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ABSTRACTS ON FIELD BEANS

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Information and conclusions reported herein do not necessarily reflect the position of any of the aforementioned entities.

Abstracts on Field Beans
(*Phaseolus vulgaris* L.)

Vol. XIII | No. 1 | April, 1988

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INTRODUCTION

This journal of analytical abstracts is designed to provide a specialized guide to the world's literature on field beans (*Phaseolus vulgaris* L.), disseminating research results and ongoing activities related to the crop.

The abstracts present condensed information from journal articles, booklets, reports, theses, manuals, and other conventional and nonconventional material, categorized into broad disciplinary fields. These are complemented with author and subject indexes to enable more comprehensive consultation.

When information is required on a specific topic, CIAT's Bean Information Center can carry out bibliographic searches of its entire document collection. As part of this service, users receive a set of abstracts of the articles related to the topic of their interest. The full text of these articles is available through the Photocopy Service of the Communication and Information Support Unit.

The Specialized Information Centers on cassava (*Manihot esculenta* Crantz) and on tropical pastures also publish abstract journals in their respective areas.

COMPONENTS OF AN ABSTRACT

Accession number (for photocpy requests)

Authors

Year of publication

Sequential number in the journal (for use of indices)

[19421 ABATE, T.; NEGASI, A. 1981. 0118 Chemical control of American bollworm (Heliothis armigera) (Hubner) with ultra-low-volume sprays. Ethiopian Journal of Agricultural Science 3(1):49-55. Engl., Sum. Engl., 11 Refs. [Inst. of Agricultural Research, P.O. Box 2003, Addis Ababa, Ethiopia]

Original title

Additional notes

Author address

Source

Pages

Language of paper

Language of summary

Phaseolus vulgaris. Injurious insects. Lepidoptera. Heliothis armigera. Insect control. Chemical control. Ethiopia.

Descriptors

Expt. consisting of ultralow vol. formulations of endosulfan (500 and 750 g a.i./ha), cypermethrin (150 g a.i./ha), fenitrothion (960 g a.i./ha), profenofos (750 g a.i./ha), and an untreated check were conducted for 2 consecutive yr against Heliothis armigera on haricot beans at the Awassa and Nazareth Expt. Stations of the Institute of Agricultural Research (IAR), Ethiopia. The treatments were replicated 5 times in a randomized complete block design on 20 x 20 m plots. Of the insecticides used, single application of cypermethrin gave a more consistent and significant control than the check in both seasons at both stations. A new product, cypermethrin/profenofos 166^{R}, substituted for fenitrothion at Nazareth in the 1980 season, gave promising results to warrant further testing. Endosulfan, a recommended insecticide against the American bollworm in the past, was not as satisfactory as cypermethrin in its control of H. armigera on haricot beans. [AS]

Abstract

Abstractor and/or translator

HOW TO USE THE INDEXES

The numbers listed under each entry in the author and subject indexes correspond to the abstract's sequential number, found above each abstract within the journal.

The last issue of the year contains cumulative author and subject indexes for the year.

Author Index

The Author Index can be used to find abstracts when the personal or corporate authors are known. The Author Index, which is alphabetically arranged, lists *all* author and co-author names cited in the publication.

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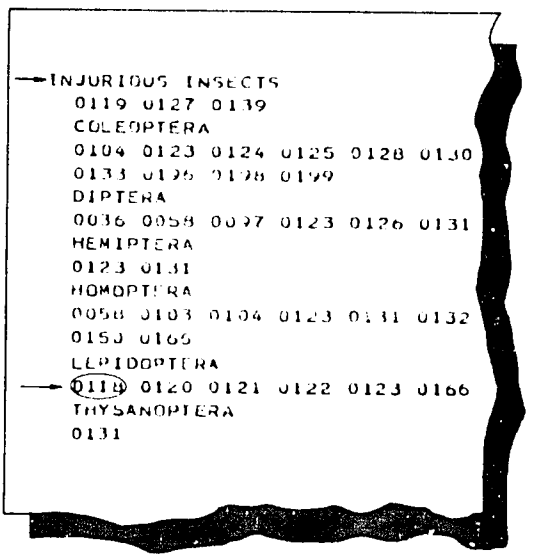
The Subject Index presents an alphabetical list of descriptors used in beans research, many of which are combined with other descriptors, allowing the identification of more specific topics.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6. UNESCO coupons, available at UNESCO offices all over the world

0001

29936 EURQUEZ, A. 1987. Leaf thickness and water deficit in plants: a tool for field studies. Journal of Experimental Botany 38(186):109-114. En., Sum. En., 19 Ref., Il. [Dept. of Applied Biology, Pembroke St., Cambridge CB2 3DX, U.K.]

Phaseolus vulgaris. Leaves. Water content. Water stress. United Kingdom.

A technique for estimating plant water deficits using a relatively inexpensive micrometer to measure leaf thickness was developed. A strong correlation was found between leaf thickness and relative water content in Brassica napus, Mirabilis jalapa, Phaseolus vulgaris, and Impatiens parviflora. Although leaf thickness at a given relative water content varied between plants, it increased linearly with leaf relative water content, the rate of change being similar in leaves of plants of the same age and species. Due to this relationship, the construction of a pressure-vol. curve makes possible the estimation of leaf water potential. In this case a calibration curve is needed for each population studied or, for the highest accuracy, for each individual. The technique is particularly useful in field conditions where other techniques are not reliable because of difficulties in controlling temp. and where nondestructive measurements are required. (AS)

0002

28810 EBELHART, C.; CLIVER, J.E.; FORCE, R.J.; SAARELAINEN, R.; MIFLIN, B.J. 1986. Primary structure and differential expression of glutamine synthetase genes in nodules, roots and leaves of Phaseolus vulgaris. European Molecular Biology Organization Journal 5(7):1429-1435. En., Sum. En., 24 Ref., Il. [Max-Planck-Inst. f. Zuchtungsforschung, 5000 Koln 30 (Vogelsang), Federal Republic of Germany]

Phaseolus vulgaris. Enzymes. Genes. DNA. Amino acids. United Kingdom.

The isolation and nucleotide sequencing of 2 essentially full-length glutamine synthetase (GS) cDNA clones (pR-1 and pR-2) from a root cDNA library and the deduced amino acid sequences of the corresponding (GS) subunits (356 amino acid residues each) are reported. The coding sequences of pR-1 and pR-2 are closely related (90 percent nucleotide homology, 88 percent amino acid homology), but their 5'- and 3'-untranslated regions have diverged almost completely. Both pR-1 and pR-2 are related to, but distinct from, the nodule GS cDNA, pelvNGS-01 (or pN-1). Hybridization to genomic Southern blots showed that the 3 GS mRNAs are encoded by 3 separate genes and indicated the existence of a 4th class of GS gene. An S1 nuclease protection assay demonstrated the presence of R-1 and R-2 mRNA in both roots and leaves and confirmed that expression of the N-1 gene is nodule-specific. Expression of the R-1 and R-2 genes in the roots did not change significantly during nodulation; however, only the R-1 gene is expressed in the nodules themselves, indicating that the R-2 gene is specifically repressed during nodule development. (AS (extract))

0003

29788 RODRIGUEZ C., M.; RODRIGUEZ T., S.; AGUILAR S., M.; DERCUCK, D.G. 1987. Phaseolus germplasm collection in Mexico. FAO/IBPGR Plant Genetic Resources Newsletter 69:30-38. En., Sum. Fr., Es., 20 Ref., Il. [Univ. Autónoma de Nuevo León, Facultad de Agronomía, Apartado Postal 358, San Nicolás de los Garza, N.L., México]

Phaseolus vulgaris. Germplasm. Mexico.

Results are given from a Phaseolus germplasm field study carried out in southern Nuevo León, Mexico: 143 samples of 8 different species. The

presence of each one of the species in this part of the country is discussed. (CIAT) See also 0170 0213

B00 PLANT ANATOMY, MORPHOLOGY AND CYTOLOGY

0004

28919 BOLWELL, G.P. 1986. Significance of a common epitope of plant and animal endomembranes. Journal of Cell Science 82:187-201. En., Sum. En., 46 Ref., Il. [Dept. of Biochemistry, Royal Holloway & Bedford Colleges, Univ. of London, Egham, Surrey TW20 0EX, England]

Phaseolus vulgaris. Analysis. Trypsin. Cytology. Biochemistry. England.

A rat monoclonal antibody that was raised against a common epitope on bean endomembranes has been shown to cross-react with microsomal polypeptides from a no. of plant and animal species. Immunoblotting has shown that the epitope is present on a large subset of polypeptides on microsomes of 5 animal species. The antigenic site appears to be accessible on intact bean membranes since it is readily digested by trypsin. The epitope is probably not derived post-translationally since the same Mr range is immunoprecipitated from polypeptides newly synthesized in vivo and in vitro. The polypeptides in bean appear to be regulated independently, one of Mr 58,000, in particular, was highly induced by treatment of suspension cultures with fungal elicitor. Preincubation of membranes enriched with endoplasmic reticulum and Golgi apparatus with the antibody blocks transfer of radioactivity from one compartment to the other in vitro. The common antigenic site could possibly be concerned in recognition or some fusion event during membrane trafficking within the cell. (AS)

0005

29752 CASTIÑEIRAS, L.; RIVERO, E.; MORENO, V. 1986. Caracterización de 17 variedades cultivadas de frijol común (Phaseolus vulgaris L.) en Cuba. 1. Organos vegetales. (Characterization of 17 cultivated common bean varieties in Cuba. 1. Plant organs). Cuba, Instituto de Investigaciones Fundamentales en Agricultura Tropical. Reporte de Investigación no.28. 15p. Es., Sum. Es., En., 5 Ref., Il.

Phaseolus vulgaris. Cultivars. Leaves. Stems. Plant habit. Plant anatomy. Cuba.

The characterization of 17 cultivated common bean var. during 2 yr is presented. The most important characters of the plant vegetative organs are described using the classifier of the Phaseolus genus. Some characters, as the shape of trifoliate leaf blade and leaf base, stem form, and growth habit, allow a major differentiation among var.; these latter 2 are of great agronomic importance. (CIAT)

0006

28683 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1986. The cultivated species of Phaseolus; audiotutorial unit. Scientific content Hidalgo, R.; Song, L.; Gepts, P.; production Fernández C., F. Cali, Colombia. 113 color slides 5 x 5 cm.; 1 cassette 34 min.; script 10p.; study guide 52p. En., Il.

Phaseolus vulgaris. Phaseolus lunatus. Phaseolus coccineus. Phaseolus acutifolius. Plant anatomy. Wild Phaseolus. Hybridizing. Plant habit. Growth. Adaptation. Colombia.

The morphological characteristics that differentiate the cultivated species of the genus Phaseolus (P. vulgaris, P. acutifolius, P. lunatus, and P. coccineus) are described. Differentiation between cultivated and wild species is included. Potential for interspecific hybridization within the

genus Phaseolus is briefly analyzed. Principal agronomic characteristics (growth habit, vegetative cycle, and adaptation) of the cultivated species are presented. (CIAT)

C007

28688 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1982. Morfología de la planta de frijol común (Phaseolus vulgaris); unidad audiotutorial. (Morphology of the bean plant; audiotutorial unit). Contenido científico Debouck, D.G.; producción Ospina O., H.F.; Flor M., C.A. 2ed. Cali, Colombia. 123 diap.; 1 cassette 36 min.; guión 16p.; guía de estudio 51p. Es., Il. También en inglés, francés.

Phaseolus vulgaris. Plant anatomy. Roots. Stems. Leaves. Inflorescences. Flowers. Seed. Plant habit. Pods. Colombia.

The structural parts of the bean plant are detailed. The different types of growth habits are highlighted, allowing the bean plants to be grouped into postrate, climbing, bush, or perennials. This information makes the identification of var. easier. (CIAT)

C008

28682 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1980. Diversidad genética de las especies cultivadas del género Phaseolus; unidad audiotutorial. (Genetic diversity of cultivated species of the Phaseolus genus; audiotutorial unit). Producción Ospina O., H.F.; asesoría científica Hidalgo, R.; Kamp, L.; Gepts, P. Cali, Colombia. 115 diap.; 2 cassettes 26 y 21 min.; guión 30p.; guía de estudio 52p. Es., Il.

Phaseolus vulgaris. Phaseolus lunatus. Phaseolus coccineus. Phaseolus acutifolius. Agronomic characters. Plant anatomy. Colombia.

The morphological characteristics of Phaseolus vulgaris, P. lunatus, P. coccineus, and P. acutifolius to allow their identification are described. Their agronomic characteristics are also mentioned, and they are grouped into perennials and annuals. Their potential use in new regions when climatic characteristics favor 1 or another species is discussed. Valuable recommendations are included on future research trends. (CIAT)

C009

28894 EAMUS, D. 1986. Further evidence in support of an interactive model in stomatal control. Journal of Experimental Botany 37(178):657-665. En., Sum. En., 35 Ref., Il. [School of Natural Resources, Univ. of the South Pacific, P.O. Box 1168, Suva, Fiji]

Phaseolus vulgaris. Stomata. CO_2. Indoleacetic acid. Plant growth substances. Temperature. Light. Fiji.

The interaction between CO_2, IAA, ABA, and temp. in the control of stomatal behavior was investigated in chill-resistant Pisum sativum and chill-hardened Phaseolus vulgaris cv. Masterpiece. Induction of stomatal closure by ABA was dependent on the presence of CO_2 in both species at 5 and 22 degrees Celsius. Similarly, decreased stomatal resistance induced by IAA was dependent in both species on CO_2 at both temp. Chilling at 5 degrees Celsius in the light did not affect the response characteristics of stomata to CO_2, ABA, or IAA in either species. These results are discussed in relation to a model of the interactions of these growth regulators of stomatal aperture. (AS)

C010

30635 HINCKS, M.J.; STANLEY, D.W. 1987. Lignification: evidence for a role in hard-to-cook beans. Journal of Food Biochemistry 11(1):41-58. En., Sum. En., 33 Ref., Il. [Dept. of Food Science, Univ. of Guelph, Guelph, Ontario, Canada, N1G2W1]

Phaseolus vulgaris. Cooking. Seed hardening. Seeds. Cell walls. Canada.

Research was conducted to establish whether lignification was a possible mechanism contributing to the hard-to-cook defect in beans. Cell wall material from control and defective beans was isolated and microscopic techniques employed to compare the 2 fractions. Transmission electron microscopy indicated that K permanganate-fixed material had heavier deposition of Mn dioxide in cell corners, secondary walls, and middle lamella of hard beans, a pattern seen during the lignification of plant tissue. Cell wall material from hard beans had a lamellated appearance not seen in the control as viewed by scanning electron microscopy. It is suggested that this is a result of cellulose deposition, a process known to occur before lignification. This tentative evidence of lignin within the cell walls of legume seeds has a host of implications for hydration during cooking, cell separation, and ultimately, texture. (AS)

0011

29624 HOSTALACIO, S.; SODEK, L.; VALIO, I.F.M. 1985 Atividade de alantoinase e asparaginase nas diferentes partes da semente de feijao (Phaseolus vulgaris L.). (Allantoinase and asparaginase activities in different parts of bean seed). Revista Brasileira de Botanica 8(1):81-85. Pt., Sum. Pt., En., 28 Ref., Il. [Depto. de Biologia, Escola Superior de Agricultura de Lavras-MG, Brasil]

Phaseolus vulgaris. Seeds. Enzymes. Cotyledons. Metabolism. Embryo. Brazil.

The activities of asparaginase and allantoinase of developing Phaseolus vulgaris seeds were investigated since these enzymes may be involved in the utilization of asparagine and allantoin. The high activities of these enzymes found in the cotyledons during seed development suggest they may play an important role in the N metabolism of these seeds. Some activity of both enzymes was also found in the seed coat and embryo axis, and asparaginase activity was particularly high in the seed coat towards the end of seed development. (AS)

0012

29606 JEFFREE, C.E.; DALE, J.E.; FRY, S.C. 1986. The genesis of intercellular spaces in developing leaves of Phaseolus vulgaris L. Protoplasma 132(1-2):90-98. En., Sum. En., 27 Ref., Il. [Dept. of Botany, King's Buildings, Mayfield Road, Edinburgh EH9 3JH, Scotland]

Phaseolus vulgaris. Leaves. Analysis. Cell division. Cell walls. Scotland.

Observations by light, transmission electron, and scanning electron microscopy have shown that intercellular spaces are formed schizogenously in expanding leaves of Phaseolus vulgaris. Intercellular spaces formation occurs in predictable positions at the junctions between 3 or more cells, and follows 3 phases of development. The 1st phase, initiation, occurs soon after cell division, and is marked by the formation of an electron-dense osmiophilic body, probably proteinaceous, at the end of the cell plate/middle lamella of the daughter cell wall and across the adjacent piece of the primary wall of the mother cell. This part of the mother cell wall is digested, involving cellulolysis. The 2nd phase, of cell separation, is marked by the 1st appearance of the intercellular spaces. In Phaseolus primary leaves this phase begins about day 3 after sowing, at which time the leaf area is about 1 square centimeter. In the final enlargement phase, lysis of cell wall material continues in the region of the middle lamella, and mechanical tensions arising from the rapid expansion of the lamina lead to further separation of the mesophyll cells so that spaces enlarge and merge. (AS)

0013

29604 KIM, S.G.; SONG, J.H.; LEE, K.W. 1982. Hormonal effect and cytokinin autonomy in callus culture of Phaseolus vulgaris L. Korean Journal of Botany 25(4):161-168. En., Sum. En., Ko., 10 Ref., Il.

Phaseolus vulgaris. Auxins. Cytokinins. Tissue culture. Korea.

The effects of the activities of auxins and cytokinins on the growth of callus tissue derived from Phaseolus vulgaris cv. Damyang were examined. The synthetic auxin, picloram, was the most effective in promoting callus growth and the range of effective concn. (0.1-32.0 micromolar) was broad. 2,4-D also enhanced callus growth at the optimal concn. of 3.2 micromolar. NAA promoted callus growth at relatively higher concn. than other auxins tested. IAA was less effective in supporting callus growth. Cytokinin bearing saturated side chain (N(6)-isopentyladenine) was approx. 30 times more active than the corresponding unsaturated compound, N(6)-(delta(2)-isopentenyl)adenine. The abilities of cytokinin-autonomous growth were also examined. Callus tissues previously grown on concn. lower and/or higher than optimal concn. of cytokinins were better situated in the subsequent passage. It was suggested that the development of cytokinin autonomy may be related to dosage concn. of cytokinin in the previous passage. (AS)

0014

28297 MARECHAL, L.; GUILLEMAUT, P.; GRIENENBERGER, J.M.; JEANNIN, G.; WEIL, J.H. 1986. Sequences of initiator and elongator methionine tRNAs in bean mitochondria. Localization of the corresponding genes on maize and wheat mitochondrial genomes. Plant Molecular Biology 7(4):245-253. En., Sum. En., 31 Ref., Il. [Inst. de Biologie Moléculaire et Cellulaire, Univ. Louis Pasteur, 15 Rue Descartes, 67084 Strasbourg Cedex, France]

Phaseolus vulgaris. Mitochondria. Genes. RNA. Methionine. France.

Two bean mitochondria met. transfer RNAs, purified by RPC-5 chromatography and 2-dimensional gel electrophoresis, have been sequenced using in vitro postlabeling techniques. One of these tRNAs(Met) has been identified by formylation using an Escherichia coli enzyme as the mitochondrial tRNA(Met)F. Bean mitochondrial tRNA(Met)F and tRNA(Met)m were hybridized to Southern blots of the mitochondrial genomes of wheat and maize, whose maps have been recently published, to locate the position of their genes. (AS (extract))

0015

29657 MARECHAL, L.; GUILLEMAUT, P.; GRIENENBERGER, J.M.; JEANNIN, G.; WEIL, J.H. 1985. Structure of bean mitochondrial tRNA(Phe) and localization of the tRNA(Phe) gene on the mitochondrial genomes of maize and wheat. Febs Letters 184(2):289-293. En., Sum. En., 25 Ref., Il. [Inst. de Biologie Moléculaire et Cellulaire, Université Louis Pasteur, 15 Rue Descartes, 67084 Strasbourg Cedex, France]

Phaseolus vulgaris. Mitochondria. RNA. Analysis. Laboratory experiments. Chloroplasts. Genes. France.

Bean mitochondrial tRNA(Phe), purified by RPC-5 chromatography and 2-dimensional gel electrophoresis, has been sequenced using in vitro postlabeling techniques. It is the 1st plant mitochondrial tRNA sequenced. It shows 76 percent homology with bean chloroplast tRNA(Phe) and has many features characteristic of prokaryotic tRNA(Phe). It was used as a probe to localize the tRNA(Phe) gene on the mitochondrial genomes of maize and wheat. (AS)

0016

28650 MUSATENKO, L.I.; PUSHKAREV, V.M.; GALKIN, A.P. 1984. Biogenesis of ribonucleoprotein particles of cytoplasm of embryonic axis cells in initial

stages of bean seed germination. Biochemistry 49(10 pt.1):1362-1367. En., Sum. En., 16 Ref., Il.

Phaseolus vulgaris. Embryo (plant). Germination. Cytology. Proteins. RNA.

Fractionation in a CsCl density gradient of EDTA-dissociated and formaldehyde-fixed RNP particles from the cytoplasm of embryonic axis cells, labeled in vivo for 1 h with ((3)H)uridine in the earliest stages of bean seed germination (1-3 h) under conditions of cycloheximide-blocked translation, showed that in the absence of protein synthesis newly formed ribosomes do not enter the cytoplasm either in the 1st or 3rd h of germination; however, the uptake of newly synthesized mRNPs is retained, although at a level constituting 50 percent of the control level. The role of the products (proteins) of cytoplasmic protein synthesis in biogenesis in the nuclei and the entry of ribosomes and informosomes into the cytoplasm of embryonic axis cells in the initial periods of bean seed germination is discussed. (AS)

0017

29747 TAPIA E., H. 1987. Variedades mejoradas de frijol Phaseolus vulgaris L. con grano rojo para Nicaragua. (Improved red bean varieties for Nicaragua). Managua, Nicaragua, Instituto Superior de Ciencias Agropecuarias, Dirección de Investigación y Postgrado. 27p. Es., 30 Ref., Il.

Phaseolus vulgaris. Cultivars. Plant anatomy. Yields. Yield components. Fertilizers. P. Intercropping. Zea mays. Organoleptic properties. Resistance. Pythium. Rhizoctonia solani. Isariopsis griseola. Uromyces phaseoli. Colletotrichum lindemuthianum. Xanthomonas campestris pv. phaseoli. Bean common mosaic virus. Nicaragua.

Detailed information is given on genotypic composition, plant morphology, yield and yield components, phenotypic stability, consistency, productive capacity, response to P fertilization, response to associated cropping with maize, disease resistance, organoleptic characteristics, and prospects for commercial production for improved bean var. Revolución-79, Revolución-79A, Revolución-81, Revolución-82, Revolución-83, Revolución-83A, Revolución-84, Revolución-84A, and Revolución-85 for Nicaragua. P rates required by these var. vary between 30-120 Kg/ha, Revolución-84 being the least demanding. The best performers in association with maize are Revolución-79 and 85. Disease reactions (susceptibility, tolerance, resistance) are given for each var. regarding the following causal agents: Pythium sp., Thanatephorus cucumeris, Isariopsis griseola, Uromyces phaseoli, Colletotrichum lindemuthianum, Xanthomonas campestris pv. phaseoli, and BCMV. Recommended production sites in Nicaragua are listed for each var. and a list is included of improved bean var. to be released. (CIAT)

0018

29648 FASUI, T. 1985. Variation in low molecular weight carbohydrate composition of Phaseolus vulgaris seeds. Phytochemistry 24(6):1241-1244. En., Sum. En., 6 Ref., Il. [National Food Research Inst., Ministry of Agriculture, Forestry & Fisheries, 1-2, Kan-nondai 2-chome, Yatabe-machi, Tsukuba-gun, Ibaraki 305, Japan]

Phaseolus vulgaris. Seeds. Carbohydrate content. Analysis. Wild Phaseolus. Japan.

Variations in the low Mr carbohydrate composition were observed in wild forms of common bean seed. In 4 of 23 samples, verbascose content in the seeds was quite high and the ratio verbascose:stachyose was more than 1.0. This type of carbohydrate composition was named type A, and has a much higher verbascose content and lower galactinol and stachyose content than

the rest of the wild forms, named type B. Although the total and individual carbohydrate content, with the exception of the verbascose content, of the cultivated forms of the common bean were higher than those of wild forms, the carbohydrate composition of the cultivated forms was essentially similar to type B of the wild forms. This carbohydrate composition was considered to be basic to the species. (AS) See also 0098 0129 0213

C00 PLANT PHYSIOLOGY

0019

29665 BACCI, E.; GAGGI, C. 1986. Chlorinated pesticides and plant foliage: translocation experiments. Bulletin of Environmental Contamination and Toxicology 37(6):850-857. En., 20 Ref. [Dipartimento di Biologia Ambientale, Universita di Siena, Via delle Cerchia 3, 53100 Siena, Italy]

Phaseolus vulgaris. Insecticides. Plant assimilation. Translocation. Italy.

The significance of root uptake (translocation) in the determination of foliar levels of hexachlorobenzene (HCB), alpha- and lambda-hexachlorocyclohexane (HCH), p,p'DDT, and p,p'DDE was studied using beans as a test plant grown in glass boxes containing clean or contaminated (250 mg/kg sand) sand. Leaf samples were taken for analysis at 7, 14, 21, and 60 days. Air analyses were also conducted. The concn. of HCB, alpha- and lambda-HCH, p,p'DDT, and DDE in the control bean plants after 60 days of treatment were always lower than 20 ng/g dry wt. The results indicated that the foliar levels of the tested chlorinated pesticides are not significantly dependent on the contamination level of the soil. Probably the mobility of these contaminants through the root is very slight; therefore, levels found in bean foliage are mainly due to the vapor uptake from the contaminated air of the glass boxes. (CTAT)

0020

29703 BREEN, P.J.; HESKETH, J.D.; PETERS, D.B. 1986. Field measurements of leaf photosynthesis of C3 and C4 species under high irradiance and enriched CO2. Photosynthetica 20(3):281-285. En., Sum. En., 11 Ref., Il. [Dept. of Horticulture, Oregon State Univ., Corvallis, OR 97331, USA]

Phaseolus vulgaris. Photosynthesis. CO2. Growth. Solar radiation. Leaves. Analysis. USA.

Leaf net photosynthetic CO2 exchange rates were measured on field-grown C3 (Glycine max, Gossypium hirsutum, Helianthus annuus, Phaseolus vulgaris, and Vigna unguiculata) and C4 (Amaranthus hybridus) dicotyledonous species at available sunlight, available sunlight plus an additional 1000 micromol (photon)/square meter/s at the bottom surface of the leaf, and in CO2 air mixtures of 370, 760, 1500, and 3000 cubic centimeters/cubic meter. Three kinds of leaf net photosynthetic exchange rates:CO2 responses were encountered: (1) hyperbolic up to 3000 cubic centimeters/cubic meter, (2) hyperbolic up to 1500 cubic centimeters/cubic meter, with less than predicted leaf net photosynthetic exchange rates at 3000 cubic centimeters/cubic meter, and (3) almost no response between 370-3000 cubic centimeters/cubic meter CO2 in air. The shapes of these response curves varied with growth stage. In general, leaves of all C3 species approached the same CO2 and radiant energy saturated leaf net photosynthetic exchange rates value of 70-75 micromol CO2 square meter/s, but some required higher CO2 concn. than others before such rates were attained. (AS)

0021

29978 CARRERAS, M.; BARTRONS, R.; CLIMENT, F.; CARRERAS, J. 1986. Effects of fructose 2,6-bisphosphate on phosphoglucomutase from plants. Plant Physiology 82(2):619-621. En., Sum. En., 14 Ref., Il. [Depto. de

Bioquímica, Facultad de Medicina, Univ. de Barcelona, Casanova 143, 08036-Barcelona, España]

Phaseolus vulgaris. Enzymes. Biochemistry. Spain.

An expt. was undertaken to clarify the different effects of fructose 2,6-bisphosphate reported on the enzymic activity of phosphoglucomutase from plant (pea, string bean, and potato) and from animal sources. Fructos 2,6-bisphosphate could not substitute for glucose 1,6-bisphosphate as a cofactor in the reaction catalyzed by phosphoglucomutase from all 3 plant sources. Activation of phosphoglucomutase from plant sources by fructose 2,6-bisphosphate reported by others was probably due to contamination of the commercial preparation of fructose 2,6-bisphosphate by glucose 1,6-bisphosphate. (AS)

0022

29972 CORNIC, G.; FARGHORGIOU, I.; LOUASON, C. 1987. Effect of a rapid and a slow drought cycle followed by rehydration on stomatal and non-stomatal components of leaf photosynthesis in Phaseolus vulgaris L. Journal of Plant Physiology 126(4-5):309-318. En., Sum. En., 20 Ref., Il. [Inst. de Physiologie Végétale, C.N.R.S., 91190, Gif-sur-Ivette, France]

Phaseolus vulgaris. Drought. CO2. Plant assimilation. Photosynthesis. Stomata. France.

CO2 assimilation of leaves of kidney bean submitted to either a rapid (4 days) or a slow (8 days) drought cycle was measured. As the daily net photosynthesis showed great variations during dehydration, only the max. daily net photosynthesis and stomatal conductance were studied. The max. daily net photosynthesis decline during the 1st 3 days of the rapid drought cycle was due to stomatal closure, but on the last day of the rapid drought cycle and during the slow drought cycle it was due both to stomatal closure and inhibition of mesophyll activity; however, the decline in leaf photosynthesis which was observed each day along the light period during dehydration both on plants submitted to a rapid and a slow drought cycle was largely due to a nonstomatal inhibition. Leaf photosynthesis increased rapidly upon rehydration. It was shown that nonstomatal components of leaf photosynthesis recovered faster than the stomatal component. Photosystems I and II reaction centers were not affected by dehydration. (AS)

0023

29995 GUYE, M.G.; VIGH, L.; WILSON, J.M. 1987. Chilling-induced ethylene production in relation to chill-sensitivity in Phaseolus spp. Journal of Experimental Botany 38(189):680-690. En., Sum. En., 26 Ref., Il. [School of Plant Biology, Univ. College of North Wales, Bangor, Gwynedd LL 57 2UW, United Kingdom]

Phaseolus vulgaris. Leaves. Ethylene production. Snap beans. Cultivars. Temperature. France.

Ethylene production from the primary leaves of 6 Phaseolus cv. (among them, dwarf French bean cv. 222, 251, and Tendergreen), known to differ in chill-sensitivity, was monitored at 23 degrees Celsius following chilling of whole plants at 5 degrees Celsius for 24 h. The more chill-tolerant cv. produced greater amounts of chilling-induced ethylene than the chill-sensitive cv. The onset of max. ethylene production rates and the following decline in rates was more rapid in chill-tolerant cv. This pattern of ethylene production was also similar when chill-tolerance was chemically enhanced by choline treatment. The low levels of ethylene production in chill-sensitive genotypes was also reflected by their poor ability to convert the exogenously applied ethylene precursor, 1-aminocyclopropane-1-carboxylic acid (ACC), to ethylene. Moderate levels of leaf water deficit induced by chilling chill-tolerant cv. and choline-treated plants appeared to stimulate chilling-induced ethylene

production. High levels of leaf wilt, shown by more chill-sensitive cv., reduced this stimulatory effect. Ethylene production was slightly greater when warming was carried out in the light rather than in the dark. (AS)

0024

29954 GUYE, M.G.; VIGH, L.; WILSON, J.M. 1987. Recovery after chilling: an assessment of chill-tolerance in Phaseolus spp. Journal of Experimental Botany 38(189):691-701. En., Sum. En., 35 Ref. [School of Plant Biology, Univ. College of North Wales, Bangor, Gwynedd LL 57 2UW, United Kingdom]

Phaseolus vulgaris. Phaseolus coccineus. Phaseolus aureus. Leaves. Temperature. Resistance. Genotypes. Cultivars.

The chill sensitivity of 2 Phaseolus species (8 cv.) was assessed by measuring 5 different physiological parameters (leaf pigment loss, leaf diffusion resistance, RGR recovery, change in leaf water content, and severity of leaf necrosis) on return to the warmth (23/18 degrees Celsius), following a brief but severe chilling treatment (24 h at 5 degrees Celsius). In this way the genotypes could be ranked in order of increasing chill sensitivity as follows: P. coccineus cv. Prizewinner and Streamline, P. vulgaris cv. 251 less than P. vulgaris cv. 194, 222, and Seafarer less than P. vulgaris cv. Tenderegreen less than P. aureus cv. Berken. (AS)

0025

29700 HOREMANS, S.; VAN ONCKELEN, H.A.; DE GREEF, J.A. 1986. Longitudinal gradients of indole-3-acetic acid and abscisic acid in the hypocotyl of etiolated bean seedlings. Journal of Experimental Botany 37(183):1525-1532. En., Sum. En., 22 Ref., Il. [Univ. of Antwerpen, UIA, Dept. of Biology, Universiteitsplein 1, B-2610 Wilrijk, Belgium]

Phaseolus vulgaris. Hypocotyl. Indoleacetic acid. Analysis. Protein content. Belgium.

The endogenous conc. of ABA and IAA along the hypocotyl of 5-day-old etiolated Phaseolus vulgaris cv. Limburg seedlings, grown in the dark, were measured. IAA was analyzed by the 2-methyl-indole-alpha-pyrone assay (2-MII) and ABA by electron capture gas chromatography. Length and width of the inner parenchyma cells, growth rate, and protein content were also measured. Cell expansion occurred predominantly in a region 20 mm below the center of the hook where elongation rate was max. and where protein conc. decreased rapidly with distance from the hook. The ABA:IAA ratio was constant along the length of the hypocotyl. On a fresh wt. basis the conc. of both growth substances was maximal in the upper (youngest) part, decreased in slightly older sections where cell expansion was proceeding, and was smallest in the basal regions where cell expansion was complete; however, when expressed on a protein basis the conc. gradient of the hormones was the reverse of that described on a fresh wt. basis. (AZ)

0026

29950 KELLY, P.; TREWAVAS, A.J.; LEWIS, L.N.; DURBIN, M.L.; SEXTON, R. 1987. Translatable mRNA changes in ethylene induced abscission zones of Phaseolus vulgaris (Red Kidney). Plant, Cell and Environment 10(1):11-16. En., Sum. En., 31 Ref., Il. [Biosecot Ltd, Kings' Buildings, West Mains Road, Edinburgh EH9, 3JF, United Kingdom]

Phaseolus vulgaris. RNA. Analysis. Enzymes. Leaves. United Kingdom.

The wheat germ translation system was programmed with soluble RNA extracted from foliar abscission zones of Phaseolus vulgaris. These extracts were taken at various times after the induction of abscission. A translation product with a mol. wt. of 42 kilodaltons was only present after this treatment, though 3 other species of 32, 27, and 17 kilodaltons increased substantially. The isozyme of cellulase with a pI of 9.5 could not be

conclusively identified among the products, though the 32 kilodaltons protein is probably chitinase. Comparison of the abscission zone translatable RNA with that from adjacent petiole and stem tissues showed the 17 kilodaltons protein developed in all these locations. The 42, 32, and 27 kilodaltons bands were found predominantly in the abscission zone and petiole. (AS)

0027

28911 SHARKEY, T.D.; SEEMANN, J.R.; PEARCY, R.W. 1986. Contribution of metabolites of photosynthesis to postillumination CO2 assimilation in response to lightflecks. Plant Physiology 82(4):1063-1068. En., Sum. En., 17 Ref., Il. [Biological Sciences Center, Desert Research Inst., P.O. Box 60220, Reno, NV 89506, USA]

Phaseolus vulgaris. Photosynthesis. CO2. Light. Shading. ATP. USA.

In the shade plant Alocasia macrorrhiza grown in low light, it was found that the pool of triose-P was much larger than that of ribulose 1,5-bisphosphate (RuBP) and could account for 5 times more postillumination CO2 assimilation than could RuBP. The same trend was seen in the sun plant Phaseolus vulgaris when it was grown in the shade. In contrast, sun-grown Alocasia and Phaseolus did not have a large pool of triose-P relative to RuBP following a lightfleck. In sun plants, carbon may rapidly be converted to RuBP in the light whereas in shade plants there may be a restriction in the path between the triose-P and RuBP pools. It is hypothesized that in shade plants the buildup of triose-P rather than RuBP during the lightfleck prevents inhibition of electron transport which may otherwise occur because of competition for ATP between the 2 kinases of the photosynthetic carbon reduction cycle. Utilization of the triose-P for postillumination CO2 fixation would require the capacity for significant postillumination ATP synthesis. The extensive grana stacking and large intrathylakoid space, which accompanies the high level of chlorophyll in low light-grown Alocasia, could be an important contributing factor to postillumination ATP formation. (AS (extract))

0028

29150 VELISEK, J.; DAVIDEK, J.; MNUKOVA, J.; PISTEK, T. 1986. Gas chromatographic determination of thiamin in foods. Journal of Micronutrient Analysis 2(2):73-80. En., Sum. En., 11 Ref., Il. [Dept. of Food Chemistry & Analysis, Inst. of Chemical Technology, Suchbátorova 5, 16628 Prague 6, Czechoslovakia]

Phaseolus vulgaris. Thiamin. Analysis. Laboratory experiments. Czechoslovakia.

A gas chromatographic method has been developed for the determination of thiamin (vitamin B1) in foods, among them White beans. The method involves acidic and enzymic hydrolysis of the sample. Thiamin in the hydrolysate is cleaved by sulphite, the resulting 5-(2'-hydroxyethyl)-4-methylthiazole extracted, and the concentrated extract analyzed by GLC using a flame-photometric detector. The procedure was tested by analyzing 6 different foods of animal and vegetable origin and the results were compared with those obtained by the commonly used fluorimetric (thiochrome) method. It is hoped that the introduced method will become a valuable, rapid, routine, and widely accepted technique for the determination of thiamin in foods. Thiamin content obtained in white beans was 4.14 and 5.05 with the gas chromatographic and the thiochrome methods, resp. (AS)

0029

29622 WATTS, J.E.; DE VILLIERS, O.T. 1986. The effect of 2,4,5-TP on the activity of cellulase, pectin methylesterase and polygalacturonase in bean explants. South African Journal of Botany 52(3):241-245. En., Sum. En.,

Af., 27 Ref., Il. [Dept. of Botany, Univ. of Stellenbosch, Stellenbosch, 7600 Republic of South Africa]

Phaseolus vulgaris. Abscission. Enzymes. Petioles. South Africa.

Bean explants were used as a model system to study the effect of 2-(2,4,5-trichlorophenoxy) propionic acid (2,4,5-TP) on certain enzymes which are involved in abscission. An increase in cellulase activity in pulvini, petioles, and abscission zones during the course of abscission was significantly inhibited by 2,4,5-TP. During abscission the gradient of pectin methylesterase activity in control explants decreased significantly, but 2,4,5-TP maintained this gradient by increasing pectin methylesterase activity in abscission zones and maintaining it in pulvini and petioles. The activity of exopolygalacturonase was not affected by 2,4,5-TP; however, the activity of endo-polygalacturonase increased from zero to a max. in control explants, with 2,4,5-TP maintaining the activity at zero. 2,4,5-TP was found to prevent abscission in bean explants by maintaining a form(s) of pectin constituting a more rigid complex in middle lamellae. (AS) See also 0013 0125 0213

C01 Plant Nutrition

0030

29702 BARCELO, J.; GUNSE, B.; POSCHENRIEDER, C. 1986. Chlorophyll and carotenoid contents of Phaseolus vulgaris L. in relation to mineral nutrition disorders induced by chromium VI supply. Photosynthetica 20(3):249-255. En., Sum. En., 23 Ref., Il. [Depto. de Fisiología Vegetal, Facultad de Ciencias, Univ. Autónoma de Barcelona, Bellaterra, España]

Phaseolus vulgaris. Chlorophyll. Leaves. Mineral content. Micronutrients. Cr. Fe. Zn. Nutrient uptake. Spain.

The contents of chlorophyll a and b, total carotenoids, and micronutrients of primary and 1st trifoliate leaves of bush bean cv. Contender plants grown with normal nutrient supply or with Cr VI-containing nutrient solution were determined. Only in trifoliate, but not in primary, leaves was there a good negative linear relation between the chlorophyll or total carotenoid contents and the Cr content. High correlation coefficients were also obtained between the contents of pigments and Fe or Zn. Cr-induced inhibition of Fe and Zn transport may cause Cr VI-induced chlorosis. (AS)

0031

29704 FENN, L.B.; TAYLOR, R.M.; HORST, G.L. 1987. Phaseolus vulgaris growth in an ammonium-based nutrient solution with variable calcium. Agronomy Journal 79(1):89-91. En., Sum. En., 23 Ref. [Texas A & M Univ., Agric. Res. and Ext. Ctr., El Paso, TX 79927, USA]

Phaseolus vulgaris. Nutrient uptake. Ca. K. N. Growth. Nutrient solution. USA.

A study was designed to determine whether Ca stimulates NH4 absorption by plants. Greenhouse expt. were conducted with Phaseolus vulgaris (Great White Northern bean) in quartz sand with 5 percent CaCO3 to determine the effects of variable Ca concn. on plant growth in an NH4-based nutrient solution. Ammonium absorption increased with increasing Ca to 13 mmol/liter, as indicated by decreasing NH4 concn. in the leachate, and increased plant growth. Tissue N was unchanged as solution Ca concn. increased. K accumulation in the plant behaved much like N, whereas the Ca level increased with increasing solution Ca concn. (AS (extract))

0032

29721 SLAMA, F. 1986. Effect du chlorure de sodium sur la croissance et la nutrition minérale de six especes de plantes cultivées. (Effect of sodium chloride on the growth and mineral nutrition of six species of crop plants). Agronomie Tropicale 41(1):21-26. Fr., Sum. Fr., En., Es., 25 Ref., Il. [INAT, 43, Avenue Charles Nicolle, 1002 Tunis, Tunisie)]

Phaseolus vulgaris. Nutrient uptake. Na. Cl. Growth. Nutrient solution. Leaves. Stems. Roots. Salinity. Tunisia.

The effect of salt on the growth and mineral nutrition of plants was studied. Six plant species (among them beans), each represented by 2 var., were cultivated in water culture under controlled conditions, in the absence or presence of 3 g NaCl/liter. Results showed that beans accumulated little or no NaCl in the leaves (exclusive plants). The exclusive (no accumulation) or inclusive (accumulation) character of Na in the leaves was insufficient to assess the sensibility or the tolerance of the var. to NaCl. The exclusive character did not appear in the stems, which accumulated more Na than the roots. The reduction by Cl of anions, other than the Cl provisioning of the leaves, appeared to be a sensible criterion to classify plants according to their tolerance to salt. (AS)

0033

28939 SLAMA, F. 1986. Intervention des racines dans la sensibilité ou la tolérance a NaCl de plantes cultivées. (Involvement of roots in NaCl tolerance and sensitivity of cultivated plants). Agronomie 6(7):651-658. En., Sum. Fr., En., 34 Ref., Il. [Inst. National Agronomique, Laboratoire d'Agronomie, 43, Avenue Charles-Nicolle, 1002 Tunis, Tunisie]

Phaseolus vulgaris. Growth. Na. Cl. Roots. Resistance. Leaves. Translocation. Shoots. Nutrient transport. Tunisia.

Growth in water culture and Na(+) and Cl(-) distribution were studied in plants of Phaseolus vulgaris, Cucurbita sp., sunflowers, maize, Cucumis melo, and cotton differing in their resistance to NaCl. Several features of Na(+) distribution seemed to be associated with the edaphic status of the plants. Only the tolerant species and cv. accumulated Na(+) in their leaves. Various treatments were used to specify the involvements of roots in these behaviors (KCN in the media, root cooling, lowering the air humidity, or time-limited NaCl applications). The general conclusion was that the roots of sensitive plants were less effective than those of tolerant plants in transporting Na(+) into the xylem, and more effective in accumulating Na(+) in their tissues. These properties could not explain Na(+) exclusion from leaves in long-duration NaCl treatments. It was concluded that the difference between includer and excluder behavior resulted rather from the recirculation of Na(+) from shoots to roots in sensitive plants. (AC) See also 0044 0083

C02 Plant Development

0034

29686 BECKER, T.W.; HOPPE, M.; FOCK, H.P. 1986. Evidence for the participation of dissimilatory processes in maintaining high carbon fluxes through the photosynthetic carbon reduction and oxidation cycles in water stressed Phaseolus leaves. Photosynthetica 20(2):153-157. En., Sum. En., 15 Ref. [Fachbereich Biologie der Universitat, Postfach 3049, D-6750 Kaiserslautern, F.R.G]

Phaseolus vulgaris. Water stress. Leaves. Photosynthesis. Flowering. Enzymes. Chloroplasts. Federal Republic of Germany.

Water stress accelerated the development of Phaseolus vulgaris. This was expressed by the premature development of flowers and the subsequent production of small fruits. The activities of NADH-3-phosphoglycerate dehydrogenase, glutamine synthetase, and glutamate synthase decreased by about 25-30 percent when the leaf water potential dropped to -1.24 MPa, while the activity of NAD-malate dehydrogenase remained unaffected by water stress and the activity of nicotinamide adenine dinucleotide phosphate-glucose-6-phosphate dehydrogenase increased by about 133 percent. The decrease in the activities of some enzymes during the stress period was related to the concomitant net loss of soluble protein. The strong increase in the activity of nicotinamide adenine dinucleotide phosphate-glucose-6-phosphate dehydrogenase may be due to a function of this enzyme in the dissimilatory process leading to the almost complete degradation of the chloroplast starch during water stress. Significant changes in the content of chlorophyll and the chlorophyll a:b ratio occurred only at severe stress (leaf water potential of -1.24 MPa). While the photosynthetic performance of medium stressed leaves (leaf water potential of -0.7 to -1.0 MPa) recovered almost completely after rewatering, severely stressed leaves died or recovered by not more than 40 percent. (AS)

0035

29971 CASTREGANA, M.C.; SERRA, M.T.; RODRIGUEZ, J.F.; TEJERINA, C. 1987. Distribution of lectin during the life cycle of Phaseolus vulgaris L. Plant Science 48(2):79-88. En., Sum. En., 22 Ref., Il. [Centro de Investigaciones Biológicas, CSIC Velazquez 144, 28006, Madrid, Spain]

Phaseolus vulgaris. Seeds. Seedling. Developmental stages. Lectins. Composition. Spain.

Phaseolus vulgaris cv. Garrafal Encarnada plants were used to study the distribution of lectins accumulated in the seeds and throughout the life cycle of the plant. The distribution of both total proteins and lectins was studied in aqueous and saline (1 molar NaCl) extracts from different parts and organs in 4 distinct stages of plant development (small seedling, plant with 1st trifoliate leaves, plant in preflowering state, and mature plant with fruit). Lectin conen. decreased sharply during the 1st week of plant growth, reaching the lowest value in the trifoliate leaf stage and increasing during the following phases of plant development. The presence of lectins, however, was detected in all the plant tissues throughout every phase of the life cycle. The differences observed in lectin levels (radioimmunoassay) and lectin activity (hemagglutination) indicate the presence of different molecular forms of the lectin in aqueous and saline extracts of plant tissues. These results, as well as the observations on the fixation of lectin on the bacterial surface, support the idea that the function of lectins in the plant may not be limited to storage proteins, but may be involved in specific host-parasite recognition. (AS)

0036

29974 CASTRO, P.R.C.; CARRER, E.; COLMENAREZ, F.V.; SILVA, A.A.; ALMEIDA, C.V. 1985. Acao de estimulantes vegetais no comportamento do feijoeiro (Phaseolus vulgaris L. cv. Goiano Precoce). (Action of plant stimulants on behavior of bean cv. Goiano Precoce). Anais da Escola Superior de Agricultura Luiz de Queiroz 42(1):15-28. Pt., Sum. Pt., En., 12 Ref., Il.

Phaseolus vulgaris. Plant growth substances. Yield components. Brazil.

The effects of mepiquat chloride, Atonik, Ergostim, and Cytozyme application on the behavior of bean cv. Goiano Precoce were studied under greenhouse conditions. Beans were planted in pots and mepiquat chloride and Atonik (1.0 liter/ha), Ergostim (0.5 liter/ha) and Cytozyme (2.0 liters/ha) were applied 30 days after sowing. Ergostim promoted growth and tended to increase the no. of pods and seeds, and reduced the

ratio between DM wt. of vegetative and reproductive parts. Mepiquat chloride tended to increase the no. of pods, the ratio between DM wt. of vegetative and reproductive parts, and seed protein level. Atonik and Cytozyme did not promote changes in the parameters studied. (AS)

0037

28686 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1982. Etapas de desarrollo de la planta de frijol común; unidad audiotutorial. [Developmental stages of the bean plant; audiotutorial unit). Contenido científico Fernández O., F.; Gepts, P.; López, M.; producción Ospina O., H.F.; colaboración Hidalgo, R. Cali, Colombia. 76 diap.; 1 cassette 27 min.; guion 11p.; guía de estudio 26p. Es., Il. También en inglés, francés.

Phaseolus vulgaris. Germination. Emergence. Flowering. Podding. Maturation. Colombia.

The developmental stages of the bean plant (germination, emergence, trifoliate leaf, preflowering, flowering, podding and pod fill, and maturity) are described in detail. The effect of var. differences or of environmental variations on the duration of each stage was analyzed. Improved crop management is feasible with information available to identify the different developmental stages; this constitutes a valuable tool for the researcher in the assessment of var. (CIAT)

0038

29973 CLIFFORD, P.E.; OFFLER, C.E.; PATRICK, J.W. 1987. Injection of growth regulators into seeds growing in situ on plants of Phaseolus vulgaris with a double-fruit sink system. Canadian Journal of Botany 65(3):612-615. En., Sum. En., Fr., 29 Ref., Il. [Botany Dept., Queen's Univ. of Belfast, Belfast BT7 1NN, Northern Ireland]

Phaseolus vulgaris. Plant growth substances. Seeds. Australia.

An injection procedure to deliver growth substance solutions continuously to developing seeds of dwarf bean plants for periods of up to 10 days with min. damage to seed development is described. Its use in conjunction with exptl. plants having a double-fruit sink system enabled a comparison for any growth substance effect within the plant. It was demonstrated that supply of BAI (0.0001 molar) and ABA (0.00001 molar) singly or in combination to seeds increased seed dry wt. significantly but only in plants that were defoliated severely beforehand. (AS)

0039

29170 KAHNT, G.; HIJAZI, L.A.; MAC, M. 1986. Effect of homogenous and heterogenous soil compaction on shoot and root growth of field bean and soybean. Zeitschrift fur Acker-und Pflanzenbau 157(2):105-113. En., Sum. En., De., 17 Ref., Il. [Inst. fur Ackerund Pflanzenbau der Univ. Hohenheim, Fruwirthstr. 23, D-7000 Stuttgart 70, Federal Republic of Germany]

Phaseolus vulgaris. Soil compaction. Laboratory experiments. Growth. Shoots. Roots. Yields. Dry matter. Federal Republic of Germany.

The effects of soil compaction on field bean and soybean growth in the greenhouse were studied. Plastic cylindrical tubes of 58 cm height and 12 cm diameter were filled with silty loam soil with 3 bulk densities i.e., low, medium, and high (1.25, 1.45, and 1.65 g/cubic centimeter, resp.) either separately or in combination of low/medium (level 1), low/high (level 2), and medium/high (level 3) as topsoil and subsoil densities. The general effect of compaction was a reduction in shoot and root growth and in yield of both the legumes; the probable reason seemed to be mechanical impedance. At homogeneous compaction throughout the soil profile, high bulk density decreased the root DM from 6 to 37 percent and total root

length from 30 to 57 percent, but total root vol. was not much affected due to thickening of the roots. From 4 to 31 percent reductions were also observed in shoot DM. Increase in only subsoil density from medium to high (level 2) decreased shoot and root DM (8-36 percent and 16-39 percent, resp.) but not the total root length. Plant growth was more hampered when both top and subsoil densities were increased (level 3) but the total root length was not highly affected in the upper (0-20 cm) and middle (20-40 cm) layers. (AS)

0040

28818 LOPES, N.F.; OLIVA, M.A.; CARDOSO, M.J.; GOMES, M.M.S.; SOUZA, V.F. DE 1986. Crescimento e conversao da energia solar em Phaseolus vulgaris L. submetido a tres densidades de fluxo radiante e dois regimes hídricos. (Growth and solar energy conversion in Phaseolus vulgaris under three light flux densities and two water regimes). Revista Ceres 33(186):142-164. Pt., Sum. Pt., En., 36 Ref., Il. [Depto. de Biología Vegetal da Univ. Federal de Vicosa, 36.570 Vicosa-MG, Brasil]

Phaseolus vulgaris. Growth. Light. Water stress. Solar radiation. Dry matter. Plant assimilation. Shading. Plant habit. Brazil.

Growth analysis and evaluation of solar energy efficiency conversion were studied in Phaseolus vulgaris cv. Negrito 897, under 3 light levels (30, 62, and 100 percent of sunlight) and 2 water conditions (-0.03 and -1.00 MPa) in the greenhouse. The plants were harvested at 10-day intervals. Max. rates of DM production were 0.41, 0.56, and 0.51, recorded at 36, 34, and 31 days, and 0.11, 0.09, and 0.08 g/pot/day, registered at 15, 24, and 30 days after emergence, in order of increasing light level under field capacity and water deficit, resp. Differences in CGR for all treatments were due mainly to the values of the NAR. Water deficit shortened the life cycle of the plants grown under full sunlight. Water stress reduced CGR for all light treatments. Max. efficiency of solar energy conversion was 2.8 percent for shading (70 percent of light cut off) and nonwater-stressed plants. The av. efficiency of solar energy conversion throughout the entire crop cycle was 0.21, 0.31, and 0.64 with soil at field capacity and 0.03, 0.08, and 0.17 percent under water stress conditions, in order of decreasing light level. The av. efficiency of solar energy conversion in water-stressed plants was markedly reduced, being 14.3, 25.8, and 26.6 percent of the values obtained when plants were grown in soil under field capacity conditions. Plant growth habits changed from type II to type III with shading. Bean plants showed a high plasticity to light level but low adaptability to severe water stress. (AS (extract))

0041

28913 MOROT-GAUDRY, J.F.; FARINEAU, J.; LELANDAIS, M.; MOUTOT, F.; POWLES, S.; CORNIC, G. 1986. Photoinhibition in leaves of Phaseolus vulgaris: metabolic approach. Physiologie Végétale 24(5):541-549. En., Sum. En., Fr., 21 Ref., Il. [Laboratoire du Métabolisme et de la Nutrition des Plantes, Inst. Nationale de Recherches Agronomiques, Route de St.-Cyr, 78000 Versailles, France]

Phaseolus vulgaris. Photosynthesis. Leaves. CO_2. O_2. Illumination. France.

Attached leaflets of Phaseolus vulgaris were illuminated at 1200 micromol/square meter/s for 3 h in an atm. devoid of CO_2 and with low O_2 (99 percent N_2 and 1 percent O_2). This treatment resulted in a reversible 50-60 percent loss of photosynthetic activity when leaflets were reintroduced into normal air (photoinhibition of CO_2 assimilation rate). Photosynthetic intermediates and especially phosphoglycerate pool sizes were lower than in the control leaflets; however, the ratio phosphoglycerate:ribulose bisphosphate remained lower in treated leaflets than in the control submitted to a short illumination at high irradiance.

(14)CO2 pulse-chase expt., performed at steady state photosynthesis, showed that the flow of C through intermediates of the Benson-Calvin cycle was correspondingly decreased in photoinhibited leaflets while phosphoglycerate turnover did not appear to be affected by treatment. The capacity for ribulose bisphosphate regeneration appeared to be the main limiting factor involved in photoinhibition of C assimilation. It was consistent with the observation that electron transport through PSII was inhibited in photoinhibited leaves. In addition, ribulose bisphosphate accumulation also in evidence in leaves submitted to prolonged illumination could be due to some limitation of ribulose bisphosphate carboxylase oxygenase activity. (AS)

0042

29927 SAGE, T.L.; WEBSTER, P.D. 1987. Flowering and fruiting patterns of Phaseolus vulgaris L. Botanical Gazette 148(1):35-41. En., Sum. En., 26 Ref., Il. [Desert Research Inst., Biological Sciences, Reno, NV 89506, USA]

Phaseolus vulgaris. Flowering. Podding. Timing. Buds. Embryo. Morphogenesis. USA.

Spatial and temporal aspects of reproductive development were examined in morphological units--a compound raceme and subtending axillary flowers and trifoliolate leaf--of Phaseolus vulgaris. Flowering occurs acropetally, and the probability of flowering varies with the position of a bud in a unit: axillary, basal buds have a higher percentage of flowering than more distal buds on a raceme. The percentage of bud and fruit abortion also varies in relation to position within a unit. The axillary, basal buds are the 1st to flower and have the lowest percentage of abortion. All distal buds abort. Nonflowering buds abort in the green-bud stage of floral ontogeny. Growth and cytological analyses indicate that the aborting fruits contain embryos in the proembryo and early and late globular stages of embryogeny. The percentage of abortion at each stage varies with the position of the fruit within a unit. Axillary and basal fruits contain embryos in the late globular stage. Distal fruits contain embryos in the proembryo stage. Fruits with embryos in the early globular stage are in the midregion of the raceme. Abortion-inducing factors appear to be important in the green-bud stage of ontogeny and in early stages of fruit/embryo development. (AS)

0043

29919 SANTOS, E. DOS 1985. Um estudo das resistencias ao transporte de vapor sobre uma cultura de feijao (Phaseolus vulgaris L.). (Study of resistance to water vapor transport in a bean crop). Tese Mestrado. Piracicaba-SP, Brasil, Escola Superior de Agricultura Luiz de Queiroz da Universidade de Sao Paulo. 92p. Pt., Sum. It., En., 64 Ref., Il.

Phaseolus vulgaris. Growth. Flowering. Podding. Temperature. Water absorption. Stomata. Transpiration. Leaves. Evapotranspiration. Irrigation. Radiation. Brazil.

The vertical latent heat flux and the corresponding resistances related to micrometeorological and physiological parameters of bean cv. Aroana 80 were determined in the summer of 1984 at the Escola Superior de Agricultura Luiz de Queiroz in Piracicaba (Sao Paulo, Brazil). Energy (diurnal cycle) and water balance (periods) were computed for the analysis in the final vegetative and initial blooming stages. The results showed good correlation between aerodynamic and canopy resistances with micrometeorological parameters; canopy resistance was also related to the physiological parameters. (AS)

0044

29731 STOPINSKA, J. 1986. Studies on the interaction of growth regulators with potassium ions in some physiological processes in the bean (Phaseolus vulgaris L.). 2. The effect of potassium on growth of bean leaves and on their potassium and hormone levels. Acta Societatis Botanicorum Poloniae 55(2):209-225. En., Sum. En., Pl., 39 Ref., Il. [Dept. of Plant Physiology, Inst. of Biology, Copernicus Univ., Gagarina 9, 87.100 Torun, Poland]

Phaseolus vulgaris. Growth. Leaves. Nutrient solution. K. Auxins. Gibberellins. Water content. Cytokinins. Poland.

The effect of K(+) on the growth of primary and trifoliate bean leaves and on their K and hormone levels was studied. Bean seedlings were grown in Hoagland's water solution, in which the K conc. (K(+)-NO3(-)) were 1 and 3 millimolar. The increase in the amount of K in bean leaves, elicited by increased K(+) conc. in the medium or by partial defoliation, was correlated with a stimulation of growth of these organs and an increase in their H2O content. These effects were connected with an increase in the amount of ABA and bound GA and decrease in the amount of auxins. The effect of K on the level of free gibberellins and cytokinins depended on the kind of leaves. In young trifoliate leaves, K(+) was found to have a positive effect on the level of free GA, whereas in older primary leaves, this effect concerned the level of cytokinins. (AS) See also 0009 0016 0074 0075 0079 0085 0130

C03 Chemical Composition, Methodology and Analyses

0045

29642 ANEJA, V.P.; ROGERS, H.H.; STAHEL, E.P. 1986. Dry deposition of ammonia at environmental concentrations on selected plant species. Journal of the Air Pollution Control Association 36(12):1338-1341. En., Sum. En., 21 Ref., Il. [General Electric Company, Corporate Research & Development Center, Schenectady, NY 12301, USA]

Phaseolus vulgaris. Snap beans. Air pollution. Analysis. Stomata. USA.

The deposition velocity of NH3 on 6 plant species (maize, snap bean, soybean, orchard grass, oats, and fescue) at environmental concn. has been studied in a dynamic plant gas exchange reactor. The total resistance to the transport of NH3 was studied. The aerodynamic resistance was determined directly by NH3 gas absorption in aqueous solutions at environmental concn. in a 2-phase gradientless reactor modeling the transfer processes through the stomata in a leaf. The NH3 concn. in the gas phase ranged from 50 to 1000 ppb and the temp. varied from 25 to 30 degrees Celsius. The results for the deposition velocity for NH3, during the day, varied from 0.3 to 1.3 cm/s. The deposition velocities at night were about 1 order of magnitude smaller. These results are compared with estimates from the Frossling equation, which consistently yields higher values of the same order of magnitude. To determine accurate atmospheric transport models or global budget models, a variable deposition velocity should be used to account for the diurnal and seasonal variations in the surface resistance. (AS)

0046

28640 BOLWELL, G.P. 1986. Microsomal arabinosylation of polysaccharide and elicitor-induced carbohydrate-binding glycoprotein in French bean. Phytochemistry 25(8):1807-1813. En., Sum. En., 45 Ref., Il. [Dept. of Biochemistry, Bourne building, Royal Holloway & Bedford New College, Univ. of London, Egham, Surrey, TW20 0EX, England]

Phaseolus vulgaris. Snap beans. Analysis. Phytohemagglutinins. Proteins. United Kingdom.

In contrast to microsomal membranes from suspension cultured cells of French bean cv. Canadian Wonder undergoing primary wall synthesis, which incorporated arabinose directly from uridine 5'-diphosphate-beta-L-arabinose into arabinan, membranes from cells treated with fungal elicitor catalysed the formation of a lipid oligosaccharide intermediate in the arabinosylation of an insoluble Mr 42,500 glycoprotein. These variations in the patterns and mechanism of arabinosylation observed between the cells in response to the differing stimuli were detected in both the kinetics of incorporation and the demonstration that the lipid oligosaccharide after purification on ion-exchange chromatography could act as primary donor for the glycoprotein and not polysaccharide. These results distinguish mechanisms for the transfers of arabinose onto glycoprotein and polysaccharide by enzyme systems known to be immunologically distinct. The fungal elicitor-induced Mr 42,500 glycoprotein binds to thyroglobulin- and fetuin-Sepharoses in a specific manner and this binding is prevented by chitin oligomers. The glycoprotein thus appears to be a carbohydrate-binding protein and the sugar specificity together with the demonstration of hydroxyproline residues in acid hydrolysates of the glycoprotein purified by affinity chromatography indicate a close similarity to the arabinosylated hydroxyproline-rich lectins of the Solanaceae, which can function as bacterial agglutinins. The Mr 42,500 glycoprotein, which undergoes rapid transient induction, also clearly differs from other extensin-like hydroxyproline-rich glycoproteins, arabinogalactan proteins, and the characteristic bean seed lectin, phytohemagglutinin, in a no. of properties. (AS)

0047

29742 BUERA, M.P.; PILOSOF, A.M.R.; BARTHOLOMAI, G.B. 1984. Kinetics of trypsin inhibitory activity loss in heated flour from bean, Phaseolus vulgaris. Journal of Food Science 49:124-126. En., Sum. En., 14 Ref., Il. [Depto. de Industrias, Facultad de Ciencias Exactas y Naturales, Univ. de Buenos Aires, Ciudad Universitaria, 1428 Buenos Aires, Argentina]

Phaseolus vulgaris. Trypsin. Bean flour. Nutritive value. Temperature. Timing. Analysis. Argentina.

The effect of temp., time, and MC on TIA of bean flour was studied. TIA loss followed 1st order reaction kinetics and the rate of loss was greatly increased with increasing MC of flour from 2 to 5% percent. Activation energies for the 1st order reaction constants were calculated and ranged between 13-27 Kcal/mole, showing a max. value at 30 percent MC. (AS)

0048

28968 CHANG, S.S.; ASHTON, F.M.; BAYER, D.E. 1985. Butachlor influence on selected metabolic processes of plant cells and tissues. Journal of Plant Growth Regulation 4(1):1-9. En., Sum. En., 17 Ref. [Dept. of Agronomy, National Taiwan Univ. Taipei, Taiwan]

Phaseolus vulgaris. Herbicides. Metabolism. Timing. Leaves. Laboratory experiments. Taiwan. USA.

Time-course and concn.-course studies were conducted to determine the effects of butachlor on photosynthesis, protein synthesis, RNA synthesis, and lipid synthesis using isolated leaf cells of red kidney bean. At the 2-h incubation period, butachlor inhibited photosynthesis, protein synthesis, RNA synthesis, and lipid synthesis 99, 99, 95, and 81 percent, resp., at 100 micromolar, and 0, 19, 17, and 40 percent, resp., at 10 micromolar. At 100 micromolar and 15-, 30-, and 60-min incubations, RNA synthesis was inhibited 20, 76, and 90 percent, resp., and lipid synthesis 35, 48, and 62 percent, resp. Photosynthesis and protein synthesis were inhibited over 90 percent at all of these time periods. (AS (extract))

0049

29634 CRAMER, C.L.; BELL, J.N.; RYDER, T.B.; BAILEY, J.A.; SCHUCH, W.; BOLWELL, G.P.; ROBBINS, M.P.; DIXON, R.A.; LAMB, C.J. 1985. Co-ordinated synthesis of phytoalexin biosynthetic enzymes in biologically-stressed cells of bean (Phaseolus vulgaris L.). European Molecular Biology Organization Journal 4(2):285-289. En., Sum. En., 32 Ref., Il. [Plant Biology Laboratory, Salk Inst. for Biological Studies, P.O. Box 85800, San Diego, CA 92138, USA]

Phaseolus vulgaris. Snap beans. Enzymes. Analysis. Colletotrichum lindemuthianum. Resistance. Hypocotyl. Phytoalexins. USA.

Changes in the rates of synthesis of 3 enzymes of phenylpropanoid biosynthesis in dwarf French bean were investigated by immunoprecipitation of ((35)S) met.-labeled enzyme subunits with monospecific antisera. Elicitor caused marked, rapid but transient coordinated increases in the rate of synthesis of phenylalanine ammonia-lyase, chalcone synthase, and chalcone isomerase concomitant with the phase of rapid increase in enzyme activity at the onset of accumulation of phenylpropanoid-derived phytoalexin antibiotics in suspension cultures of French bean. Coordinate induction of enzyme synthesis was also observed in hypocotyl tissue during race/cv. specific interactions with Colletotrichum lindemuthianum, causal agent of anthracnose. In an incompatible interaction (host resistant) there were early increases apparently localized to the initial site of infection prior to the onset of phytoalexin accumulation and expression of hypersensitive resistance. In contrast, in a compatible interaction (host susceptible) there was no induction of synthesis in the early stages of infection, but a delayed widespread response at the onset of lesion formation associated with attempted lesion limitation. It was concluded that expression of the phytoalexin defense response in biologically stressed cells of French bean characteristically involved coordinate induction of synthesis of phytoalexin biosynthetic enzymes. (AS)

0050

29667 BARMS-RINGDAHL, M.; FORSBERG, J.; FEDORCSAK, I.; EHRENBERG, L. 1979. Trypsin inhibitory activity of a polypeptide isolated from red kidney beans, that also enhances lymphocyte stimulation. Biochemical and Biophysical Research Communications 88(3):492-499. En., Sum. En., 17 Ref., Il.

Phaseolus vulgaris. Trypsin. RNA. DNA. Enzymes. Biochemistry. Sweden.

A polypeptide isolated from red kidney beans, which has previously been shown to stimulate RNA synthesis in cultures of mouse spleen lymphocytes and plasmolyzed Escherichia coli, was shown to be a potent inhibitor of trypsin and alpha-chymotrypsin. This polypeptide is compared with commercially available trypsin inhibitors with regard to their capacity to inhibit some proteolytic enzymes and to stimulate in vitro cultures of lymphocytes. Similar to FV (fraction V, low mol. wt.protein) the lima bean trypsin inhibitor was found to possess a stimulating effect on the RNA as well as the DNA synthesis in lymphocyte cultures. (AS)

0051

29676 HOOVER, R.; SOSULSKI, F. 1985. A comparative study of the effect of acetylation on starches of Phaseolus vulgaris biotypes. Starch/Starke 37(12):397-404. En., Sum. En., De., 42 Ref., Il. [Dept. of Crop Science & Plant Ecology, Univ. of Saskatchewan, Saskatoon, Saskatchewan, Canada S7N 0W0]

Phaseolus vulgaris. Enzymes. Analysis. Starch content. Biochemistry. Canada.

Enzyme hydrolysis, X-ray diffraction, differential scanning calorimetry, and Visco/Amylo/Graphy were used to examine the strength of associative bonding forces between starch chains of native pinto, navy, and black beans. Addition of acetic anhydride resulted in unequal degrees of substitution. Scanning electron microscopy revealed no differences between the external morphology of native and acetylated starches. Similarities in the X-ray diffraction patterns of native and acetylated starches indicated that acetyl groups mainly entered the amorphous regions. On acetylation, decreases in starch hydrolysis, gelatinization temp., enthalpies of gelatinization, extent of viscosity increase during the holding period at 95 degrees Celsius and syneresis, and increases in 95 degrees Celsius viscosity, set-back, and amylose exudation were observed. It appeared the extent of distribution of the acetyl groups between the amylose and the amorphous regions of the amylopectin fraction varied among legume biotypes, and differences existed between legume starches with regard to the ratio of the concn. of the acetyl group at the 2-O position relative to that at 6-O. (AS)

0052

30642 HUSSEIN, H.A.; HUSSEIN, E.H.A.; YOUSSEF, S.S.; EWEDA, M.A. 1984. Genotypic differences in banding patterns of Phaseolus proteins. Bulletin of Faculty of Agriculture, Cairo University 35(3):1521-1532. En., Sum. En., Ar., 13 Ref., Il. [Dept. of Genetics, Faculty of Agriculture, Cairo Univ., Giza, Egypt]

Phaseolus vulgaris. Cultivars. Proteins. Analysis. Egypt.

Water-soluble proteins of 10 Phaseolus vulgaris cv. were characterized according to their electrophoretic patterns. Results indicated that the cv. Giza-3, Giza-4, and Swiss blanc could be classified as 1 group and cv. Prevato, Ramesco, and Largo in a 2nd group. The other 4 cv. (Daupline, Jolanco, Recores, and Processor) did not show clear genetical relationships at the protein banding level. It was concluded, however, that each of the 10 genotypes represents a different genetical identity. Densitograms as well as SDS + the reducing agent 2ME confirmed the results based on SDS alone. (AS)

0053

30639 IRELAND, P.A.; DZIEDZIC, S.Z. 1987. Saponins and sapogenins of chick pea, haricot bean, and red kidney bean. Food Chemistry 23(2):105-116. En., Sum. En., 19 Ref., Il. [Dept. of Food Science, Food Studies Building, Univ. of Reading, Whiteknights, P.O. Box 226, Reading RG6 2AP, Great Britain]

Phaseolus vulgaris. Snap beans. Analysis. Hydrolysis. Glycosides. United Kingdom.

The saponins of red kidney and haricot beans (both Phaseolus vulgaris) and Cicer arietinum all contain soyasapogenol B as the only aglycone. The levels of soyasapogenol B estimated were: C. arietinum, 0.075 percent; haricot bean, 0.149 percent; and red kidney bean, 0.102 percent, on a defatted, dry wt. basis. High performance liquid chromatography separation of the saponin preparations indicates the presence of at least 5 saponins in red kidney bean, 5 in haricot bean, and 2 in C. arietinum. Retention time comparison of the saponin preparations indicates the possible presence of soyasaponin I in all 3 legumes and soyasaponin II in haricot and red kidney beans. (AS)

0054

29639 JACOB, R.T.; PATTABIRAMAN, T.N. 1984. Purification of bovine and porcine enterokinase by affinity chromatography with immobilized kidney bean enterokinase inhibitor. Journal of Biosciences 6(3):289-295. En., Sum. En., 16 Ref., Il.

Phaseolus vulgaris. Enzymes. Analysis. Biochemistry. India.

A specific enterokinase inhibitor isolated from kidney bean was immobilized on Affigel-10. Solubilized bovine and porcine enterokinases were bound to this matrix at pH 7.5 and the complex was dissociated by elution with 10 millimolar HCl, resulting in the isolation of the enzymes in homogeneous form as judged by gel chromatography on Sephadex G-200, and SDS-polyacrylamide gel electrophoresis. Human enterokinase, however, could not be purified by this method in sufficient yield since it did not bind strongly to the insolubilized inhibitor. (AS)

0055

29699 KERMASHA, S.; VAN DE VOORT, F.R.; METCHE, M. 1986. Conversion of linoleic acid hydroperoxide by French bean hydroperoxide isomerase. Journal of Food Biochemistry 10(4):285-303. En., Sum. En., 39 Ref., Il. [Dept. of Food Science & Agricultural Chemistry, MacDonald Campus of MacGill Univ., 21111 Lakeshore Road, Ste. Anne de Bellevue, Quebec, Canada H9X 1C0]

Phaseolus vulgaris. Snap beans. Enzymes. Biochemistry. Analysis. USA.

Hydroperoxide isomerase was extracted from the cotyledon portion of sprouted French bean seeds after 5 days of incubation and partially purified by ammonium sulphate fractionation and ultracentrifugation. Linoleic acid hydroperoxides were produced using commercial soybean lipoxygenase and purified using a silicic acid column and identified by high performance liquid chromatography. The characterized linoleic acid hydroperoxides were used as substrates for the French bean hydroperoxide isomerase. The purified French bean extract showed a 3-fold increase in activity over the crude preparation and a pH optimum of 7.2. The primary end products of the enzyme reaction were separated into ketol and carbonyl compounds and then further purified by preparative TLC. Subsequent gas chromatography-mass spectrometry analysis of the ketol fraction indicated that hydroperoxide isomerase converted the 13-hydroperoxyoctadec-9, 11-dienoic acid primarily into 10,13-dihydroxyoctadec-11-enoic acid (gamma-ketol) and to a lesser extent into 12,13-dihydroxyoctadec-9-enoic acid (alpha-ketol). Trace amounts of 9,12-dihydroxyoctadec-10-enoic acid resulting from the isomerization of 9-hydroperoxyoctadec-10,12-dienoic acid were also found. Hexanal was revealed to be the principal carbonyl compound resulting from the decomposition of 13-hydroperoxyoctadec-9,11-dienoic acid, suggesting that a lyase was also present in the French bean extract. (AS)

0056

29607 KHAN, S.U.; ZHANG, L.Z.; AKHTAR, M.H. 1984. Bound residues of deltamethrin in bean plants. Journal of Agricultural and Food Chemistry. En., Sum. En., 12 Ref.

Phaseolus vulgaris. Shoots. Insecticides. Analysis. Enzymes. Radiation. Biochemistry. USA.

Deltamethrin, a new synthetic pyrethroid insecticide, labeled with (14)C at the methyl or benzylic position formed unextractable (bound) (14)C residues in bean plant shoots. The amount of bound (14)C residues formed was higher in the benzylic label deltamethrin-treated plants. Deltamethrin and a no. of metabolites, present in the plant as bound (14)C residues, were released and identified with the high temp. distillation technique followed by thin-layer and gas chromatographic analyses, whereas a major portion of the unextractable products remaining was of unknown composition. A small proportion of the bound (14)C residues from plant tissue was released after incubation with enzymes. (AS)

0057

29687 LEBEDEV, N.N.; SIFFEL, P.; SESTAK, Z. 1986. Composition of chlorophyll-protein complexes and fluorescence spectrum changes during ontogeny of primary leaves of Phaseolus vulgaris L. Photosynthetica

20(2):146-152. En., Sum. En., 26 Ref., Il. [A.N. Bakh Inst. of Biochemistry, Academy of Sciences of the U.S.S.R., Moscow 117071, U.S.S.R]

Phaseolus vulgaris. Leaves. Analysis. Light. Biochemistry. USSR.

SDS-polyacrylamide gel electrophoretic profiles of chlorophyll-protein complexes (CP) and the low-temp. fluorescence emission spectra of isolated chloroplasts were measured during ontogeny of primary Phaseolus vulgaris leaves. The monomeric light-harvesting chlorophyll-protein complex called LH3 and monomeric CP of photosystem 1 called CP1 prevailed at the early and the latest stages of the leaf life. The concn. ratio sigma CP1/sigma LH had a max. in the middle age leaf. Both the relative height of the long-wavelength fluorescence band (F735/F685) and the ratio of aggregated LH, i.e. LH1 to CP1 (LH1/sigma CP1) had a max. at the end of the leaf elongation stage and followed the same ontogenetic kinetics. (AS)

0058

29688 LEBEDEV, N.N.; SIFFEL, P.; PAKSHINA, E.V.; KRASNOVSKII, A.A. 1986. The effect of acidification on absorption and fluorescence spectra of French bean chloroplasts and the kinetics of pheophytin formation. Photosynthetica 20(2):124-130. En., Sum. En., 27 Ref., Il. [A.N. Bakh Inst. of Biochemistry, Academy of Sciences of the U.S.S.R., Lenin Prospect 33, SU-1170 71 Moscow, U.S.S.R]

Phaseolus vulgaris. Snap beans. Chloroplasts. Proteins. Analysis. Chlorophyll. Biochemistry. USSR.

The low-temp. absorption and fluorescence spectra, their 2nd derivative and difference spectra, and the kinetics of their changes were measured after acid action (pH 2.2) on chloroplasts isolated from primary leaves of Phaseolus vulgaris. During the 1st min of action the chlorophyll-proteins, closely connected to reaction centers of photosystems 1 and 2, were reorganized. The structure of the light-harvesting chlorophyll-protein complex, as well as the antenna of photosystem 1 did not change during this time, but an electrochromic shift for the spectra of their pigments occurred. The reorganization of the reaction center chlorophyll-protein complexes led to the formation of a monomeric chlorophyll a, which in turn transformed into monomeric pheophytin. Prolonged acidification of chloroplasts led to the formation of 2 types of aggregated pigment. One of them, which appeared after 10 min, seemed to originate from the antenna chlorophyll-proteins of photosystem 1, and the other one which appeared after 1 h came from the light-harvesting chlorophyll-protein complex. (AS)

0059

29186 MUGGIO, B.N.; UEBERSAX, M.A.; HOSFIELD, G.L.; THOMPSON, S.S. 1985. Characterization and bioconversion of Great Northern bean blancher effluent. Journal of Food Science 50(4):918-921. En., Sum. En., 35 Ref., Il. [Gordon Food Service, Grand Rapids, MI 49501, USA]

Phaseolus vulgaris. Canned beans. Fermentation. Microbiology. Biochemistry. USA.

Chemical characterization of a Great Northern bean blanching effluent and bioconversion by Hansenula anamola was performed. The effluent contained 27,000 mg/liter BOD and 31,000 mg/liter total solids including 49.5 percent starch and 23.6 percent protein (dry basis). A high BOD:COD ratio (0.95) indicated a waste easily and completely degradable, with N and P levels above those necessary for unimpeded microbial growth. Batch fermentations of raw effluent produced 12 g dry cells/liter, containing 53 percent protein, with a corresponding 84 percent reduction in BOD. Great Northern bean blanching effluent was demonstrated to be a suitable growth medium for H. anomala. (AS)

0060

29712 PLIETZ, P.; DAMASCHUN, G.; SCHWENKE, K.D.; SCHLESTER, B. 1986. Small-angle X-ray scattering investigations on seed proteins. Nahrung 30(3-4):245-250. En., Sum. En., De., Ru., 10 Ref., Il. [Central Inst. of Molecular Biology, DDR-1115 Berlin-Buch, Robert-Rossle-Str. 10, German Democratic Republic]

Phaseolus vulgaris. Snap beans. Seeds. Proteins. Analysis. German Democratic Republic.

The 11S globulins from sunflower and rape seeds as well as from broad beans were investigated by small angle X-ray scattering. The 7S globulin from French beans was also investigated by small angle X-ray scattering. It has a molar mass of 1.45 x 10(5) g/mole. The shape of the molecule is disk-like. The molecule consists of 3 subunits separated by deep clefts filled with solvent, and has a 3-fold symmetry axis perpendicular to the plane of the disk. (AS (extract))

0061

29640 RAUHUT, R.; GABIUS, H.J.; CRAMER, F. 1986. Phenylalanyl-tRNA synthetase from chloroplasts of a higher plant (Phaseolus vulgaris); purification and comparison of its structural, functional, and immunological properties with those of the enzymes from the corresponding cytoplasm, the cyanobacterium Anacystis nidulans, and the photosynthetic green sulfur bacterium Chlorobium limicola. Journal of Biological Chemistry 261(6):2799-2803. En., Sum. En., 60 Ref., Il. [Max-Planck-Inst. fur Experimentelle Medizin, Abteilung Chemie, Hermann-Rein-Strasse 3, D-3400, Gottingen, Federal Republic of Germany]

Phaseolus vulgaris. Enzymes. RNA. Metabolism. Chloroplasts. Photosynthesis. Bacteriology. Analysis. ATP. Federal Republic of Germany.

Chloroplastic phenylalanyl-tRNA synthetase from bean leaves was purified under optimal protective conditions over 4900-fold. Its apparent mol. wt. was 78,000, as determined by gel filtration, with a dimeric subunit structure of alpha-beta (alpha = 33,000 and beta = 42,000), as determined by SDS gel electrophoresis. This indicates a drastic size reduction of 40 percent for each subunit compared with the corresponding cytoplasmic enzyme and a unique quaternary structure. Heterologous aminoacylation and substrate properties of ATP analogs indicated substantial differences in the topographies of the substrate binding domains of these 2 heterotopic intracellular plant enzymes. No common antigenic determinants with the bean cytoplasmic enzyme were detected by polyclonal antibodies against the chloroplastic enzyme. The same negative result applied to the immunological comparison with the partially purified enzymes from the cyanobacterium Anacystis nidulans and the photosynthetic green sulfur bacterium Chlorobium limicola, both with a mol. wt. of 260,000. (AS)

0062

29681 RYDER, T.B.; CRAMER, C.L.; BELL, J.N.; ROBBINS, M.P.; DIXON, R.A.; LAMB, C.J. 1988. Elicitor rapidly induces chalcone synthase mRNA in Phaseolus vulgaris cells at the onset of the phytoalexin defense response. Proceedings of the National Academy of Sciences of the United States of America 81(18):5724-5728. En., Sum. En., 44 Ref., Il. [Plant Biology Laboratory, The Salk Inst. for Biological Studies, P.O. Box 85800, San Diego, CA 92138, USA]

Phaseolus vulgaris. Biochemistry. DNA. RNA. Analysis. Enzymes. Genes. Phytoalexins. USA.

DNAs complementary to poly(A)(+) RNA present in elicitor-treated cells Phaseolus vulgaris were inserted into pBR325 and used to transform Escherichia coli strain JA221. A clone was identified that contained sequences complementary to mRNA encoding chalcone syntnase, a regulatory

enzyme of phenylpropanoid biosynthesis, which catalyzes the 1st reaction of a branch pathway specific to flavonoid and isoflavonoid biosynthesis. Rapid, marked but transient increases in chalcone synthase mRNA in response to elicitor treatment were observed by RNA blot hybridization with (32)P-labeled chalcone synthase cDNA sequences. Induction of chalcone synthase mRNA governs the rate of enzyme synthesis throughout the phase of rapid increase in enzyme activity at the onset of accumulation of isoflavonoid-derived phytoalexins. The data are consistent with the hypothesis that elicitor causes a rapid transient stimulation of transcription of chalcone synthase gene(s) as an early event in the expression of the phytoalexin defense response. (AS)

0063

29635 SACCHI, G.A.; VIGANO, P.; FORTUNATI, G.; COCUCCI, S.M. 1986. Accumulation of 2,3,7,8-tetrachlorodibenzo-p-dioxin from soil and nutrient solution by bean and maize plants. Experientia 42(5):586-588. En., Sum. En., 11 Ref., Il. [Istituto di Chimica Agraria, Universita degli Studi di Milano, via Celoria 2, I-20133 Milano, Italy]

Phaseolus vulgaris. Herbicides. Translocation. Laboratory experiments. Italy.

Maize and bean plants grown on soil polluted with (3)H-2,3,7,8-tetrachlorodibenzo-p-dioxin ((3)H-TCDD), a herbicide component, accumulated the toxin in the aerial parts progressively with the time and with the soil contamination. Plants in hydroponic solution polluted with (3)H-TCDD accumulated the toxin in the aerial parts in the light and not in the dark. The concn. of TCDD accumulated was not proportional to the surface area of plant organs and the distribution of (3)H-TCDD in the leaves suggested that TCDD was translocated through the vessels to the aerial parts by the transpiration stream. (AS)

0064

29683 SEEMANN, J.R.; BERRY, J.A.; FREAS, S.M.; KRUMP, M.A. 1985. Regulation of ribulose bisphosphate carboxylase activity in vivo by a light-modulated inhibitor of catalysis. Proceedings of the National Academy of Sciences of the United States of America 82(23):8024-8028. En., Sum. En., 28 Ref., Il. [Desert Research Inst., Biological Sciences Center, P.O. Box 60220, Reno, NV 89506, USA]

Phaseolus vulgaris. Enzymes. Photosynthesis. Leaves. Light. USA.

The activity of ribulose 1,5-bisphophate carboxylase (RuBPCase) in leaf extracts of a no. of species kept in the dark overnight was found to be very low. This was not the result of a change in the activation state or in the amount of enzyme that could be extracted from "dark" leaves. Rather, in Phaseolus vulgaris it was due to an inhibitor of catalysis that occupied the catalytic site of the enzyme. This inhibitor was compartmentalized in the chloroplast and its max. concn. in both dark leaves and in intact chloroplasts made from such leaves was slightly in excess of the RuBPCase catalytic site concn. The inhibitor (a phosphate ester) was bound preferentially to the activated form of the enzyme, apparently functioning as a positive effector of activation. Treatment of the enzyme-inhibitor complex in vitro with alkaline phosphatase could restore RuBPCase activity. In vivo, both the initial rate of disappearance and the final concn. of inhibitor in intact leaves was found to vary with light intensity, and these changes could account for observed light-dependent changes in RuBPCase activity, indicating that light modulation of inhibitor concn. controlled RuBPCase activity. Recovery of activity in vivo could be inhibited by 3-(3',4',4-dichlorophenyl)-1,1-dimethylurea. (AS)

0065

29646 WILCOX, E.R.; WHITAKER, J.R. 1984. Structural features of red kidney bean alpha-amylase inhibitor important in binding with alpha-amylase. Journal of Food Biochemistry 8(3):189-213. En., Sum. En., 63 Ref., Il. [Mycogen Corporation, 5451 Oberlin Drive, San Diego, CA 92121, USA]

Phaseolus vulgaris. Enzymes. Composition. Temperature. Timing. Biochemistry. USA.

The structural features of the glycoprotein alpha-amylase inhibitor from red kidney bean, important for binding to alpha-amylase, were examined. The inhibitor contained 13.0 percent carbohydrate. The carbohydrate portion of the inhibitor is composed of 25 mannose, 2 xylose, 1 fucose, and 17 N-acetylglucosamine residues/mole. Seventy percent of the neutral carbohydrates were removed from the inhibitor by treatment with endo-beta-N-acetylglucosaminidase H. The carbohydrate remaining attached to the protein consisted of 7 mannose, 2 xylose, and 1 fucose residues (N-acetylglucosamine was not determined). The intact glyco chains obtained from the pronase digest of the inhibitor failed to inhibit alpha-amylase (3.3 x 10(5) fold molar excess of glyco chains to enzyme) when preincubated with the enzyme at 30 degrees Celsius for 30 min at pH 6.9 before adding starch as substrate. Oxidation of 1 tryptophan residue of the alpha-amylase inhibitor with N-bromosuccinimide at pH 6.0 led to a 50 percent loss in inhibitory activity. Periodate oxidation of alpha-amylase inhibitor led to loss of 2 tyrosine and 1 met. residues/mole of inhibitor within 15 min. There was not a direct correlation between modification of these residues and loss of inhibitory activity. Modification of 3 of the 5 histidine residues with diethylpyrocarbonate resulted in about 50 percent loss in inhibitory activity. (AS)

0066

29611 WILLS, R.B.H.; EVANS, T.J.; LIM, J.S.K.; SCRIVEN, F.M.; GREENFIELD, H. 1984. Composition of Australian foods. 25. Peas and beans. Food Technology in Australia 36(11):512-514. En., Sum. En., 10 Ref. [School of Food Technology, The Univ. of New South Wales, P.O. Box 1, Kensington, NSW 2033, Australia]

Phaseolus vulgaris. Seeds. Cooking. Water content. Protein content. Fat content. Sugar content. Starch content. Fiber content. Ash content. Mineral content. K. Na. Ca. Mg. Fe. Zn. Vitamin content. Australia.

Fresh peas and beans were analyzed raw and cooked (boiled in water) for water, protein, fat, sugars, starch, dietary fiber, organic acids, ash, K, Na, Ca, Mg, Fe, Zn, vitamin C, thiamin, riboflavin, niacin, and carotenes. The energy content was also calculated. Frozen, canned, and dried peas and beans and a multiprocessed canned dried pea product were analyzed as purchased for water, protein, and vitamin C, and after cooking for the full range of nutrients except for organic acids. Results are included in table form. (AS) See also 0001 0004 0014 0015 0018 0030 0035 0071 0098 0129 0142 0144 0199 0221

D00 AGRONOMY

See 0213

D01 Soil, Water, Climate and Fertilization

0067

29987 CAPINERA, J.L.; HORTON, D.R.; EPSKY, N.D.; CHAPMAN, P.L. 1987. Effects of plant density and late-season defoliation on yield of field

beans. Environmental Entomology 16(1):274-280. En., Sum. En., 30 Ref., Il. [Dept. of Entomology, Colorado State Univ., Fort Collins, CO 80523, USA]

Phaseolus vulgaris. Spacing. Planting. Defoliation. Epilachna varivestis. Yield components. Plant injuries. Yields. USA.

The effects of stand density and late-season defoliation by Mexican bean beetles, Epilachna varivestis, on 3 yield components of beans were estimated from field studies conducted during 1983 and 1984 in 4 fields of pinto beans in NE Colorado, USA. The no. of beans/plant, mean grain wt., and mean grain wt./plant were calculated for 100 samples/field, and regressed against 3 independent variables: plant density, percentage of defoliation, and density x defoliation interaction. Results of the analyses showed that plant density negatively affected the no. of bean grains/plant and grain wt./plant, but not av. grain wt. Responses were not linear; the slope decreased at higher densities. Defoliation negatively affected all 3 yield variables. Av. grain wt. was linearly related to defoliation. The no. of beans/plant and grain wt./plant showed linear responses above a threshold level of defoliation. A piecewise regression model indicated that yields were not affected by defoliation until levels reached approx. 19 percent foliage loss. Lab. consumption studies were conducted to determine age-specific damage potential for Mexican bean beetle and 2 occasional defoliators of pinto beans (Estigmene acrea, Spilosoma virginica). Insect consumption potentials and field studies of yield responses to defoliation were used to estimate threshold densities. (AS)

0065

28872 GERARD, T.R. 1986. Détermination des besoins en eau des plantes, des doses d'irrigation et des fréquences d'arrosage (AM 8301). (Determination of plant water requirements and irrigation rates and frequencies). In Institut des Sciences Agronomiques du Burundi. Rapport Annuel 1986. (Septembre 1985-Aout 1986). Bujumbura. v.3, pp.AM52-AM61. Fr., Il.

Phaseolus vulgaris. Water requirements. Irrigation. Yields. Burundi.

In trials carried out in Burundi over a 3-yr period (1983-85) to determine the water requirements of bean crops and adequate irrigation rates and frequencies, it was observed that this crop responded favorably to irrigation when rates were increased from 75 or 50 to 100 percent of the optimum rate. Increases in production (6-23 percent) were observed and it was found that moist soil (little drainage) favors bean germination. (CIAT)

0069

29790 HINOJOSA V., E. 1973. Influencia del nitrógeno y azufre en el rendimiento del frijol (Phaseolus vulgaris L.). (Influence of nitrogen and sulphur on bean yields). Turrialba, Costa Rica, Instituto Interamericano de Ciencias Agrícolas de la OEA. 94p. Es., Sum. Es., En., 70 Ref., Il.

Phaseolus vulgaris. Fertilizers. N. S. Yields. Protein content. Costa Rica.

Under greenhouse conditions at the Instituto Interamericano de Ciencias Agrícolas (Turrialba, Costa Rica) the effect of N and S on yields and protein content of bean var. 27-8 was determined. Four levels of N and S were applied; these corresponded to 16 treatments and 48 exptl. units. The remaining nutrients were applied at standard rates. It was found that bean yield depended mainly on N application; however, max. yields were not obtained with the levels selected. There was no response to S application at the N levels applied. It appears that a yield response to S could be expected at higher levels of N application. Max. protein contents in bean seed corresponded to higher N and S applications (300 and 150 kg/ha, resp.). The optimum N:S ratio (17:1) for protein synthesis was not always associated with higher bean yields. (AS (extract))

0070

28948 FORTELA, M.C.L. DA S.; DEFELIPO, B.V.; BRAGA, J.M.; RIBEIRO, A.C. 1986. Necessidade de calagem para as culturas de feijao e milho em consórcio, em solos da microrregiao Mata de Vicosa, Minas Gerais. 2. Ensaios de campo. (Lime requirements for the maize/bean associated cropping systems on soils in the Mata de Vicosa microregion, Minas Gerais. 2. Field trials). Revista Ceres 33(185):23-35. Pt., Sum. Pt., En., 23 Ref. [Inst. de Pesquisas Agronômicas de Pernambuco, Caixa Postal 125, 55.100 Caruaru-PE, Brazil]

Phaseolus vulgaris. Intercropping. Zea mays. Agricultural lime. pH. Yields. Brazil.

The effects of different rates of lime applied to soils planted to beans and maize in association were studied at 5 locations in the Zona da Mata region (Minas Gerais, Brazil). Rates of 0, 2, 4, and 8 t lime (33 percent CaO and 11 percent MgO)/ha were evaluated in a randomized complete block design with 3 replications, in plots 10 m x 10 m. Lime was incorporated to a depth of 0-20 cm. Different methods were used to determine the amount of lime required to maximize production: increase of soil pH to 5.5 and 6.0; Woodruff; SMP; calcium acetate; exchangeable Al and Ca plus Mg; base saturation; and CM to raise soil pH to 5.0 and 6.5. Results indicated that liming did not increase maize yields and its effects on bean yields varied depending on the soil. The methods of exchangeable Al and Ca + Mg and base saturation underestimated the liming requirement, whereas the other methods overestimated the liming requirement for max. yield. (AS)

0071

29968 PRIMAVESI, O.; MELLO, F.A.F. DE; MURAOKA, T. 1985. Efeito do nivel de fertilidade de dois solos submetidos a compactacao sobre o comportamento do acumulo de materia seca e nutrientes por feijoeiro (Phaseolus vulgaris). (Effect of the level of fertility of two soils subjected to compaction on the dry matter and nutrient accumulation in dry beans). Anais da Escola Superior de Agricultura Luiz de Queiroz 42(1):245-264. Pt., Sum. Pt., En., 15 Ref.

Phaseolus vulgaris. Cultivars. Soils. Soil compaction. Fertilizers. Dry matter. Mineral content. Shoots. Roots. Ca. Zn. P. Fe. Mn. Brazil.

Bean cv. Rico Pardo and Aroana 80 were grown in 2 soil types (Oxisol and Alfisol) subjected to 3 levels of compaction, with and without fertilization. The level of fertility affected DM content as well as the Ca, Zn, and P in the shoots and Ca, Zn, P, Fe, and Mn in the roots. (AS (extract))

0072

29728 PRIMAVESI, O.; MELLO, F.A.F. DE; LIBARDI, P.L. 1984. Influencia da compactacao em caracteristicas químicas e propriedades físicas de amostras de solo cultivadas com feijoeiro. (Influence of compaction on chemical characteristics and physical properties of soil samples planted to bean). Anais da Escola Superior de Agricultura Luiz de Queiroz 41(1):465-483. Pt., Sum. Pt., En., 29 Ref., Il.

Phaseolus vulgaris. Soil compactation. Soils. Soil fertility. Soil moisture. C. Al. P. Mg. Brazil.

Expt. were carried out to determine the effect of compaction on chemical and physical properties of soils cultivated with beans. Oxisol and Alfisol samples (horizons A and B2), submitted to compaction, were used. Samples were placed in 3.8-liter pots, incubated for 80 days, and cultivated with beans during 67 days. Soil water tension varied between 100-300 mbars. An increase of the soil bulk density and a decrease of the total porosity and the saturated hydraulic conductivity were observed. The micropores and blocked pores increased in ten Oxisol and decreased in the Alfisol. Soil

samples of Oxisol-B2 were less susceptible to changes due to compaction, while those of Alfisol-B2 were the most susceptible, followed by those of Oxisol-A1 and Alfisol-Ap. Chemical data showed a tendency of the C level to increase in the A horizon without fertilizer and to decrease with fertilizer, on Oxisols and Alfisols with increasing compaction. Available P also decreased and exchangeable Al increased with fertilization; exchangeable Mg decreased with and without fertilization in the A horizon of both soils as compaction increased. (AS)

0073

29729 PRIMAVESI, O.; MELLO, F.A.F. DE; MURAOKA, T. 1984. Variacao na participacao relativa dos nutrientes acumulados por feijoeiro (Phaseolus vulgaris L.), em Oxisol e Alfisol em funcao da compactacao. (Variation in the relative participation of the nutrients accumulated by common beans in an Oxisol and an Alfisol, due to compaction). Anais da Escola Superior de Agricultura Luiz de Queiroz 41(1):413-432. Pt., Sum. Pt., En., 11 Ref.

Phaseolus vulgaris. Nutrient uptake. Mg. Ca. Fe. K. N. Soil compaction. Soils. Roots. Shoots. Brazil.

The relative analytical data of absorption of the macro- and micronutrients in the DM of common bean were analyzed in relation to the behavioral tendency due to soil compaction levels and further compared with available absolute values. Plants were grown in Oxisol and Alfisol soils in 3.8-liter pots. The accumulation of Mg, Ca, and Fe tended to increase and that of K to decrease in the shoots; root extraction of Mg, Ca, and K increased and that of N decreased. A differential behavior was observed between relative and absolute data, mainly for the roots. An inversion of the general tendency of K, Ca, and Fe occurred. To compare the behavior of the different nutrients, the relative data seem to be more appropriate, when all essential nutrients are considered. (AS)

0074

29924 RODRIGUEZ R., J.J.; CHAVES F., C.A.; ARAYA V., R.; RIVERA G., J.C. 1986. Distribución de riego por etapas de desarrollo en frijol (Phaseolus vulgaris L.). (Irrigation distribution at different development stages of beans). Boletín Técnico de la Estación Experimental Fabio Baudrit 19(4):9-16. Es., Sum. En., Es., 11 Ref.

Phaseolus vulgaris. Developmental stages. Irrigation. Yields. Costa Rica.

The effect of 3 irrigation distributions was studied at different developmental stages of the bean cv. Mexico 80-R at the Fabio Baudrit Exptl. Station (Alajuela, Costa Rica). A randomized complete block exptl. design with 6 replications was used. Treatments were: (a) irrigation at the development stages of germination, primary leaves, 3rd trifoliate leaf, flowering, and pod formation-pod fill; (b) irrigation at the development stages of germination, primary leaves, 1st trifoliate leaf-3rd trifoliate leaf, preblooming-pod fill; and (c) irrigation at the development stages of germination, primary leaves, preblooming, pod formation, and pod fill. Three 70-m-long rows, spaced at 0.60 m, were used. The middle row (42 square meters) was taken as the useful plot area. The irrigation treatments affected the grain yield. Treatment b yielded the highest, providing better cover at the vegetative and preblooming stages. (AS)

0075

29930 SACKO, M. 1987. Water management effects on biomass production and seed yield of Phaseolus vulgaris L. Thesis M.Sc. Gainesville, University of Florida. 91p. En., Sum. En., 55 Ref., Il.

Phaseolus vulgaris. Cultivars. Irrigation. Water stress. Developmental stages. Leaf area. Yields. Yield components. Growth. USA.

The effects of differential irrigation treatments imposed on 2 bean cv. (Porrillo Sintetico and BAT-477) were examined in a field expt. conducted in 1986 in Gainesville (Florida, USA). Water management treatments included daily irrigation, 4-day irrigation, 8-day irrigation, special irrigation (conservative water application followed by severe stress during seed filling), and rainfed. Vegetative and reproductive growth stages, plant height, leaf area, light interception, and leaf water potentials were determined in addition to weekly dry wt. measurements of leaves, main stems, pods, and seeds. Seed yields and yield components were determined at crop maturity. Rates of crop and seed DM accumulation were estimated as the slopes of linear regressions fitted to data from linear growth phases. Total biomass accumulation, LAI, and light interception increased as the amount of irrigation water increased. Biomass accumulation, CGR, total pod growth rate, total seed growth rate, seed no., wt./seed, and seed yield at harvest maturity in the daily irrigated plants and those irrigated on a 4-day interval were statistically similar for both cv. The 8-day irrigation treatment resulted in intermediate leaf water potentials, plant heights, seed no., and seed yields at harvest maturity. Withholding water during seed filling (special irrigation treatment) resulted in severe water deficits and reduced seed no., seed growth rate, and effective seed filling period. Severe season-long stress as a result of the rainfed treatment caused rainfed plants to maintain low leaf water potentials and resulted in very low biomass accumulation, leaf area, and seed yield. Yield components (wt./seed and no. of seed.) were quite responsive to water stress, but HI was reduced only when more severe water deficits were imposed. Seed yield at harvest maturity were similar in both cv. for the daily and 4-day irrigation intervals, while the 8-day, special irrigation, and rainfed treatments significantly reduced yields. Results from this study demonstrated the sensitivity of the 2 cv. to water stress when grown on a deep, well-drained sandy soil during a relatively dry spring growing season in north Florida. (AS (extract))

0076

29746 SIDDIQUE, M.A.; SAGWAN, F.F. 1984. Influence of growing temperature on vegetative growth and yield of French bean. Indian Journal of Horticulture 41(3-4):753-758. En., Sum. En., 9 Ref., Il. [Dept. of Horticulture, Bangladesh Agricultural Univ., Mymensingh, Bangladesh]

Phaseolus vulgaris. Snap beans. Planting. Temperature. Growth. Podding. Australia.

Glasshouse expt. were carried out to define an optimum temp. for the production of French beans. A temp. of 24/19 degrees Celsius (day/night) during the initial vegetative growth phase was found to be optimal for the development of healthy, compact, and strong French bean cv. Apollo plants. Growth was slower at lower temp. Plants grew at higher temp. (33/28 and 30/25 degrees Celsius) were less vigorous, with weak stems and pale leaves. Pod set and retention were optimal at 24/19 and 27/22 degrees Celsius, falling both at higher and lower temp. Set did not occur at 33/28 degrees Celsius. Pods developed and matured earlier at higher temp. Growing of the plants at 18/13, 21/16, or 24/19 degrees Celsius after the initial vegetative growth of the plants and pod set at 24/19 degrees Celsius did not influence the total seed yield/plant; however, seed size decreased with increase in temp. (AS)

0077

29744 SOARES FILHO, H.F.; PUZZO, L.C. DE S.; SANTOS, J.P. DOS 1984. Comportamento de cultivares de feijoeiro (Phaseolus vulgaris L.) e de suas misturas em relação a doses de superfosfato simples. (Performance of bean cultivars and of their mixtures in relation to doses of superphosphate). Ciencia e Pratica 8(2):167-177. Pt., Sum. Pt., En., 18 Ref.

Phaseolus vulgaris. Cultivars. Fertilizers. P. Yields. Brazil.

Stability parameters of yield (b and s(2)d) were estimated for 7 dry bean cv. and 3 mixtures of these cv., grown in 5 environments simulated by different doses of superphosphate, according to the Eberhart and Russell method which is based on simple linear regression. Mixtures of cv. Rico 23 + Cuva 168-N + Moruna and Ricobaio 1014 + Mulatinho Vagem Roxa gave the highest yields whereas cv. Ricopardo 896 had the highest yield capacity. Cv. Ricobaio 1014 and the mixture Rico 23 + Cuva 168-N + Moruna showed little response to the increase in phosphate fertilization levels, giving higher yield with low doses of superphosphate. Cv. Ricopardo 896 showed high adaptation to favorable environments, with a positive response to phosphate fertilization. Cv. Moruna was unstable in relation to the simulated environments. There was a tendency for the mixtures to be more productive than the mean of its resp. components. The mixture Rico 23 + Cuva 168-N + Moruna had higher stability than its components. (AS)

0078

29735 SRINIVAS, K.; RAO, J.V.; PRABHAKAR, B.S. 1985. Response of French bean to planting time in relation to plant density. Mysore Journal of Agricultural Science 19(4):260-264. En., Sum. En., 11 Ref., Il. [Indian Inst. of Horticultural Research, Bangalore-560 080, India]

Phaseolus vulgaris. Snap beans. Planting. Timing. Spacing. Yields. Yield components. Climatic requirements. Soil fertility. India.

The response of French bean cv. Purpee Stringless to 9 planting dates (June 5 and 25, July 15, Aug. 5 and 25, Sept. 15, Oct. 5 and 25, and Nov. 15) and 4 planting densities (100,000, 125,000, 200,000, and 250,000 plants/ha) was studied on a low fertility, sandy loam soil at the Hessaraghatta expt. station of the Indian Institute of Horticultural Research in Bangalore during 1978-79 and 1980-81. Plantings carried out up to Aug. 5 consistently gave higher yields compared with later plantings. Environmental factors affected growth and yield components such as plant height, no. of branches, pod no./plant, and pod wt./plant, leading to lower pod yields. Pod yields at 200,000 and 250,000 plants/ha were similar, but were significantly higher than at 100,000 and 125,000 plants/ha. (AS)

0079

29288 SUMMERFIELD, R.J.; ROBERTS, E.H. 1987. Effects of illuminance on flowering in long- and short-day grain legumes: a reappraisal and unifying model. In Atherton, J.G., ed. Manipulation of flowering. London, Butterworths. pp.203-223. En., 58 Ref., Il.

Phaseolus vulgaris. Illumination. Photoperiod. Flowering. United Kingdom.

The responsiveness of grain legumes (including beans) to dim light at dawn and dusk was studied, and the implications of the conclusions from this work for the interpretation of photoperiodic responses in natural environments and for the execution of breeding programs are discussed. The work described involves the interpretation of several expt. in which plants were subjected to natural short days, which were extended to long days of at least 16 h by illumination provided by tungsten incandescent lamps along an illuminance gradient. A model that shows the response of beans in terms of its rate of progress towards flowering at different values of log illuminance is developed and tested. (CIAT)

0080

29923 VIEIRA, R.F. 1986. Desempenho de sementes de feijao provenientes de diferentes niveis de adubacao. (Performance of bean seeds produced under different levels of fertilization). Pesquisa Agropecuaria Brasileira 21(11):1161-1168. Pt., Sum. Pt., En., 17 Ref., Il. [EMBRAPA/Centro Nacional de Pesquisa de Arroz e Feijao, Caixa Postal 179, 74.000 Goiania-GO, Brasil]

Phaseolus vulgaris. Cultivars. Seed. Fertilizers. N. P. K. Mo. Yield components. Seed characters. Water stress. Brazil.

Two 2-stage expt. were conducted to study the performance of the seeds of 3 bean cv. submitted to different levels of fertilization: T0, no fertilization; T1, NPK fertilization based on soil lab. recommendations; T2, twice the rate applied in T1. In the 1st expt., Mo was added to T2. In the 2nd stage, the performance of seeds produced under T0 and T2 was assessed under different levels of fertilization. In both stages of both expt., the effect of fertilization on final stand, seed wt., and commercial acceptability of seed was observed. Fertilizer application reduced the final stand when water stress occurred after planting. Fertilization increased seet wt. but, for unknown reasons, reduced its commercial acceptability. Under adverse germination conditions, the seeds of cv. Rico 23 submitted to T2 had a higher final stand than those produced without fertilizer; however, this difference did not significantly affect seed yield. (AS) See also 0001 0017 0039 0043 0093 0203 0205

D02 Cultivation Practices: Planting, Weed Control and Harvesting

0081

29796 ACOSTA, M.A.; SILVERA, G.A.; RUIZ, J.C. 1985. Guía para el productor de poroto. (Handbook for bean producers). El Dorado, Panamá, Instituto de Investigación Agropecuaria de Panamá. Departamento de Publicaciones. 20p. Es., Il.

Phaseolus vulgaris. Cultivars. Land preparation. Planting. Timing. Fertilizers. Weeding. Agrotis. Elasmopalpus. Phyllophaga. Diabrotica balteata. Cerotoma. Trichoplusia. Epicauta. Rhizoctonia solani. Harvesting. Disease control. Production. Panama.

A handbook for bean producers is presented based on the research and farming experience in Caisán (Chiriquí, Panama). Different aspects covered are soil and climate requirements, var. (Rosado, Chileno, Mantequilla, Calima), soil preparation (covered beans, zero tillage, conventional tillage), seed selection, planting seasons and methods, fertilization, weed control, and harvest. Economically important insect pests (Agrotis sp., Elasmopalpus sp., Phyllophaga sp., Diabrotica balteata, Cerotoma sp., Trichoplusia sp., Epicauta sp.) and diseases (Thanatephorus cucumeris) and their control are mentioned. A comparative table shows farmer practices vs. improved practices recommended by the Instituto de Investigación Agropecuaria de Panamá. Additionally, bean production and importation figures of Panama are given on a yearly basis for the period 1974-82. (CIAT)

0082

29904 ARAYA V., R.; GONZALEZ M., W. 1987. El sistema de frijol tapado en Costa Rica. (The covered bean planting system in Costa Rica). In Taller de Mustia Hilachosa (Thanatephorus cucumeris), 2, San José, Costa Rica, 1986. Conferencias. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Regional de Frijol para Centroamerica y el Caribe. pp.66-73. Es. [Estación Experimental Fabio Baudrit, Apdo. 183-405, Alajuela, Costa Rica]

Phaseolus vulgaris. Covered beans. Planting. Harvesting. Costa Rica.

The covered bean planting system as used in Costa Rica is described in detail. When the crop is for self-consumption, grain color is not important. Criteria to select land for this planting system are given and cultural practices used are described: land clearing in strips, broadcasting, clearing and chopping of brush, and harvesting. (CIAT)

0083

29976 CAMPBELL, J.R.; PENNER, D. 1987. Retention, absorption, translocation and distribution of sethoxycim in monocotyledonous and dicotyledonous

plants. Weed Research 27(3):179-186. En., Sum. En., Fr., De., 20 Ref., Il. [BASF Corporation, Parsippany, NJ 07054, USA]

Phaseolus vulgaris. Herbicides. Plant assimilation. Translocation. USA.

Quackgrass (Elymus repens) and barnyard grass (Echinochloa crus-galli) were more than 100 times more susceptible to sethoxydim than alfalfa or navy bean cv. Seafarer. More than 80 percent of foliar-applied (14)C-sethoxydim was absorbed within 6 h in all species. Translocation occurred in all species with accumulation of (14)C in rapidly growing plant tissues. Translocation to the roots was less than 8 percent of total in all species. Most of the extracted (14)C initially partitioned into an ethyl acetate-soluble fraction. The proportion of (14)C in the ethyl acetate-soluble fraction decreased with time with a concomitant increase of that in the insoluble fraction. Differences in the quantity of (14)C in the ethyl acetate-soluble fraction did not account for the observed selectivity. (AS)

0084

28668 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1980. Manejo y control de las malezas y el cultivo del frijol; unidad audiotutorial. (Weed management and control and bean cultivation; audiotutorial unit). Producción Fuentes de Piedrahita, C.L.; asesoría Doll, J.; colaboración Ospina O., H.F.; Flor M., C.A. Cali, Colombia. 112 diap. color 5 x 5 cm.; 1 cassette 42 min.; guión 30p.; guía de estudio 71p. En., Il.

Phaseolus vulgaris. Weeding. Weeds. Intercropping. Zea mays. Manihot esculenta. Tillage. Colombia.

The critical periods of weed competition with beans are discussed. Recommendations on chemical control are included. The main weeds that affect the bean crop are described as well as the pests and diseases of which these are hosts and that can be injurious to the crop. The bean-maize and bean-cassava associated cropping systems are discussed from the viewpoint of weed management and control. The min. tillage system is also analyzed. (CIAT)

0085

29988 FAIGUENBAUM M., H.; BADILLA S., I.; CONCHA V., J.; ARCE P., F. 1986. Efecto de la densidad y espaciamiento sobre el área foliar, duración del área foliar y producción de dos cultivares de frejol (Phaseolus vulgaris L.). (Effect of density and arrangement on leaf area, leaf area duration, and yield of two bean cultivars). Ciencia e Investigación Agraria 13(2):91-101. Es., Sum. Es., En., 8 Ref., Il.

Phaseolus vulgaris. Spacing. Planting. Cultivars. Leaf area. Yields. Chile.

The effect of plant arrangements and populations on leaf area, LAD, and yield was studied in bean cv. Seaway (bush type) and Tortola (climbing type). Eight populations resulting from the combination of 4 interrow distances (70, 60, 50, and 40 cm) and 2 interrow distances (10 and 5 cm) were tested. Leaf area/plant decreased significantly when the intrarrow distance decreased; however, no significant change occurred when interrow distance was reduced. Highest leaf area values/plant were obtained with the lowest populations, but these were associated with lower yields. On the contrary, higher populations resulted in plants with smaller leaf area but the highest LAI were obtained and, consequently, a better yield/unit area. The LAD between emergence and harvest was found to be significantly related with yield. Correlation values were 0.71 for Seaway and 0.68 for Tortola. LAD highest values were obtained with the highest populations. A rectangularity effect was observed in intermediate plant densities in which the smaller populations with more equidistant arrangements showed higher yields than larger populations. (AS)

0086

29979 FIELD, R.J.; NKUMBULA, S. 1986. Green beans (Phaseolus vulgaris cv. Gallatin 50): effects of plant population density on yield and quality. New Zealand Journal of Experimental Agriculture 14(4):435-442. En., Sum. En., 10 Ref., Il. [Agriculture & Water Development, Magoye Regional Research Station, P.O. Box 11, Magoye, Zambia]

Phaseolus vulgaris. Snap beans. Spacing. Planting. Yields. New Zealand.

Field trials were conducted to determine whether plant population density and spatial arrangement improve yields and quality of green bean cv. Gallatin 50. Between-row distances were 15, 30, 38, and 45 cm and within-row distances, 7 or 14 cm. Total pod yield and yield of processable pods (more than 5 cm in length) showed significant quadratic responses to increasing population density. A plant population density of more than 40 plants/square meter increased total pod yield by 3 kg/square meter. Plant population density was a more important determinant of yield than planting arrangement. No significant differences were observed in pod size distribution between treatments, with at least 92.5 percent of total fresh wt. being processable pods. In the same way, plant population density had no effect on distance between the soil and the 1st pod and on pod color (as determined by chlorophyll measurements); however, some pod bleaching occurred in all but the 15 cm treatments. (CIAT)

0087

29925 SOLIS D., C.M.; ARAYA V., R. 1986. Evaluación de distancias y densidades de siembra en frijol (Phaseolus vulgaris L. cv. Huetar). (Plant distances and population assessment of common bean cv. Huetar). Boletín Técnico de la Estación Experimental Fabio Baudrit 19(4):17-23. Es., Sum. Es., En., 9 Ref., Il.

Phaseolus vulgaris. Spacing. Yields. Growth. Costa Rica.

Three distances between rows (0.2, 0.4, and 0.6 m) and 3 plant populations (200,000, 300,000, and 400,000 plants/ha) of bean cv. Huetar were evaluated at 2 localities of Costa Rica: Fabio Baudrit exptl. station and Upala. At the exptl. station only the distance between rows influenced the grain yield, with a linear negative effect. With a population of 200,000 plants/ha, a higher no. of pods/plant was obtained. In Upala grain yield was not affected by the evaluated treatments, but taller plants, no lodging, and greater elongation of growth apexes of stems and branches were observed. (AS)

0088

29916 SOTO, A.; GAMBOA, C. 1984. Competencia entre las malas hierbas y el frijol (Phaseolus vulgaris L.) en función del cultivar, la población y la distancia entre hileras. (Bean competition with weeds as influenced by cultivar, plant density and interrow distances). Agronomía Costarricense 8(1):45-52. Es., Sum. En., Es., 8 Ref.

Phaseolus vulgaris. Cultivars. Spacing. Weeding. Yields. Costa Rica.

Two expt. were conducted with beans at the Fabio Baudrit Moreno Exptl. Station (Alajuela, Costa Rica) to study the influence of the cv., density, and interrow distances on bean competition with weeds. The 1st expt. took place during the rainy season of 1981, with cv. ICA-Pijao and Talamanca, planted in rows 0.3 and 0.6 m apart, and a planting density of 238,000 plants/ha. Weeds were allowed to grow in the bean field for 0, 15, 30, and 45 days after crop establishment and were then removed manually until harvest. In the control treatment, weeds were left in the field until harvest. The 2nd expt. took place during the dry season of 1982, with cv. ICA-Pijao at planting densities of 238,000 and 476,000 plants/ha, with 0.3 and 0.6 m between rows. Weeds were manually removed (1) during the whole crop cycle, (2) during the 1st 30 days (3) after crop establishment, after

the 1st 30 days following crop establishment, and (4) left unweeded throughout the crop cycle. When the interrow distance was reduced from 0.6 m to 0.3 m, ICA-Pijao gave a better ground cover, this did not occur with Talamanca. Furthermore, the shorter distance between rows (0.3 m) increased bean tolerance to weed damage, and during the dry season led to an increase in grain production. When the bean planting density was increased from 238,000 to 476,000 plants/ha, coverage improved; however, yields did not increase. The critical period for weed competition in both cv. was from 30 to 45 days after crop establishment. Weed damage to beans during this period reduced grain yield. (AS) See also 0078 0128 0141 0175 0221

D03 Cultivation Systems: Intercropping, Rotational Crops

0089

29922 CANDAL NETO, J.F.; PACOVA, B.E.V.; GUIDONI, A.L. 1986. Comportamento de cultivares de feijao em cultivo exclusivo e associado ao milho no Espírito Santo. (Performance of bean cultivars in sole and associated cropping with maize in Espírito Santo). Pesquisa Agropecuaria Brasileira 21(11):1155-1159. Pt., Sum. Pt., En., 10 Ref. [Empresa Capixaba de Pesquisa Agropecuária, Caixa Postal 391, 29.000 Vitória-ES, Brasil]

Phaseolus vulgaris. Intercropping. Cultivars. Yields. Brazil.

Expt. were carried out from 1978 to 1980 in Afonso Claudio and Domingos Martins (Espírito Santo, Brazil), to select bean cv. adaptable to both associated and sole cropping, and to determine if there is any correlation between the yield of both cultivation systems. The most productive cv. in both systems were Rio Tibagi and Ricopardo 896: 1293 and 1208 kg/ha in associated cropping and 1683 and 1725 kg/ha in sole cropping, resp. There was a positive and significative correlation (r = 0.74**) between sole and associated cropping yield. The associated cropping presented an av. decrease of 37.7 percent, in relation to sole cropping. The development of diseases was lower in the associated cropping. (AS)

0090

28684 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1986. Bean production systems in Africa; audiotutorial unit. Scientific content Allen, D.J.; production Arregocés, O. Cali, Colombia. 65 color slides 5 x 5 cm.; 1 cassette 65 min.; script 12p.; study guide 16p. En., Il. Also in French.

Phaseolus vulgaris. Cultivation systems. Plant breeding. Africa.

The principal bean production systems in Africa are described. Potential improvement strategies are proposed. The main agronomic constraints to bean production are analyzed and strategies are given for improving production. (CIAT)

0091

28678 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1986. Principles of intercropping with beans; audiotutorial unit. Scientific content Davis, J.H.C.; Smithson, J.B.; production Arregocés, O. Cali, Colombia. 90 color slides 5 x 5 cm.; 1 cassette 19 min.; script 11p.; study guide 40p. En., Il. Also in French.

Phaseolus vulgaris. Intercropping. Colombia.

Intercropping systems with beans are described. The advantages of intercropping for the farmer are discussed and the importance of including intercropping in research programs is emphasized. (CIAT)

0092

29749 CHUI, J.N.; NADAR, H.M. 1984. Effect of spatial arrangements on the yield and other agronomic characters of maize and legume intercrops. East African Agricultural and Forestry Journal 44(Special issue):137-146. En., Sum. En., 16 Ref., Il. [Agricultural Research Dept., Kenya Agricultural Research Inst., Muguga, Kenya]

Phaseolus vulgaris. Zea mays. Intercropping. Yields. Yield components. Kenya.

Field trials were conducted at the National Dryland Farming Research Station Katumani, Kenya), during the long rains of 1981, to determine the effects of spatial arrangements on the yield and yield components of maize intercropped with beans. Maize cv. Katumani Composite B was sown with the common bean cv. Mwezi Moja, and thinned to 55,000 and 55,000 or 100,000 plants/ha, resp. Beans were planted in the same hole or in the same or alternate rows with maize. Intercropping systems increased maize grain yields, and reduced bean seed yields by 67 percent; the bean seed reduction was mainly due to a decrease in no. of pods/plant (31-38 percent) and reduced no. of seeds/pod (9-20 percent). Total yields and LER were greatest in intercropped systems. It is concluded that manipulation of plant spatial arrangements, total component-plant densities, and soil fertility levels could improve the yield of intercropped legumes without significantly reducing the yield of maize. (CIAT)

0093

28871 LANDA, C. 1986. Essai de rentabilisation immédiate des amendements calco-magnésiens par application localisée sur cultures vivrieres. AM 8602. (Trial on immediate income of calcium-magnesium amendments by spot application on horticultural crops. AM 8602). In Institut des Sciences Agronomiques du Burundi. Rapport Annuel 1986. (Septembre 1985-Aout 1986). Bujumbura. v.3,pp.20-30. Fr., Il.

Phaseolus vulgaris. Zea mays. Intercropping. Soil amendments. Income. pH. Ca. Mg. K. Micronutrients. Burundi.

The economic and agronomic advantages of the spot application of Ca-Mg amendments in bean/maize associated cropping systems were studied as compared with broadcasting. The trials were performed in Nyabihanga (Nyabibuga, Burundi), in acid soil (pH 4.3) with a high percentage of exchangeable Al. Results showed a severe effect of spot applications which rapidly increased the soil pH. Consequently, there was a lack of equilibrium in the Ca:Mg ratio and minor elements such as Fe and Mn were immobilized. Soil pH increased at a slower rate with broadcasting. It was concluded that broadcasting was more efficient since it assures a better distribution of the amendment on the topsoil, without causing such rapid increases in pH which are harmful to a balanced mineral nutrition. The economic optimum is reached with a Ca-Mg amendment dose between 800-1000 kg/ha, although very good results were obtained with lower doses. (CIAT)

0094

29650 MILANEZ, J.M. 1987. Estudo da entomofauna em consórcio feijao-milho em Santa Catarina. (Entomofauna study in the bean-maize association in Santa Catarina). Florianópolis-SC, Brasil, Empresa Catarinense de Pesquisa Agropecuária. Comunicado Técnico no.110. 18p. Pt., 5 Ref. [EMPASC, Centro de Pesquisa para Pequenas Propriedades, Caixa Postal 151, Chapecó-SC, Brasil]

Phaseolus vulgaris. Intercropping. Zea mays. Diabrotica speciosa. Cerotoma. Colaspis. Predators and parasites. Piezodorus guildini. Population dynamics. Planting. Timing. Brazil.

Insect populations were qualitatively and quantitatively evaluated on a weekly basis in bean cv. Rio Tibagi/maize hybrid Pionner 6872 in

association and their resp. monocrops in Chapecó (Santa Catarina, Brazil) for the 1982/83, 1983/84, and 1984/85 cropping seasons. Insect incidence in beans over the whole period was generally low; however, the populations of Diabrotica speciosa, Cerotoma sp., and Colaspis sp. were reduced 30.6, 56.6, and 13.9 percent, resp., in the associated cropping system compared with beans in monoculture. Predatory insect populations (especially Lebia concinna and Nabis sp.) increased 70.2 percent in the bean/maize association. During the secondary planting season (Feb.-April), insect populations were higher and the bean/maize association during this period showed reductions in the populations of D. speciosa, Cerotoma sp., and Colaspis sp. of 54.5, 51.6, and 6.8 percent compared with beans in monoculture. Empoasca kraemeri populations during the same period were reduced 59.1 percent in associated beans. The populations of predatory insects (especially L. concinna and Doru lineare) during this same period increased 56.3 percent in associated crops compared with monocrops. Populations of the bean pest Piezodorus guildini were reduced 97.2 percent in associated crops in the main planting season (Oct.-Jan.) and 93.4 percent in the secondary planting season. It was concluded that the bean/maize association could be used as a strategy to minimize problems caused by certain important insect pests of beans, such as E. kraemeri. (CIAT)

0095

28429 SERPA, J.E.S.; BARRETO, A.C. 1986. Competicao de cultivares de feijao em consorciacao com o milho nas microrregioes homogeneas 123 e 130, do Estado de Sergipe. (Competition of bean cultivars in association with maize in the homogeneous microregions 123 and 130 of the state of Sergipe). Aracaju-SE, Brasil, Empresa Brasileira de Pesquisa Agropecuaria. Centro Nacional de Pesquisa de Coco. Pesquisa em Andamento no.06. 6p. Pt. [EMBRAPA, Centro Nacional de Pesquisa de Coco, Caixa Postal 44, 49.000 Aracaju-SE, Brasil]

Phaseolus vulgaris. Cultivars. Intercropping. Zea mays. Yields. Adaptation. Brazil.

Ten bean cv. (Mulatinho Vagem Roxa, Favinha, IPA-74-19, IPA-1, Rim de Porco, Gordo, Costa Rica, Aristides, Milagre de Santo Antonio, and Mulatao) were assessed for productivity in association with maize cv. Centralmex in simultaneous plantings in Poco Verde and Porto da Folha (Sergipe, Brazil). A maize:beans spatial arrangement of 1:3 was used, with 25,000 maize plants and 150,000 bean plants/ha. LER's for each bean cv. in association were higher in Poco Verde (range 1.19-1.50) than in Porto da Folha (range 1.11-1.31). Outstanding cv. regarding LER were Mulatinho Vagem Roxa (1.50) in Poco Verde and IPA-1 (1.31) in Porto da Folha. The highest bean yields were also recorded in Poco Verde and were attributed to higher rainfall during the growth cycle and greater natural soil fertility. The most productive bean cv. in Poco Verde were IPA-1, Mulatinho Vagem Roxa, and Rim de Porco (1336.3, 1256.4, and 1198.9 kg/ha, resp.), while the most productive in Porto da Folha were Gordo, Favinha, and IPA-1 (967.6, 906.4, and 829.5 kg/ha, resp.). A generalized BGMV attack occurred in Porto da Folha contributing to lower yields. Cv. Gordo, Favinha, IPA-1, and Bagajo showed tolerance to the disease. Correlations between bean yields in monoculture and in association showed a nonsignificant coefficient in Poco Verde ($r = 0.33$) and a significant coefficient in Porto da Folha ($r = 0.77$), indicating that the best bean cv. in Poco Verde, selected for a given cropping system, are not necessarily a selection for another system, the contrary being true for Porto da Folha. (CIAT)

0096

28089 VILLACRES G., F. 1976. Estudio agroeconómico preliminar de la producción de frejol asociado con maíz en las provincias de Carchi e Imbabura. (Preliminary agroeconomic study of the production of beans associated with maize in the Carchi and Imbabura provinces). Quito,

Ecuador, Instituto Nacional de Investigaciones Agropecuarias. Departamento de Economía Agrícola. 83p. Es., Sum. Es., 15 Ref., Il.

Phaseolus vulgaris. Intercropping. Zea mays. Cultivation. Income. Ecuador.

An agroeconomic analysis was carried out on 23 and 25 farms, resp., of the Carchi and Imbabura provinces, Ecuador, to gather basic information in order to establish research strategies and priorities and government policies, aimed at increasing bean production. It was concluded that the area of Carchi is more adequate for the promotion of bean cultivation. The associated-intercropping system with maize (climbing bean/maize + bush bean) is the most profitable and represents the greatest benefits for the farmer. Diseases and pests are the main constraints. Irregular rainfall and the lack of infrastructure, such as irrigation facilities, can also be considered limiting factors. (AS (extract)-CIAT)

0097

29959 WOOLLEY, J.N.; RODRIGUEZ, W. 1987. Cultivar x cropping system interactions in relay and row intercropping of bush beans with different maize plant types. Experimental Agriculture 23(2):181-191. En., Sum. En., Es., 11 Ref., Il. [Centro Agronómico Tropical de Investigación y Enseñanza, Turrialba, Costa Rica]

Phaseolus vulgaris. Intercropping. Dwarf beans. Cultivars. Zea mays. Relay crops. Yields. Costa Rica.

Bean yield at 2 sites in Costa Rica (Turrialba and Parruas) was affected by the interactions of maize and bush bean cv. with cropping system (relay, row intercropping, and sole cropping). Maize cv. were grouped according to LAI and plant height. In Turrialba, a site with a severe weed problem, leafy maize of intermediate height allowed the highest bean yield in relay cropping but the lowest in intercropping. With tall, leafy maize intercropped beans yielded the same as with short, less leafy cv. In intercrops, tall maize plants shaded the beans less, while in relay crops leafy plants of intermediate height shaded and suppressed weed growth thus benefitting the following bean crop. At the other site, all maize groups had the same effect on beans whether grown in relay or intercropping system. Leafy maize cv. of intermediate height are preferable for sole cropping of maize and, at physiological maturity, for relay cropping with beans when weeds are a problem. Less leafy maize types, however, are better for bean intercropping or for relay crops where the beans are planted before maize maturity. Plant types selected for sole cropping are not necessarily the best for associated cropping systems and one crop may affect another even when their periods of active growth do not overlap. (AS) See also 0017 0084 0184

D04 Seed Production

0098

29625 SIDDIQUE, M.A.; GOODWIN, P.B. 1984. Development of bean (Phaseolus vulgaris) seed in relation to morphology, physiology, chemical composition, anatomy and vigour of seed. Bangladesh Journal of Botany 13(1):68-78. En., Sum. En., 16 Ref., Il. [Dept. of Horticulture, Bangladesh Agricultural Univ., Mymensingh, Bangladesh]

Phaseolus vulgaris. Seed. Seeds. Seedling. Plant development. Seed vigor. Pods. Starch content. Germination. Bangladesh.

Early harvested fresh bean cv. Apollo seeds with a high MC showed radicle emergence in Petri dishes; however, drying of the seed was essential to obtain healthy, normal seedlings. Rapid drying of threshed seeds with a high MC caused physical injury to the seed, and ultimately reduced seed

vigor. Slow drying of early harvested pods resulted in a gain in seed dry wt. Pods harvested as early as day 31 and dried slowly gave seeds of high vigor. Slow drying of threshed seeds harvested between days 39-49 (seed MC ranging from 54.5 to 23.5 percent at harvest) gave high quality seeds. Seed vigor could not be related to the conc. of starch or N/g seed dry wt. or to the development of starch grains in the cotyledon cells; however, in dried seeds the seed vigor was well correlated with seed dry wt. (AS)

D05 Varietal Trials

0099

29783 SERPA, J.E.S.; CARVALHO, H.W.L. DE 1985. Introducao e avaliacao de cultivares de feijao (Phaseolus vulgaris L.) no Estado de Sergipe. (Introduction and evaluation of bean cultivars in the state of Sergipe). Aracaju-SE, Brasil, Empresa Brasileira de Pesquisa Agropecuaria. Unidade de Execucao de Pesquisa de Ambito Estadual de Aracaju. Pesquisa em Andamento no.32. 7p. Pt.

Phaseolus vulgaris. Germplasm. Plant introductions. Cultivars. Adaptation. Yield. Yield components. Resistance. Isariopsis griseola. Flowering. Plant habit. Selection. Brazil.

A total of 195 bean cv. were introduced and evaluated in Poco Verde and Nossa Senhora das Dores (Sergipe, Brazil) in 1984; 100 were from the Empresa Pernambucana de Pesquisa Agropecuaria (IPA) and 95 from the Centro Nacional de Pesquisa de Arroz e Feijao (CNPAF). Yields, yield components, reaction to Isariopsis griseola, and other plant characteristics are given for the top 30 bean cv. evaluated at both sites. In Nossa Senhora das Dores the av. yield of the cv. introduced from IPA was 391 kg/ha and that of the top 30 cv. was 572 kg/ha. Outstanding cv. were L-8.446, L-8.043, L-8.449, and L-8.042 (771, 754, 720, and 694 kg/ha, resp.). The av. yield of the cv. introduced from CNPAF was 345 kg/ha and that of the top 30 cv. was 645 kg/ha. Outstanding cv. were A 252, Rico Pardo 896, A 296, and CNF 0167 (1323, 931, 925, and 919 kg/ha, resp.). In Poco Verde, the av. yield for the cv. introduced from IPA was 618 kg/ha and that of the top 30 cv. was 811 kg/ha. Outstanding cv. were L-9.189, L-8.043, L-8.042, L-9.111, L-8.491, and L-10.146 (999, 948, 924, 917, 909, and 906 kg/ha, resp.). The av. yield for the cv. introduced from CNPAF was 407 kg/ha and that for the top 30 cv. was 631 kg/ha. Outstanding cv. were A 247, BAT 336, and A 358 (970, 937, and 920 kg/ha, resp.). Thus promising materials with good yields, tolerant to I. griseola and to drought, were identified for further screening and subsequent distribution to farmers. (CIAT) See also 0211

E00 PLANT PATHOLOGY

See 0213

E02 Bacterioses

0100

28951 CARY, J.W.; LINDOW, S.E. 1986. The effect of leaf water variables on ice nucleating. Pseudomonas syringae in beans. HortScience 21(6):1417-1418. En., Sum. En., 9 Ref., Il. [Agricultural Research Service, United States Dept. of Agriculture, Route 1, Box 186, Kimberly, ID 83341, USA]

Phaseolus vulgaris. Pseudomonas syringae pv. syringae. Leaves. Water stress. Temperature. USA.

Pinto bean seedlings UI 114 were subjected to temp. between -2 and -5 degrees Celsius for periods ranging from 0.5 to 12.0 h. The plants that were not sprayed with a suspension of the nucleating Pseudomonas syringae bacteria and those that were water-stressed to near wilting were most resistant to ice nucleation. Plants with dry leaf surfaces were much more apt to supercool than those with distilled water droplets on their leaves, whether inoculated with the bacteria or not. Spraying the freeze-dried bacteria suspended in distilled water on the leaves increased wettability and dew formation on the leaf surfaces. Tests with an oxytetracycline preparation, which also increased wetting, suggested that a hydrophobic leaf surface helps delay ice formation. Use of wetting agents in leaf sprays may be counterproductive so far as supercooling stability is concerned. It is obvious that leaf water relations interact with bacterial ice nucleation. (AS)

0101

28673 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1981. Enfermedades bacterianas del frijol: identificación y control; unidad audiotutorial. (Bacterial diseases of beans: identification and control; audiotutorial unit). Coordinación de producción Ospina O., H.F.; asesoría científica Schwartz, H.F.; Rivero, R.; Otoya, M.M.; Correa, F.; Katherman, M.; coordinación unidades Flor M., C.A. Cali, Colombia. 104 diap. color 5 x 5 cm.; 1 cassette 39 min.; guión 16p.; guía de estudio 42p. Es., 11.

Phaseolus vulgaris. Symptomatology. Bacterioses. Isolation. Disease control. Colombia.

The symptomatology of the main bacterial diseases of beans is described. Indications are also given on favorable environmental conditions. Bacteria isolation techniques from infected plant samples are illustrated; these techniques are used for pathogenicity tests. Recommendations on bacterial control are given, highlighting the importance of var. resistance with detailed information on the methodology to evaluate germplasm resistance. (CIAT)

0102

29732 FINKE, M.L.; COYNE, D.P.; STEADMAN, J.R. 1986. The inheritance and association of resistance to rust, common bacterial blight, plant habit and foliar abnormalities in Phaseolus vulgaris L. Euphytica 35(3):969-982. En., Sum. En., 34 Ref. [Dept. of Horticulture & Plant Pathology, Univ. of Nebraska, Lincoln, NE 68583, USA]

Phaseolus vulgaris. Uromyces phaseoli. Xanthomonas campestris pv. phaseoli. Resistance. Crossbreeding. Genes. Plant habit. USA.

No antagonistic or synergistic interaction was found between isolates of Uromyces appendiculatus var. appendiculatus and Xanthomonas campestris pv. phaseoli when inoculated to the same bean plant. A single dominant gene was suggested to control resistance to 3 isolates of rust in the crosses Pompadour Checa x Chichara and Pompadour Checa x NE W-4. A 2-gene model was confirmed for the reaction to the 3 rust isolates for the crosses Pompadour Checa x GN Tara and Pompadour Checa x San Cristobal; a dominant (Urp) gene determined resistance and was epistatic to a dominant gene (Urt) for susceptibility. (Urt) was expressed only in the presence of recessive (urp) alleles. The reaction to common bacterial blight was quantitatively inherited and an association was detected with plant habit but not with rust reaction and leaf variegation. Plants with leaf variegation and crippled growth were detected in the progeny of the cross Pompadour Checa x GN Tara and were controlled by duplicate recessive genes (mutator-unstable genes) and 3 genes, acting additively, resp. The developmental expression of the latter trait varied considerably. Linkage was detected between genes controlling the variegated and the crippling traits. (AS)

0103

29636 LAURENCE, J.A.; REYNOLDS, K.L. 1984. Growth of leaf surface populations of Xanthomonas phaseoli on red kidney bean plants exposed to SO2. Environmental Pollution (Series A) 33(4):379-385. En., Sum. En., 6 Ref., Il. [Boyce Thompson Inst. for Plant Research, Cornell Univ., Ithaca, NY 14853, USA]

Phaseolus vulgaris. Xanthomonas campestris pv. phaseoli. Air pollution. SO2. Leaves. USA.

Three-wk.-old kidney bean plants were exposed to either constant or continuously varying concn. of SO2 at times before or after the application of Xanthomonas phaseoli to leaf surfaces. The growth rate of the bacterium during the 10-day period after application to the leaf surface was not affected by exposures of up to 520 micrograms SO2/cubic meter (approx. 0.20 ppm at standard temp. and pressure) for 6 h on each of 10 days or four 3-h exposures to peak concn. of 2600 micrograms SO2/cubic meter (approx. 1.0 ppm at standard temp. and pressure). Twenty days after application of the bacterium there was some indication that reduced populations were present on leaves of plants exposed to SO2. It does not appear, however, that SO2 in these concn. or durations significantly affects the populations of this bacterium during the epidemiologically important resident phase. (AS)

0104

28631 LINDGREN, P.B.; PEET, R.C.; PANOPOULOS, N.J. 1986. Gene cluster of Pseudomonas syringae pv. phaseolicola controls pathogenicity of bean plants and hypersensitivity on nonhost plants. Journal of Bacteriology 168(2):512-522. En., Sum. En., 38 Ref., 11. [Dept. of Plant Pathology, Univ. of California, Berkeley, CA 94720, USA]

Phaseolus vulgaris. Pseudomonas syringae pv. phaseolicola. Pathogenicity. Races. USA.

Loss of the ability of Pseudomonas syringae pv. phaseolicola NPS3121 to elicit a hypersensitive response on tobacco and other nonhost plants was associated with loss of pathogenicity on the susceptible host bean. Eight independent, prototrophic transposon Tn5 insertion mutants, which had lost the ability to elicit a hypersensitive response on tobacco plants, were identified. Six of these mutants no longer produced disease lesions on primary leaves of the susceptible bean cv. Red Kidney and failed to elicit a hypersensitive response on the resistant bean cv. Red Mexican and on the nonhost plants tomato, cowpea, and soybean. The 2 remaining mutants had reduced pathogenicity on Red Kidney bean and elicited variable hypersensitive responses on the other plants tested. Southern blot analysis indicated that each mutant carried a single independent Tn5 insertion in 1 of 3 EcoRI fragments of about 17, 7, and 5 kilobases. Marker exchange mutagenesis further supported the conclusion that the pleiotropic mutant phenotype was not associated with multiple Tn5 insertions. A genomic library of the wild-type strain was constructed in the cosmid vector pLAFR3. A recombinant plasmid, designated pPL6, that carried P. syringae pv. phaseolicola genomic sequences was identified by colony hybridization. This plasmid restored the wild-type phenotype to all but one mutant, suggesting that genes affected by the insertions were clustered. Structural analysis of pPL6 and the wild-type genome indicated that the 17- and 5-kilobase EcoRI fragments were contiguous in the strain NPS3121 genome. (AS)

0105

28955 MORRIS, C.E.; ROUSE, D.I. 1985. Role of nutrients in regulating epiphytic bacterial populations. In Windels, C.E.; Lindow, S.E., eds. Biological control on the phylloplane. St. Paul, Minnesota, American Phytopathological Society. pp.63-82. En., Il. [Dept. of Plant Pathology, Univ. of Wisconsin-Madison, Madison, WI 53706, USA]

Phaseolus vulgaris. Snap beans. Pseudomonas syringae pv. syringae. Minerals and nutrients. Leaves. Disease control. USA.

Recent research on nutrients available on leaf surfaces, nutrient utilization by epiphytic bacteria, and the way in which nutrients may influence populations of epiphytic microorganisms is reviewed. Results of attempts to control Pseudomonas syringae on snap beans by applying nontoxic nutritional chemicals are also included. Field plots of snap bean cv. Eagle were treated with alpha-glutamine (GLN), beta-alanine (ALA), maltose (MLT), alpha-arabinose, and alpha-glycine (GLY) at different concn. and combinations to study their effect on epiphytic bacteria, P. syringae, and bacterial brown spot. Preliminary results indicated that application of simple organic compounds to bean leaf surfaces can alter the composition of the bacterial community. It is also possible to alter the population size of fluorescent pseudomonads and reduce disease caused by P. syringae. Mechanisms responsible for reductions in fluorescent pseudomonads and bacterial brown spot may involve any of the classical categories of antagonism. It also could result from a direct effect of the chemical on P. syringae, or from indirect effects of the chemicals applied to the plant. Screening organisms able to utilize the added nutrient for antagonism to P. syringae is an approach to identifying the mechanisms for disease control. (CIAT)

0106

28875 PERREAUX, D.; BAGAMBAKE, B.; GAHUNGU, E.; MIKOKORO, C.; NKUBAYE, E.; WAKANA, E. 1986. Epidémiologie des maladies du haricot en milieu rural et pertes de rendement (DV8603). (Epidemiology of bean diseases in the field and yield losses). In Institut des Sciences Agronomiques du Burundi. Rapport Annuel 1986. (Septembre 1985-Aout 1986). Bujumbura. v.3.pp.128-146. Fr., Il.

Phaseolus vulgaris. Xanthomonas campestris pv. phaseoli. Rhizoctonia solani. Ramularia phaseoli. Isariopsis griseola. Viruses. Ascochyta phaseolorum. Epidemiology. Burundi.

In 1986 trials were carried out in 6 localities of Burundi with different ecological conditions (Bujumbura, Moso, Murongwe, Gitega, Ngozi, and Gisozi) to determine the relative importance of bean diseases per region in order to establish research priorities in breeding for resistance and to determine the sites where research should be carried out. At each site the evolution of the diseases was monitored in 2 plots of 30 square meters each. Both were fumigated with dimethoate (15 cubic centimeters/10 liters water) to limit entomological problems as much as possible. Each plot also received biweekly sprays with a mixture of maneb 50 percent and methyl thiophanate 25 percent (40 g/10 liters water) to protect the crops against fungal diseases. The most prevalent diseases in Bujumbura were common bacterial blight (Xanthomonas campestris pv. phaseoli) and web blight (Thanatephorus cucumeris); in Moso, floury leaf spot (Ramularia phaseoli); in Murongwe, angular leaf spot (Phaeoisariopsis griseola) and viral diseases; in Gitega, angular leaf spot and in Gisozi, Ascochyta leaf and pod spot (Ascochyta phaseolorum). Tables are included on the evolution of disease severity on diseased leaves and global severity in the field, in relation to the growth stage of the crop; the relative importance of diseases throughout the region and for each disease is summarized in table form, with the distribution indicated per region. Yield data/plot (treated and untreated), for both semesters, indicate losses of approx. 30 percent. (CIAT)

0107

28657 QUIGLEY, N.B.; LANE, D.; BERGQUIST, P.L. 1985. Genes for phaseolotoxin synthesis are located on the chromosome of Pseudomonas syringae pv. phaseolicola. Current Microbiology 12(5):295-299. En., Sum. En., 31 Ref., Il. [Dept. of Cell Biology, Univ. of Auckland, Auckland, New Zealand]

Phaseolus vulgaris. Pseudomonas syringae pv. phaseolicola. Races. Analysis. Disease physiology and biochemistry. Pathogenicity. New Zealand.

Transposon mutagenesis was used to locate the genes for phaseolotoxin biosynthesis in Pseudomonas syringae pv. phaseolicola. Mutants unable to produce toxin were obtained that carried Tn5 on different chromosomal restriction fragments. None of the Tn5 induced nontoxigenic mutants carried the transposon in plasmid DNA. The insertion of Tn5 into tox DNA was confirmed by site-directed mutagenesis. The results reported here suggest the involvement of at least 5 chromosomal genes in phaseolotoxin biosynthesis. All of the toxin-minus mutants retained both full pathogenicity on beans and resistance to the toxin. (AS) See also C017 0127 0180 0185

E03 Mycoses

0108

29912 ABAWI, G.; PASTOR C., M.A. 1987. Preparado para el grupo participantes del Taller de Mustia. (Prepared for the group participating in the web blight workshop). In Taller de Mustia Hilachosa (Thanatephorus cucumeris), 2, San José, Costa Rica, 1986. Conferencias. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Regional de Frijol para Centroamérica y el Caribe. pp.139-153. Es.

Phaseolus vulgaris. Inoculation. Rhizoctonia solani. Cultural control. Chemical control. Integrated control. Epidemiology. Colombia.

The procedures to be followed for the preparation of Rhizoctonia solani inoculum and of inoculum using R. solani micelium, and for the determination of R. solani populations in the soil (complete soil method, OM test, and pathogen attraction) are given. Recommendations for the International Web Blight Nursery include an international evaluation scale from 1 to 9, agronomic management of trials, control strategies (cultural, chemical, integrated), and research goals regarding ecology, biology, epidemiology, moist chamber inoculation, reaction to "cook's eye", population management, and inheritance studies. (CIAT)

0109

29932 AHMAD, J.S.; BAKER, R. 1987. Rhizosphere competence of Trichoderma harzianum. Phytopathology 77(2):182-189. En., Sum. En., 37 Ref., Il.

Phaseolus vulgaris. Trichoderma harzianum. Rhizosphere. Disease control. Fungicides. pH. Temperature. biological control. Mutation. USA.

Rhizosphere competence of Trichoderma harzianum was measured for roots of various plant species (among them beans). When seeds were coated with conidia of the wild type and germinated in soil under constant matric potential with no additional water added, the fungus was not detected in the rhizosphere of roots from 1- to 8-cm depths after 8 days. Mutants tolerant to benomyl, however, were rhizosphere-competent when 10 micrograms of benomyl was added per gram of soil. These mutants were also rhizosphere-competent when benomyl was not added. The degree of rhizosphere colonization by mutants of T. harzianum was influenced by benomyl, soil pH, and temp. Evidence indicates that a rhizosphere-incompetent biological control agent was induced by mutation to become rhizosphere-competent. (AS)

0110

29926 ARAYA F., C.M.; DHINGRA, O.D.; KUSHALAPPA, A.C. 1987. Influence of primary inoculum on bean anthracnose prevalence. Seed Science and Technology 15(1):45-54. En., Sum. En., Fr., De., 9 Ref., Il. [Escuela de

Ciencias Agrarias, Univ. Nacional, Apartado Aéreo 86-3000, Heredia, Costa Rica]

Phaseolus vulgaris. Colletotrichum lindemuthianum. Seed transmission. Rainfall. Etiology. Pods. Leaves. Brazil.

The influence of the introduced primary inoculum simulating the percentage of seed-transmitted Colletotrichum lindemuthianum on anthracnose incidence was studied at 2 locations (Vicosa and Coimbra, Brazil) during rainy and nonrainy seasons. The multiple regression analysis showed a positive and linear relationship. The quadratic effect of the inoculum and the independent effect of season and location were not significant, but the interactions between inoculum, location, and season were significant. The relationship between inoculum and pod anthracnose was also linear, but was positive only at 1 location, and varied with the season. In the presence of residual inoculum the influence of introduced inoculum was either masked or its contribution to the total disease prevalence was very low. The influence of inoculum on leaf anthracnose was much higher during the rainy than during the nonrainy season, whereas its influence on the pod anthracnose was higher in the nonrainy season. The relationship between leaf and pod anthracnose was very low (r = 0.20). (AS)

0111

29943. AZEVEDO, L.A.C. DE; KUTZEALAIPA, A.C. 1980. Parametros monocíclicos da ferrugem do feijoeiro causada por Uromyces phaseoli var. typica em variedades de feijao. (Monocyclic parameters of bean rust caused by Uromyces phaseoli var. typica on bean varieties). Fitopatologia Brasileira 11(4):[illegible]. Pt., Sum. Pt., Em., 10 Ref. [Centro Agro-Veterinario, Depto. de Fitotecnia, UDESC, 88.500 Lages-SC, Brazil]

Phaseolus vulgaris. Cultivars. Resistance. Uromyces phaseoli. Brazil.

Among the parameters tested in the greenhouse to quantify bean cv. and line resistance to rust caused by Uromyces phaseoli var. typica, uredospore production/leaflet and av. latent period were the best. Uredospore production/leaflet was highly correlated to the av. latent period, to the proportion of the area under the disease progress curve, and to the rate of intrinsic infection. The av. latent period was highly correlated to the no. of pustules/leaflet, uredospore production/leaflet, intrinsic infection rate, and proportion of the area under the disease progress curve. (AS)

0112

29944 AZEVEDO, L.A.C. DE; KUTZEALAIPA, A.C. 1980. Quantificacao do resistencia a Uromyces phaseoli var. typica em cultivares de feijao. (Quantification of resistance of bean cultivars to Uromyces phaseoli var. typica). Fitopatologia Brasileira 11(3):599-608. Pt., Sum. Pt., Em., 13 Ref. [Centro Agro-Veterinario, Depto. de Fitotecnia, UDESC, 88.500 Lages-SC, Brazil]

Phaseolus vulgaris. Cultivars. Germplasm. Resistance. Uromyces phaseoli. Brazil.

Rust resistance in 50 bean cv. and lines of the germplasm bank of the U. Federal de Vicosa and CIAT was quantified in 3 expt. conducted during Sept./Oct. 1981 and Jan./Feb. 1982. Av. latent period and no. of pustules/leaflet were measured. Significant differences were found among the bean cv. and lines to the 2 parameters studied. Cv. Serra Negra, Ag 407, S182N, Vi1011, and Agromrico were resistant to bean rust. (AS)

0113

29784 BAILEY, J.A. 1982. Physiological and biochemical events associated with the expression of resistance to disease. In Wood, R.K.S., ed. NATO Advanced Study Institute on Active Defense Mechanisms in Plants, Cape Sounion, Greece, 1980. Proceedings. New York, Plenum Press. NATO Advanced

Study Institutes Series. Series A, Life Sciences:v.37. pp.39-65. En., 75 Ref., Il.

Phaseolus vulgaris. Resistance. Colletotrichum lindemuthianum. Disease physiology and biochemistry. United Kingdom.

The physiological and biochemical processes associated with the expression of resistance to disease, particularly that of Phaseolus vulgaris to Colletotrichum lindemuthianum, are reviewed in detail. Resistance of P. vulgaris cv. to C. lindemuthianum was found to be expressed as an inhibition of intracellular hyphal growth within dead host cells and may be evident as lesion limitation or hypersensitivity. Isoflavonoid phytoalexins accumulate in these cells at high concn. and appear to be responsible for the restriction of fungal growth therein. Dead tissue caused phytoalexins to form when it was in contact with living tissue and extracts of bean tissue were also effective. It is proposed that de novo synthesis of isoflavonoids is initiated in living cells by a metabolite which is released from cells when they are injured or killed. The synthesized isoflavonoids diffuse from the living tissues into the dead cells where they accumulate. The accumulation of phytoalexins thus represents a late stage in the response of bean to C. lindemuthianum. Differentiation between virulent and avirulent races occurs much earlier, probably during the initial contact host-pathogen. Evidence suggest that the mechanisms which maintain cell viability after infection by a virulent race, or cause immediate death of cells infected by an avirulent race, are the fundamental processes which determine the cv.-specific responses. (CIAT)

0114

29934 BYAHGI, A.A.; HEGDE, R.K. 1985. Variation among the isolates of Rhizoctonia bataticola from different host plants. Indian Phytopathology 38(2):297-301. En., Sum. En., 10 Ref. [Agricultural Research Station, Nipani 591237, India]

Phaseolus vulgaris. Macrophomina phaseoli. Pathogenicity. Isolation. Screening. India.

Variations in the cultural characters, growth rate, morphology of the sclerotia, pycnidia, and pycnidiospores, and virulence of isolates of Rhizoctonia bataticola obtained from 6 different plant species (among them beans) were studied. The bean isolate grew well, exhibiting good growth with max. dry mycelial wt. Pycnidial production was recorded only on bean and bengal gram seedlings and showed variation in size and shape of pycnidia and pycnidiospores. Bean, bengal gram, and cowpea isolates were the most virulent. Based on morphological, cultural characters, and pathogenic behavior, bean isolates were classified into the A group (virulent); the other 5 isolates were classified into groups B (intermediate) and C (mild). (AS)

0115

29977 CARDOSO, J.E.; ECHANDI, E. 1987. Biological control of Rhizoctonia root rot of snap bean with binucleate Rhizoctonia-like fungi. Plant Disease 71(2):167-170. En., Sum. En., 13 Ref., Il. [Dept. of Plant Pathology, North Carolina State Univ., Raleigh, NC 27695, USA]

Phaseolus vulgaris. Rhizoctonia solani. Disease control. Biological control. Trichoderma harzianum. Trichoderma hamatum. Snap beans. USA.

Eleven isolates of binucleate Rhizoctonia-like fungi and one isolate each of R. zeae, Trichoderma hamatum, and T. harzianum were studied as potential biocontrol agents of root rot of snap bean caused by R. solani in the greenhouse and field. Isolates of binucleate Rhizoctonia-like fungi reduced (P = 0.05) disease incidence and disease severity in 4 greenhouse expt. Four selected isolates of binucleate Rhizoctonia-like fungi and the 2 isolates of Trichoderma species were then screened in soils naturally

infested with R. solani. Four field expt. were conducted at 2 locations (North Carolina, USA). Selected isolates of binucleate Rhizoctonia-like fungi significantly (P = 0.05) protected snap bean seedlings from Rhizoctonia root rot in one or more expt. One binucleate Rhizoctonia-like fungi isolate (BN-160) significantly (P = 0.05) protected snap beans from Rhizoctonia root rot in all field exbt. Isolate TC-1 of T. harzianum protected snap bean seedlings in only 1 field expt. Results indicate that isolates of binucleate Rhizoctonia-like fungi show potential as biocontrol agents of Rhizoctonia root rot of snap bean. (AS)

0116

28669 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1982. La mancha angular del frijol y su control; unidad audiotutorial. (Angular leaf spot of beans and its control; audiotutorial unit). Contenido científico Schwartz, H.F.; Correa V., F.; Pastor C., M.; producción Ospina O., H.F.; Flor, C.A. Cali, Colombia. 79 diap. color 5 x 5 cm.; 1 cassette 24 min.; guión 15p.; guía de estudio 24p. Es., Il.

Phaseolus vulgaris. Isariopsis griseola. Symptomatology. Etiology. Epidemiology. Plant injuries. Isolation. Disease control. Colombia.

A detailed study is given on the symptomatology, etiology, and environmental factors favoring the attack of angular leaf spot of beans. Its ease of dissemination, mainly by harvest residues, and the injuries caused to plants are discussed. The methodology used in the lab. for its culture and isolation is described, and recommendations for its control are given. The methodology for germplasm evaluation both in the greenhouse and in the field is explained. (CIAT)

0117

28667 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1982. La mustia hilachosa del frijol y su control; unidad audiotutorial. (Web blight of beans and its control; audiotutorial unit). Contenido científico Gálvez, G.A.; Galindo, J.J.; Cardenas, M.; producción Ospina O., H.F.; López, M.; Bonilla, M. Cali, Colombia. 76 diap. color 5 x 5 cm.; 1 cassette 16.34 min.; guión 10p.; guía de estudio 10p. Es., Il.

Phaseolus vulgaris. Rhizoctonia solani. Symptomatology. Etiology. Disease control. Isolation. Integrated control. Colombia.

The symptomatology, etiology, and methodology to identify web blight of beans in the lab. are given. Recommendations for its control are made. It is emphasized that only through the integration of known control practices can the drastic losses caused by this disease in bean plantations in the tropics be reduced. (CIAT)

0118

28670 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1981. La antracnosis del frijol y su control; unidad audiotutorial. (Bean anthracnose and its control; audiotutorial unit). Asesoría científica Schwartz H.F.; Pastor C., M.; Correa V., F.; coordinación de producción Ospina O., H.F.; coordinación unidades Flor M., C.A. Cali, Colombia. 77 diap. color 5 x 5 cm.; 1 cassette 26 min.; guión 16p.; guía de estudio 27p. Es., Il.

Phaseolus vulgaris. Colletotrichum lindemuthianum. Symptomatology. Disease control. Colombia.

The symptomatology of anthracnose in the different development stages of beans is described, and the methodology for its identification in the lab. and for evaluation of var. resistance is described in detail. Recommendations are given for disease control as well as directions on the methodology to be followed to evaluate genetic resistance and to incorporate it into commercial var. (CIAT)

0119

28664 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1981. Pudriciones radicales del frijol y su control; unidad audiotutorial. (Root rots of beans and their control; audiotutorial unit). Contenido científico Beebe, S.; coordinación de producción, Ospina O., H.F. Cali, Colombia. 11, diap. color 5 x 5 cm.; 2 cassettes 21 y 23 min.; guión 20p.; guía de estudio 52p. Es., Il.

Phaseolus vulgaris. Symptomatology. Epidemiology. Isolation. Pathogenicity. Disease control. Sclerotium rolfsii. Fusarium oxysporum. Fusarium solani phaseoli. Rhizoctonia solani. Pythium. Macrophomina phaseoli. Thielaviopsis basicola. Colombia.

The symptoms of damage caused by pathogens in the roots and stems of the bean plant during seed germination, 1st developmental stages, and at maturity are described in detail. Guidelines are included for the identification of the fungal pathogens in the lab. with photos to facilitate their identification. Likewise, the methodologies of isolation and of evaluation of var. resistance to the different pathogens are described. The most important aspects related to control are also mentioned, indicating that in the case of root rots no method alone can totally control a disease. The best results are achieved with integrated control. (CIAT)

0120

28672 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1980. Enfermedades del frijol causadas por hongos y su control; unidad audiotutorial. (Bean diseases caused by fungi and their control; audiotutorial unit). Producción Ospina O., H.F.; asesoría científica Schwartz, H.F.; coordinación Flor, C.A. Cali, Colombia. 140 diap. color 5 x 5 cm.; 2 cassettes 29:30 y 22:30 min.; guión 35p.; guía de estudio 56p. Es., Il. También en inglés.

Phaseolus vulgaris. Uromyces phaseoli. Alternaria. Isariopsis griseola. Colletotrichum lindemuthianum. Ascochyta. Entyloma petuniae. Chaetoseptoria wellmanii. Cercospora vanderysti. Ramularia phaseoli. Erysiphe polygoni. Phytophthora. Phomopsis. Botrytis cinerea. Whetzelinia sclerotiorum. Rhizoctonia solani. Macrophomina phaseoli. Thielaviopsis basicola. Fusarium solani phaseoli. Fusarium oxysporum. Pythium. Sclerotium rolfsii. Symptomatology. Epidemiology. Host range. Disease control. Colombia.

The epidemiology, symptomatology, hosts and control of fungal diseases of beans are presented. Diseases are classified into those attacking foliage and pods (rust, Alternaria leaf spot, angular leaf spot, anthracnose, Ascochyta leaf spot, Entyloma leaf smut, Chaetoseptoria leaf spot, Cercospora leaf spot, floury leaf spot, powdery mildew, white leaf spot, gray leaf spot, downy mildew, pod blight, gray mold, white mold, and web blight), stems and roots (ashy stem blight, black root rot, Fusarium root rot, Fusarium yellows, Pythium root rot, Rhizoctonia root rot, and southern blight). (CIAT)

0121

28663 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1980. La roya del frijol y su control; unidad audiotutorial. (Bean rust and its control; audiotutorial unit). Producción Ospina O., H.F.; asesoría científica Schwartz, H.F.; Correa, F.; Guzmán, F.; coordinación Flor M., C.A. Cali, Colombia. 93 diap. color 5 x 5 cm.; 1 cassette 33 min.; guión 17p.; guía de estudio 35p. Es., Il.

Phaseolus vulgaris. Uromyces phaseoli. Disease control. Disease physiology and biochemistry. Chemical control. Colombia.

The symptomatology of rust in bean plants is given as well as the morphology and physiology of the fungus Uromyces phaseoli. Control methods are discussed and recommendations are given on chemical control. Likewise,

the methodology used in the evaluation of genetic resistance is detailed. A broad description is also given on the identification of physiological races of rust. (CIAT)

0122

28662 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1980. Técnicas para el aislamiento, identificación y conservación de hongos patógenos del frijol (Phaseolus vulgaris L.); unidad audiotutorial. (Techniques for the isolation, identification, and conservation of fungal pathogens of beans: audiotutorial unit). Producción Ospina C., H.F.; asesoría científica Schwartz, H.F.; Vega, R.; Oteya, M.M. Cali, Colombia. 97 diap. color 5 x 5 cm.; 1 cassette 27:30 min.; guión 17p.; guía de estudio 33p. Es., Il.

Phaseolus vulgaris. Isolation. Mycoses. Pathogenicity. Colombia.

The appropriate lab. technique for the correct isolation, identification, and conservation of fungal pathogens of beans is described in detail. Necessary equipment is also mentioned. (CIAT)

0123

29968 DELWICHE, P.A.; GRAU, C.R.; HOLUB, E.R.; PERRY, J.B. 1987. Characterization of Aphanomyces euteiches isolates recovered from alfalfa in Wisconsin. Plant Disease 71(2):155-161. En., Sum. En., 33 Ref., Il. [Dept. of Plant Pathology, Univ. of Wisconsin-Madison, WI 53706, USA]

Phaseolus vulgaris. Aphanomyces euteiches phaseoli. Isolation. Snap beans. Pathogenicity. USA.

Aphanomyces-like fungal isolates recovered from alfalfa seedlings (alfalfa isolates) were morphologically similar to isolates of A. euteiches recovered from pea and green bean but were distinctly different from A. cochlioides. All alfalfa isolates caused essentially no symptoms on hypocotyls and a low level of disease on roots of green bean. Green bean, lima bean, soybean, table beet, radish, oat, and tomato were determined to be nonhosts to alfalfa isolates of A. euteiches. All alfalfa isolates but one grew slower than pea and bean isolates when incubated at 16-28 degrees Celsius; however, growth of alfalfa isolates, like that of pea isolates, was good at 32 degrees Celsius compared with poor growth by bean isolates at the same temp. (AF)

0124

29710 DIXON, R.A.; BAILEY, J.A.; BELL, J.N.; BOLWELL, G.P.; CRAMER, C.L.; EDWARDS, K.; HAMMAN, M.A.M.S.; LAMB, C.J.; ROBBINS, M.P.; RYDER, T.B.; SCHUCH, W. 1986. Rapid changes in gene expression in response to microbial elicitation. Philosophical Transactions of the Royal Society of London 314(1166):411-426. En., Sum. En., 47 Ref., Il. [Dept. of Biochemistry, Royal Holloway & Bedford New College, Univ. of London, Egham Hill, Egham, Surrey TW20 0EX, U.K]

Phaseolus vulgaris. Colletotrichum lindemuthianum. Biochemistry. Enzymes. Phytoalexins. Genes. RNA. Laboratory experiments. United Kingdom.

Treatment of cell suspension cultures of French bean with polysaccharide elicitor molecules from cell walls of the anthracnose fungus, Colletotrichum lindemuthianum, results in the rapid accumulation of isoflavonoid phytoalexins, deposition of wall-bound phenolic compounds, and synthesis of hydroxyproline-rich glycoproteins. These changes are dependent upon a highly selective induction of gene products, including the enzymes L-phenylalanine ammonia-lyase, cytochrome P450-dependent cinnamic acid 4-hydroxylase, chalcone synthase, chalcone isomerase, prolyl hydroxylase, and protein:arabinosyl transferase. Use of in vivo labelling, in vitro translation, and RNA blot hybridization techniques has shown that these elicitor-mediated changes arise from rapid but transient induction of enzyme synthesis, resulting from the accumulation of specific mRNAs.

Similar phenomena are observed in bean hypocotyls at the onset of phytoalexin synthesis in response to infection by incompatible and compatible races of C. lindemuthianum. In bean, both L-phenylalanine ammonia-lyase and chalcone synthase are encoded by multigene families and, at the protein level, both exhibit subunit and intact enzyme polymorphism. In addition to transcriptional control of the appearance of specific gene products, post-translational processes may result in increased subunit polymorphism for phenylalanine ammonia-lyase, and in the activation of chalcone isomerase. (AS (extract))

0125

29970 EDWARDS, M.C.; BOWLING, D.J.F. 1986. The growth of rust germ tubes towards stomata in relation to pH gradients. Physiological and Molecular Plant Pathology 29(2):185-196. En., Sum. En., 22 Ref., Il. [Dept. of Plant Science, Univ. of Aberdeen, St. Machar Drive, Aberdeen AB9 2UD, United Kingdom]

Phaseolus vulgaris. Stomata. Leaves. Uromyces viciae-fabae. United Kingdom.

Studies were made to determine whether the broad bean rust fungus, Uromyces viciae-fabae, responds to pH gradients on the leaf surface as a means of locating stomata. Gradients in pH at the leaf surface have been found around closed, but not open, stomata of Commelina communis and Tradescantia virginiana. There is a clear inverse correlation between stomatal aperture and the ability of uredospore germ tubes to find stomata on both host (Vicia faba) and nonhost (Phaseolus vulgaris, C. communis, and T. virginiana) leaves. This, together with evidence from expt. in which pH gradients were created on leaf surface replicas, suggests very strongly that uredospore germ tubes of U. viciae-fabae do indeed use pH gradients as a means of locating stomata. (AS)

0126

29652 EMPRESA BRASILEIRA DE PESQUISA AGROPECUARIA. 1985. Feijao. (Beans). In_____. Relatorio Técnico Anual da Unidade de Execucao de Pesquisa de Ambito Estadual de Rio Branco 1982-1983. Rio Branco-AC, Brasil. pp.101-105. Pt.

Phaseolus vulgaris. Germplasm. Research. Rhizoctonia solani. Chemical control. Predators and parasites. Yield. Brazil.

Bean research activities in the state of Acre, Brazil, are reported for 1982-83. It was found that the control of Thamatephorus cucumeris in beans in the region is best achieved if plantings are done during the min. rainfall season, with 2 applications of thiabendazole (0.75 kg a.i./ha): 25 days after planting and 10 days later. In another expt. the effect of the incorporation of grass residues (CM, Trichoderma sp., PCNB, all possible combinations of the above) into the soil on disease progress was studied. Yield differences were nonsignificant, but T. cucumeris infestations were greater for the untreated control and for the treatment of Trichoderma sp. alone. (CIAT)

0127

29943 FARIA, J.C. DE; HAGEKPORN, P.J. 1986. A multiple inoculation technique for selection of bean seedlings with resistance to three pathogens. Fitopatologia Brasileira 11(3):535-542. En., Sum. En., Pt., 10 Ref. [Centro Nacional de Pesquisas de Arroz e Feijao (CNPAF-EMBRAPA), Caixa Postal 179, 74.000 Goiania-GO, Brasil]

Phaseolus vulgaris. Fusarium solani phaseoli. Uromyces phaseoli. Xanthomonas campestris pv. phaseoli. Inoculation. Resistance. Cultivars. Symptomatology. Brazil.

A multiple inoculation technique was developed to evaluate resistance of bean plants to Fusarium solani f. sp. phaseoli, Uromyces phaseoli var.

typica, and Xanthomonas campestris pv. phaseoli. Differences in disease reaction were highly significant among bean cv. inoculated with the 3 pathogens. Disease reactions in the multiple inoculation expt. were not affected to the extent of changing a cv. reaction from susceptible to resistant or viceversa as compared with single inoculation expt. Inoculation with F. solani f. sp. phaseoli at high inoculum level caused overall reduction of symptom severity brought about by inoculation with X. campestris pv. phaseoli, but this effect was cv. nonspecific. The technique should be of importance to evaluate beans for multiple disease reaction, especially in tropical areas where these diseases occur simultaneously. It can also be used in situations of limited space, or to obtain faster results of bean germplasm evaluation for resistance to more than 1 pathogen. (AS)

0128

29905 GALINDO, J.J. 1987. Epidemiología y control de la mustia hilachosa del frijol en Costa Rica. (Epidemiology and control of bean web blight in Costa Rica). In Taller de Mustia Hilachosa (Thanathephorus cucumeris), 2, San José, Costa Rica, 1986. Conferencias. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Regional de Frijol para Centroamerica y el Caribe. pp.74-84. Es., 10 Ref. [Depto. de Producción Vegetal, Centro Agronómico Tropical de Investigación y Enseñanza, Turrialba, Costa Rica]

Phaseolus vulgaris. Epidemiology. Disease control. Mulching. Covered beans. Costa Rica.

The epidemiology and control of web blight of beans (Thanatephorus cucumeris) as investigated under the conditions of Esparza, Costa Rica, are reviewed. Disease development was better adjusted to the compound-cycle disease model, which has implications on the approach to disease management. Rice polishings mulches (2.5 cm thick) reduced disease incidence and severity from 100 percent on untreated soil to 13 percent in treated soil, and yields were 0 and 655 kg/ha, resp., using bean var. Porrillo 70; similar results were obtained with var. Mejico 27. The mulch provided by the so-called covered planting system was also effective in reducing web blight incidence. Research on methods to reduce the level of inoculum in the soil through cultural practices (crop rotation, planting dates, mulches, soil management), chemical treatments, and development of resistant var., is required. (CIAT)

0129

29605 GRIFFITHS, H.M.; BRISKIN, D.P.; ANDERSON, A.J. 1987. Transport properties of bean vesicles in the presence of fungal components. Phytochemistry 26(1):21-24. En., Sum. En., 18 Ref., Il. [Dept. of Biology, Utah State Univ., Logan, UT 84322, USA]

Phaseolus vulgaris. Snap beans. Hypocotyl. Cultivars. Colletotrichum lindemuthianum. Races. Biochemistry. USA.

Sealed membrane vesicles were isolated from hypocotyls of 2 French bean var. The preparations were shown to contain vesicles in which H(+) transport and ATPase were sensitive to nitrate but insensitive to vanadate. These sensitivities suggest the vesicles were enriched for tonoplast. Fractions prepared from the alpha and beta races of the fungus Colletotrichum lindemuthianum inhibited H(+) transport in the vesicles isolated from cv. Dark Red Kidney and Great Northern bean tissue. These data are discussed in terms of the biochemical mechanisms operating in plant x pathogen interactions. (AS)

0130

29982 GUEVARA T., V.; HERRERA I., L.; CAMARA, M.; GALANTAI, E. 1986. El color de la semilla del frijol (Phaseolus vulgaris L) y su relación con la resistencia al ataque de Rhizoctonia solani Kuhn. (The seed color of beans

and its relationship with the resistance to Rhizoctonia solani attack). Revista Centro Agrícola 13(1):3-6. Es., Sum. Es., En., 7 Ref., Il. [Facultad de Ciencias Agropecuarias, Univ. Nacional Autónoma, Nicaragua]

Phaseolus vulgaris. Cultivars. Rhizoctonia solani. Germination. Resistance. Nicaragua.

The behavior of 7 bean var. (Bonita 11, Bat 84, Bat 304, Ica Tamazalapa, Bat 41, Bat 42, and Line 24) of different seed color was evaluated regarding the infection of Rhizoctonia solani during germination. The evaluations consisted in determining seed germination percentage and mode as well as the percentage of R. solani-infected seed in a 2 percent agar-water medium. Results showed that the white-seeded bean cv. (Bonita 11 and Bat 84) were more susceptible to R. solani than the dark-seeded (black and red) cv.; line 24 was the most resistant. This behavior seemed to be due to the velocity of seed germination, radicle and hypocotyl growth, and the exudate of fungitoxic substances from the seed coat. (AS)

0131

28623 HEATH, M.C.; STUMPF, M.A. 1986. Ultrastructural observations of penetration sites of the cowpea rust fungus in untreated and silicon-depleted French bean cells. Physiological and Molecular Plant Pathology 29(1):27-39. En., Sum. En., 10 Ref., Il. [Dept. of Botany, Univ. of Toronto, Toronto, Ontario, M5S 1A1, Canada]

Phaseolus vulgaris. Snap beans. Uromyces vignae. Si. Pathogenicity. Canada.

The region where the cowpea rust fungus initiates haustorium formation in plant mesophyll cells was compared ultrastructurally in susceptible cowpea plants, nonhost French bean plants given access to Si (+Si plants), and French bean plants depleted in Si (-Si plants). In +Si plants, fungal development apparently ceased while the penetration peg was traversing the haustorial mother cells wall, often before the peg reached the adjacent silicified wall of the plant. In -Si plants, where silica deposits were absent, haustorial mother cells at 3 out of 10 infection sites had formed a haustorium. At the majority of the remaining sites, fungal growth appeared to have ceased before the initiation of a visible penetration peg and during a stage of development, also seen in susceptible cowpea, where the haustorial mother cells and the plant wall were bridged by electron-opaque material. It is suggested that this stage represents the incipient degradation of the fungal, and possibly the plant, wall prior to the appearance of a distinguishable penetrating peg. The fact that most penetration pegs stopped their development earlier in -Si than in +Si plants supports the previous suggestion that the higher levels of wall-associated phenolic compounds in the former results in a more rapid inhibition of fungal enzymes involved in the formation of the penetration peg. These and other ultrastructural observations suggest that in +Si plants the silicified plant walls may (1) reduce the interchange of materials between plant and fungus so that lesser amounts of phenolic materials are produced, (2) restrict the flow of material to the haustorial mother cells that normally prevent its premature senescence and/or (3) act as a physical barrier if the penetration peg reaches the plant wall. (AS)

0132

29941 ITO, M.F.; DUDIENAS, C.; CASTRO, J.L. DE; SOAVE, J.; MAEDA, J.A. 1986. Efeito de fungicidas aplicados na parte aérea, sobre a qualidade de sementes de feijao. (Effect of fungicides applied to the aerial part on bean seed quality). Fitopatologia Brasileira 11(3):627-636. Pt., Sum. Pt., En., 24 Ref. [Secao de Microbiologia Fitotécnica, Inst. Agronômico, Caixa Postal 28, 13.100 Campinas-SP, Brasil]

Phaseolus vulgaris. Cultivars. Fungicides. Colletotrichum lindemuthianum. Fusarium. Alternaria. Rhizoctonia solani. Seed characters. Germination. Seed vigor. Yields. Brazil.

A field trial was carried out in Capao Bonito (Sao Paulo, Brazil) to test the effects of fungicide application to the aerial part on disease incidence, germination, seed vigor, and yield of bean cv. Carioca Comum and Carioca 80. Benomyl, mancozeb, methyl thiophanate, captafol, and chlorothalonil (a.i.) were tested. Seed healthiness was assessed by the blotter test and physiological quality by the germination and vigor (rapid aging) tests. Alternaria spp., Colletotrichum lindemuthianum, Fusarium spp., and Rhizoctonia solani were the main pathogens found. Cv. Carioca 80 showed higher yield and lower percentage of pathogens on seeds than cv. Carioca Comum. Seed values were the same for both cv. only for R. solani. All the fungicides used controlled R. solani on cv. Carioca 80. Breeding for anthracnose resistance reduced the need for chemical control. The use of captafol or mancozeb reduced the incidence of Alternaria spp. on seeds of cv. Carioca Comum. All the fungicides controlled Fusarium spp., but none were efficient in decreasing the percentage of seeds infected by C. lindemuthianum. The best control of R. solani was provided by captafol. All the fungicides increased the yield of this cv. (AS)

0133

29120 MELENDEZ, P.L.; RODRIGUEZ, R.; WESSEL-BEAVER, L. 1986. Bean rust control under field conditions with systemic and contact fungicides. Journal of Agriculture of the University of Puerto Rico 70(1):45-55. En., Sum. En., Es., 8 Ref., Il. [College of Agricultural Sciences, Univ. of Puerto Rico, Mayaguez, Puerto Rico 00708]

Phaseolus vulgaris. Cultivars. Uromyces phaseoli. Disease control. Fungicides. Puerto Rico.

Bean rust (Uromyces appendiculatus) was generally controlled with both contact and systemic fungicides on 3 bean cv. (Blanca del País, Bountiful, and Naranjito) tested at 2 locations in Puerto Rico: Lajas and Isabela. Effectiveness, however, varied with rate, cv., location, and disease level. On cv. in Lajas, the contact fungicides chlorothalonil and mancozeb were more effective in reducing disease symptoms and in increasing yields than the systemic fungicides oxycarboxin and triforine. There were fewer differences between fungicides in Isabela, where disease incidence was lower, but contact fungicides again were generally more effective. Mancozeb was the most effective fungicide, reducing disease symptoms and increasing yields. Certain fungicides combined with genetic resistance should be effective in increasing bean yields. (AS)

0134

29743 MOHAMED, H.A.; ABDEL-AL, H.R.; FADL, F.A.; SHATTA, H.M.; NAGI, I.M. 1983. Reaction of bean cultivars to rust and its relation to stomatal size. Egyptian Journal of Phytopathology 15(1-2):1-6. En., Sum. En., Ar., 10 Ref.

Phaseolus vulgaris Uromyces phaseoli. Cultivars. Temperature. Relative humidity. Resistance. Stomata. Egypt.

Factors affecting uredospore germination of Uromyces phaseoli typica are reported. The reaction of 6 bean cv. (Taylor's Horticulture, Astro, Provider, Vadenal, Giza-3 and Giza-4) to rust and its relation with stomata size were also studied. Optimal temp. for uredospore germination was near 25 degrees Celsius. The lowest percentage of germination was obtained at 10 degrees Celsius and uredospores failed to germinate at 40 degrees Celsius. Highest percentage of germination was obtained at 95-100 percent RH. Germination gradually decreased by decreasing the RH with no germination at 14 percent RH. Cv. differed in their reaction to rust: Vadenal and Astro showed low percentage of infection, followed by Giza-3, Provider, and Giza-4; Taylor's Horticulture was the most susceptible. The no. of stomata was not correlated with rust infection; however, differences were significant between cv. with respect to the length and area of the stomata, but not the width. Taylor's Horticulture had the longest stomata and also the highest percentage of infection. (AS)

0135

29903 MORA B., B.; GALVEZ, G.E. 1987. La mustia hilachosa del frijol. (Web blight of beans). In Taller de Mustia Hilachosa (Thanatephorus cucumeris), 2, San José, Costa Rica, 1986. Conferencias. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Regional de Frijol para Centroamerica y el Caribe. pp.51-65. Es., 13 Ref.

Phaseolus vulgaris. Etiology. Epidemiology. Rhizoctonia solani. Cultural control. Resistance. Chemical control. Integrated control. Costa Rica.

The etiology and epidemiology of web blight of beans (Thanatephorus cucumeris) are reviewed and its control through cultural practices, use of tolerant cv. and fungicides is discussed. Cultural practices that have proved effective in controlling the disease include use of pathogen-free seed, elimination of crop residues, crop rotation with nonhost species (grasses and some vegetables), use of soil mulches, and intercropping. Tolerant cv. are Turrialba 1, Porrillo 70, Porrillo Sintético, S 630 B, Talamanca, Negro Huasteco 81, and Huetar; bean lines that have shown intermediate resistance are BAT 76, XAN 112, BAT 450, HT 7719, and ICTA 883-2-M. Chemical control has been effective with, for example, benomyl (0.25-0.30 kg/ha), triphenyltin hydroxide (0.4 kg/ha), triphenyltin acetate (0.16 kg/ha), carbendazim (0.3 kg/ha), captafol (1 kg/ha), NF 44 (0.5 kg/ha), and thiabendazole (0.25 kg/ha). The disease should be managed using an integrated approach in which bean cv. with intermediate resistance are combined with cultural practices aimed at reducing the incidence of primary and secondary inoculum and a min. application of fungicides. (CIAT)

0136

29680 RAJAM, M.V.; WEINSTEIN, L.H.; GALSTON, A.W. 1985. Prevention of a plant disease by specific inhibition of fungal polyamine biosynthesis. Proceedings of the National Academy of Sciences of the United States of America 82(20):6874-6878. En., Sum. En., 18 Ref., Il. [Dept. of Botany, Kakatiya Univ., Warangal 506009, India]

Phaseolus vulgaris. Uromyces phaseoli. Disease control. Chemical control. USA.

The DFMO (DL-alpha-difluoromethylornithine) can protect plants of bean cv. Pinto against infection by uredospores of the bean rust fungus, Uromyces phaseoli race 0. Unifoliolate leaves of 10-day-old greenhouse-grown seedlings were sprayed with 400 microliters DFMO/leaf at various concn. in 0.01 percent Tween 20 at pH 7.0 before or after inoculation with uredospores of Uromyces. After 16 h in darkness in dew chambers to facilitate spore germination, plants were transferred to the greenhouse, arranged randomly, and examined for local lesions 7 days later. All concn. of DFMO 0.50 millimolar or higher gave complete protection against the pathogen; at lower concn., postinoculation treatments with DFMO were generally more effective than preinoculation. The appearance of lesions on plants treated with lower concn. of DFMO was retarded 2-6 days. DFMO also confers protection on unsprayed parts of treated plants, indicating the translocation of some protective effect from sprayed areas. DL-alpha-Difluoromethylarginine, an analogous inhibitor of arginine decarboxylase, which is the rate-limiting enzyme in an alternative pathway for polyamine biosynthesis in higher plants, confers no protection even at 5 millimolar. This emphasizes ornithine decarboxylase as the biochemical locus of choice for the prevention of plant diseases by inhibiting polyamine metabolism. (AS)

0137

29909 RIVERA F., E. 1987. Investigaciones realizadas para el control de mustia hilachosa (Thanatephorus cucumeris), (Frank) Donk en frijol común (Phaseolus vulgaris) en El Salvador. (Research on web blight (Thanatephorus cucumeris) control in beans in El Salvador). In Taller de Mustia Hilachosa (Thanatephorus cucumeris), 2, San José, Costa Rica, 1986. Conferencias.

Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Regional de Frijol para Centroamérica y el Caribe. pp.118-123. Es., 6 Ref.

Phaseolus vulgaris. Fungicides. Chemical control. Rhizoctonia solani. Cultural control. Mulching. Cultivars. Resistance. El Salvador.

Research results on the use of fungicides, cultural practices, and resistant bean var. to control web blight (Thanatephorus cucumeris), in El Salvador, are summarized. Benomyl applied 12 and/or 18 days after planting, mancozeb at 30 days after planting, and benomyl at 40-45 days after planting constituted a good chemical control program against the disease. The use of sugarcane leaves as a mulch was an efficient cultural practice to avoid splashing and, in turn, T. cucumeris incidence. The package of cultural practices to control the disease includes the use of pathogen-free seed, elimination of crop residues, crop rotations with nonhost species (e.g., grasses), and planting in rows 0.6 m apart or, when intercropped with maize, at 0.15 m for improved air circulation. No native bean material with acceptable tolerance to the disease has been found, but results from evaluations of the International Web Blight Nursery have allowed the identification of sources of tolerance such as Santa Rosa and Porrillo Sintético. (CIAT)

0138

29629 RODRIGUEZ, R.; MELENDEZ, P.L. 1986. Effect of fungicide on disease incidence and yield of bean (Phaseolus vulgaris L.) infected with Isariopsis griseola Sacc. and Ascochyta phaseolorum Sacc. Journal of Agriculture of the University of Puerto Rico 70(2):127-134. En., Sum. En., 12 Ref.

Phaseolus vulgaris. Isariopsis griseola. Ascochyta phaseolorum. Fungicides. Leaves. Cultivars. Yields. Disease control. Costa Rica.

Two foliar diseases of beans, angular leaf spot (Isariopsis griseola) and Ascochyta leaf spot (Ascochyta phaseolorum), were effectively controlled with the chemicals mancozeb, chlorothalonil, and benomyl. Bi-weekly applications of mancozeb and chlorothalonil (1.12, 2.48, and 4.48 kg/ha) effectively protected the foliage of bean cv. Bonita and Naranjito against attacks by both pathogens. Cv. Bonita responded better to treatments than cv. Naranjito in terms of yield. Mancozeb at 1.12 kg/ha and chlorothalonil at 4.48 kg/ha increased yield of cv. Bonita affected by angular leaf spot by 70 and 79 percent, resp. Yield increases in plots treated with benomyl increased only when the highest rate of this chemical was used. Even at the lowest dosages, the 3 chemicals tested increased yield in cv. Bonita affected by Ascochyta leaf spot. (AS)

0139

29907 RODRIGUEZ, R.; OROZCO S., S.E. 1987. Revisión de resultados de la investigación sobre control de la mustia hilachosa del frijol común en Guatemala. (Review of research results on web blight control in Guatemala). In Taller de Mustia Hilachosa (Thanatephorus cucumeris), 2, San José, Costa Rica, 1986. Conferencias. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Regional de Frijol para Centroamérica y el Caribe. pp.102-104. En.

Phaseolus vulgaris. Rhizoctonia solani. Cultural control. Chemical control. Cultivars. Resistance. Mulching. Guatemala.

Results of research on web blight (Thanatephorus cucumeris) control conducted in Guatemala are summarized. T. cucumeris can be controlled by small farmers through the use of mulches (rice polishings or sugarcane, maize, or grass leaves) or the application of paraquat to create a mulch or of this same chemical with a shield to control weeds and maintain the mulch. Intermediate to large farmers can control T. cucumeris by (1) ridging in the 1st maize planting, applying paraquat in the 2nd maize

planting, and planting beans in relay; (2) using zero tillage with glyphosate or paraquat + pre, selective weed control, and chemical disease control. The following 13 entries from the 1984 International Web Blight Nursery showed tolerance to T. cucumeris equal to or greater than that of var. Talamanca: BAT 450, BAT 1235, XAN 93, MUS 6, HT 7716, ICTA 8131, MUS 21, ICTA L-883-2-M, BAT 76, HT 7719, ICTA 81-64, RAB 70, and XAN 90. (CIAT)

0140

29911 RODRIGUEZ Q., E. 1987. La mustia hilachosa, control y su situación en Panamá. (Web blight, its control and situation in Panama). In Taller de Mustia Hilachosa (Thanatephorus cucumeris), 2, San José, Costa Rica, 1986. Conferencias. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Regional de Frijol para Centroamérica y el Caribe. pp.129-138. Es., 2 Ref.

Phaseolus vulgaris. Epidemiology. Rhizoctonia solani. Chemical control. Cultural control. Cultivars. Resistance. Panama.

The epidemiology are reviewed and dissemination of web blight (Thanatephorus cucumeris) and recommendations on its control in beans in Panama are discussed. The best chemical control was obtained using benomyl and chlorothalonil at 0.5 and 3.5 kg/ha, resp., in 4 applications. Cultural practices recommended to control the disease include crop rotations with nonhost species, use of pathogen-free seed, elimination of crop residues, use of mulches (weeds), and min. tillage. The best web blight-tolerant bean materials from the Bean Program of the Instituto de Investigación Agropecuaria de Panamá, available for the area of Caisán are listed. (CIAT)

0141

29901 TALLER DE MUSTIA HILACHOSA (THANATEPHORUS CUCUMERIS), 2, San José, Costa Rica, 1986. 1987. Conferencias. (Conferences). Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Regional de Frijol para Centroamérica y el Caribe. 169p. Es., 34 Ref., 21.

Phaseolus vulgaris. Rhizoctonia solani. Plant breeding. Cultivars. Resistance. Cultural control. Chemical control. Mulching. Covered beans. Epidemiology. Etiology. Costa Rica. Guatemala. Dominican Republic. El Salvador. Panama. Colombia. Caribbean.

The 11 conferences given at the 2nd Web Blight (Thanatephorus cucumeris) Workshop held in San Jose, Costa Rica, in Nov. 3-7, 1986, as part of CIAT's Bean Regional Project for Central America and the Caribbean, are presented. Research progress in bean breeding for resistance to T. cucumeris and disease control in Costa Rica, Guatemala, the Dominican Republic, El Salvador, and Panama are presented. Recommendations for various disease testing procedures are given; the International Web Blight Nursery, control strategies, and research goals are also discussed. Individual papers are recorded in this publication under the following consecutive no.: 0082 0108 0128 0135 0137 0139 0140 0177 0182 0184 0186. (CIAT)

0142

28945 TEPFER, G.S.; ANDERSON, A.J. 1986. Two cultivars of bean display a differential response to extracellular components from Colletotrichum lindemuthianum. Physiological and Molecular Plant Pathology 29(3):411-420. En., Sum. En., 25 Ref., 1T. [Dept. of Biology, Utah State Univ., Logan, UT 84322-4500, USA]

Phaseolus vulgaris. Colletotrichum lindemuthianum. Races. Analysis. Glucose. Cultivars. Cytology. Biochemistry. USA.

Certain extracellular components from the alpha race of Colletotrichum lindemuthianum exhibit differential elicitor activity on bean cv. Purification of alpha race extracellular components by a var. of

chromatographic techniques has revealed elicitor activity in components with different chemical compositions. One class of elicitor, which does not adsorb to DEAE-Sephadex or CM-Sephadex, possesses galactose (17 percent), glucose (38 percent), and mannose (45 percent). This carbohydrate-rich complex displays high levels of elicitor activity on alpha race incompatible Dark Red Kidney bean but had no elicitor activity on compatible Great Northern bean. No extracellular components from the beta race were detected to have elicitor activity on compatible Dark Red Kidney and Great Northern bean. (AS)

0144

29008 VON ALTEN, H.; SCHENEFEK, F. 1985. Zur infektiosität von Uromyces phaseoli-uredosporen von induziert resistenten Wirtspflanzen. (The infectivity of Uromyces phaseoli uredospores from induced resistant host plants). Zeitschrift fur Pflanzenkrankheiten und Pflanzenschutz 92(4):376-381. De., Sum. De., En., 24 Ref., Il. [Inst. fur Pflanzenkrankheiten und Pflanzenschutz der Universitat Hannover, Herrenhauser Str. 2, D-3000 Hannover 21, Germany]

Phaseolus vulgaris. Uromyces phaseoli. Resistance. Biological control. Temperature. Stomata. Germ. Plant respiration. Federal Republic of Germany.

Uredospores produced on induced resistant bean plants showed decreased infectivity. Resistance was induced by application of a culture filtrate of Bacillus subtilis. The effect remained measurable for several passages on susceptible bean plants. Increased infectivity only appeared when environmental conditions during infection were favorable for the rust fungus. Unfavorable conditions such as high temp. or adult leaves revealed an increased infectivity. The difference in infectivity was always due to a changed ability of forming appressoria over stomates. Germ tubes of the altered spores showed a higher intensity of respiration since they had to compensate a decreased efficiency of their energy metabolism by an increased turnover. The decreased efficiency was probably due to a short supply of Fe to the pustules on induced resistant bean plants, impeding the fungal cytochrome synthesis. The culture filtrate, used to induce resistance, bound Fe in vitro and probably in the bean leaves too, causing the production of Fe-depleted uredospores. With a higher respiration intensity, germ tubes produced an abnormal amount of CO_2 on the leaves, indicating a possible disturbance of their orientation towards the stomata. CO_2 serves as a signal for the germ tube orientation. Good correlation between infectivity of spores and their ability of appressoria formation indicated a disturbed orientation to be the principal cause of this alteration in bean rust infectivity. (AS)

0144

28902 WOOD, L.A.; BEATE, M.C. 1986. Light and electron microscopy of the interaction between the sunflower rust fungus (Puccinia helianthi) and leaves of the nonhost plant, French bean (Phaseolus vulgaris). Canadian Journal of Botany 64(11):2876-2888. En., Sum. En., Fr., 13 Ref., Il. [Botany Dept., Univ. of Toronto, Toronto, Ontario, Canada M5S 1A1]

Phaseolus vulgaris. Leaves. Analysis. Mycoses. Cell walls. Snap beans. Canada.

Growth of the sunflower rust fungus (Puccinia helianthi) was compared by light microscopy in sunflower leaves, in untreated French bean leaves, in French bean leaves given a preinoculation heat treatment, and on collodion membranes. Results suggested that fungal growth was slightly reduced and the formation of haustorial mother cells was inhibited in untreated French bean leaves. Haustorial mother cells, when present, did not form haustoria and adjacent mesophyll cell walls usually were highly refractive. Preinoculation heat treatment reduced the incidence of refractive cell walls and increased that of haustorial mother cells and haustoria. Ultrastructurally, infection hyphae in unheated French bean leaves appeared

unusually vacuolate and often contained wall appositions where they touched the plant cells. Silica-like deposits were present in and on mesophyll cell walls at most infection sites. In heated plants, necrotic haustoria with small bodies were seen at the few sites that lacked silica-like deposits. At other sites, the fungus appeared to have stopped growing during the formation of the penetration peg or the haustorial neck, and such necks were encrusted with silica-like material. At most sites, penetration pegs were occluded resulting in the unusual situation in which the haustorial mother cell remained seemingly alive in spite of the necrosis of the haustorium. (AS)

0145

29741 ZAMBOLIM, L.; RODRIGUES, C.H.; MARTINS, M.C. DEL P. 1985. Controle da ferrugem do feijoeiro com fungicidas protetores e sistemicos. (Bean rust control with protective and systemic fungicides). Seiva 45(95):1-16. Pt., Sum. Pt., En., 40 Ref., Il. [Depto. de Fitopatologia da Univ. Federal de Vicosa, Vicosa-MG, Brasil]

Phaseolus vulgaris. Uromyces phaseoli. Fungicides. Brazil.

The effect of new fungicides to control bean rust was studied and the effectivity of both protective and systemic fungicides was compared. Under greenhouse conditions, chlorothalonil, mancozeb, bitertanol, thiophanate-methyl plus thiram, triadimefon, triforine, and oxycarboxin, at 1125, 1200, 125, 400, 125, 100, and 375 ppm a.i., resp., proved to be good protective fungicides when sprayed until 15 days before inoculation of uredospores of Uromyces phaseoli var. typica. Oxycarboxin and triforine showed a curative effect when sprayed up to 6 days, and bitertanol and triadimefon up to 3 days after inoculation. Under field conditions the best results were obtained with oxycarboxin (0.5 kg/ha), bitertanol (0.5 kg/ha), and triforine (0.5 liter/ha). (AS) See also 0017 0049 0081 0102 0106 0171 0177 0180 0181 0182 0184 0185 0186

E04 Viroses

0146

29693 ACOSTA, O.; ALEGRIA, A.; LASTRA, R. 1986. Some biological and physicochemical properties of bean rugose mosaic virus. Phytopathology 76(11):1182-1189. En., Sum. En., 30 Ref., Il. [Dept. of Physiological Sciences, Facultad de Medicina, Univ. Nacional, Bogotá, Colombia]

Phaseolus vulgaris. Bean rugose mosaic virus. Isolation. Analysis. Identification. Symptomatology. Colombia. Costa Rica. El Salvador.

Characterization of a BRMV isolate from Cali, Colombia, confirmed that this virus belongs to the comovirus group. In sucrose density gradients BRMV separated into 3 centrifugal components after rate zonal sedimentation and into 4 or 5 density components after CsCl equilibrium sedimentation, depending on the type of buffer. The native nucleoprotein particles also resolved into 1 or 2 electrophoretic forms depending on the type of buffer used for purification. Unfractionated BRMV, as well as the individual nucleoprotein particles, contained 2 (39.5 x 10(3) and 24.5 x 10(3) daltons) or 3 (39.5 x 10(3), 24.5 x 10(3), and 22 x 10(3) daltons) proteins that could be separated by SDS-polyacrylamide gel electrophoresis. The no. of proteins depended on the type of buffer used for the virus purification. From symptomatology and biophysical characteristics the Colombian isolate seemed to be closely related to the BRMV-Costa Rica strain but somewhat different from the BRMV-Ampollado strain from El Salvador. (AS)

0147

29719 AWASTHI, L.P.; PATHAK, S.P.; GAUTAM, N.C. 1985. Control of virus diseases of vegetable crops by a glycoprotein isolated from Boerhaavia

diffusa. Indian Journal of Plant Pathology 3(1):59-63. En., Sum. En., 19 Ref.

Phaseolus vulgaris. Viroses. Virus inhibition. Snap beans. Seedling. Disease control. India.

A virus inhibitor of glycoprotein nature, isolated from the roots of Boerhaavia diffusa plants, has shown much promise against major forms of plant virus diseases, and has no side effects. It has prevented the infection of virus diseases under field conditions in tomato, potato, brinjal, French bean, pea, and bottle gourd, when a solution of this inhibitor (1.0 mg/ml) in phosphate buffer (pH 7) was sprayed twice a week for 1 mo. from the seedling stage. The degree of protection, however, varied with the total no. of sprays and the interval between the 2 treatments. Max. protection (60-90 percent) was observed when any of these crops were sprayed with this inhibitor for about 2 mo. Inhibitor treatment caused marked suppression of disease symptoms and a drastic reduction in the virus content in treated plants. Spraying with inhibitor protected the crop plants for about a month. (AS)

0148

30637 FAHMEAT, A.; STEVENS, W.A. 1986. Occurrence and some properties of tobacco necrosis virus inhibitors extracted from seven species of plants from the Centrospermae. Microbios Letters 33(129):7-13. En., Sum. En., 25 Ref. [Dept. of Botany, Faculty of Science, Univ. of Ain Shams, Cairo, Egypt]

Phaseolus vulgaris. Snap beans. Tobacco necrosis virus. Inhibitors. Egypt.

Extracts from 5 species of plants belonging to the order Centrospermae showed potent inhibition to local lesion production in French bean plants by tobacco necrosis virus. The effect of dilution, heating, dialysis, and ammonium sulphate fractionation on the inhibitory extracts was investigated. According to these properties, 2 groups of inhibitors were identified. The 1st group contained inhibitors of high mol. wt. and were probably proteins extracted from Iliantus giganteus, Saponaria officinalis, and Rivina humilis. The 2nd group consisted of low mol. wt. inhibitors extracted from Amaranthus flavus and Celosia cristata annuus. Extracts from Gomphrena globosa and Arenaria montana showed little virus inhibition. (AS)

0149

28675 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1983. Control genético del mosaico común del frijol (BCMV); unidad audiotutorial. (Genetic control of bean common mosaic virus (BCMV); audiotutorial unit). Contenido científico Morales G., F.; Castaño J., M.; producción Ospina O., H.F. Cali, Colombia. 55 diap. color 5 x 5 cm.; 1 cassette 27 min.; guión 11p.; guía de estudio 25p. En., Il.

Phaseolus vulgaris. Bean common mosaic virus. Resistance. Genetics. Disease control. Colombia.

The methodology used at CIAT to incorporate genetic resistance to BCMV into commercial bean var. is described in detail. The techniques for evaluating germplasm are indicated, taking into account the type of resistance, hybridization, selection, progeny testing, and necrosis testing. (CIAT)

0150

28952 DAVIS, R.F.; HAMPTON, R.O. 1986. Cucumber mosaic virus isolates seedborne in Phaseolus vulgaris: serology, host-pathogen relationships, and seed transmission. Phytopathology 76(10):999-1004. En., Sum. En., 17 Ref., Il. [Dept. of Plant Pathology, Cook College, Rutgers Univ., P.O. Box 231, New Brunswick, NJ 08903, USA]

Phaseolus vulgaris. Cucumber mosaic virus. Serology. Seed transmission. Hosts and pathogens. Races. Cultivars. Symptomatology. USA.

Selected cucumber mosaic virus isolates, seed-borne in bean, were compared for serological relatedness, host-pathogen relationships, and seed transmissibility. Cucumber mosaic virus strains B, Le, F, B32, and Pg were found to be serologically indistinguishable by gel double-diffusion tests using antisera to formaldehyde-fixed immunogens (cucumber mosaic virus-B and cucumber mosaic virus-Le). Detection of cucumber mosaic virus in infected bean leaves by gel double-diffusion tests was dependent on extraction in 0.05 molar citrate buffer, pH 6.5, with 0.1 percent sodium thioglycollate (wt./vol.), 0.1 percent Triton X-100 (vol./vol.), and 1 percent formaldehyde (vol./vol.). Time of appearance and severity of symptoms induced by cucumber mosaic virus-B, and relative virus concn. varied among 37 bean cv. representing diverse germplasm. Virus titer was max. in greenhouse-grown plants 1-2 wk. after inoculation with cucumber mosaic virus-B, -Le, and -F but declined sharply after the 4th wk. Cucumber mosaic virus seed transmission varied according to var. and isolate and did not occur in seeds from plants inoculated 4 or 6 wk. after planting. Cucumber mosaic virus-Pg occurred in all parts of bean seedlings infected from seed. The implications of these results for detection and diagnosis of cucumber mosaic virus in bean plants are discussed. (AS)

0151

29945 FIGUEIRA, A. DOS R.; COSTA, A.F. 1986. Tentativas de transmissão mecânica do vírus do mosaico dourado do feijoeiro do Brasil. (Attempts of mechanical transmission of bean golden mosaic virus from Brazil). Fitopatologia Brasileira 11(2):433-447. Pt., Sum. Pt., En., 18 Ref. [Depto. Fitossanitário, ESAL, Caixa Postal 37, 37.200 Lavras-MG, Brazil]

Phaseolus vulgaris. Bean golden mosaic virus. Isolation. Cultivars. Inoculation. Disease transmission. Pathogenicity. Brazil.

An extensive series of mechanical inoculation tests with a wide range of BGMV isolates was carried out for 2 yr in Brazil. Several bean var. and susceptible species of Phaseolus were tried as virus donor and test plants. Variation in the method of sampling for the inocula and different extracting solutions and inoculation techniques were tested. Also, the techniques used successfully in the mechanical transmission of similar viruses in other countries were meticulously repeated. All results were negative, indicating that isolates of the local complex are less stable or possess characteristics that make them difficult to be transmitted mechanically. However, it seems likely that other techniques or the discovery of a new variant or mutant of the complex might lead to the mechanical transmission of 1 or more components of the Brazilian BGMV complex. (AS)

0152

28873 GOOTHALS, M. 1986. Les viroses des légumineuses (DV 8703). (Viral diseases in legumes (DV 8703)). In Institut des Sciences Agronomiques du Burundi. Rapport Annuel 1986. (Septembre 1985-Aout 1986). Bujumbura. v.3, p.93. Fr.

Phaseolus vulgaris. Bean common mosaic virus. Inoculation. Cultivars. Symptomatology. Research. Burundi. Colombia.

The main symptoms of BCMV are listed, indicating that in the Mwanira exptl. station, Burundi, higher degrees of infestation were observed on climbing beans grown in association with maize. Based on the shipment made by CIAT-Colombia of seeds of bean var. that allow the differentiation of BCMV strains, an isolate of BCMV from Gisozi was used for inoculation. Local necrotic-like lesions were observed on primary leaf venations in bean var. Widusa, Jubila, and Topecrop (cv. with dominant allele genes of the

necrosis gene), and typical BCMV symptoms in bean var. Dubbele Witte and Sanilac (cv. with recessive allele genes of the necrosis gene). (CIAT)

0153

06910 IKEGAMI, M.; MORINAGA, T.; MIURA, K.I. 1986. Infectivity of virus-specific double-stranded DNA from tissue infected by bean golden mosaic virus, a geminivirus. Annals of the Phytopathological Society of Japan 52(4):738-739. En., Sum. Es., 8 Ref., Il.

Phaseolus vulgaris. Bean golden mosaic virus. DNA. Pathogenicity.

Infectivity of BGMV double-stranded DNA isolated from BGMV-infected leaves is reported for the 1st time. BGMV was maintained in and purified from bean cv. Top Crop. The infectivity of purified BGMV double-stranded DNA was tested by rubbing a nucleic acid solution on expanding primary bean leaves with celite powder. A typical yellow mosaic symptom appeared 10-12 days after inoculation. The total nucleic acid was isolated from leaves with symptoms and was hybridized with (α-32)P-labeled BGMV single-stranded DNA, showing that BGMV double-stranded DNA is present in BGMV double-stranded DNA inoculated leaves. Further examination indicated that BGMV double-stranded DNA is infective and gives rise to progeny virus which is indistinguishable from native BGMV. This observation suggests that whether or not BGMV single-stranded DNA is 1st converted to double-stranded form by cellular DNA polymerase, the replicate form isolated from infected cells is a component both in the transcription of viral mRNA and in DNA replication. (CIAT)

0154

06897 MORALES, F.J.; CASTAÑO, M. 1987. Seed transmission characteristics of selected bean common mosaic virus strains in differential bean cultivars. Plant Disease 71(1):51-53. En., Sum. En., 8 Ref. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Phaseolus vulgaris. Bean common mosaic virus. Bacon. Seed transmission. Cultivars. Resistance. Inoculation. Yield components. Colombia.

One necrosis-inducing strain and 4 mosaic-inducing strains of BCMV were differentially seed-transmitted in 14 mosaic-susceptible bean cv. Dubbele Witte, Redlands Greenleaf 5, Michelite, Sanilac, and Red Mexican 35 consistently transmitted the US 1, US 2, US 5, NL 3, and NL 4 strains of BCMV in 39.7-54.4 percent of the seed produced by infected plants. On the contrary, Imuna and the Great Northern lines 31 and 123 transmitted the virus in less than 1 percent of the seed tested. Pinto 114 did not transmit BCMV US 2 in tests involving more than 1000 seeds. Max. seed transmission rates were observed for test plants inoculated at the primary leaf stage. Twelve of 14 cv. tested did not transmit any of the selected BCMV strains in seeds of plants inoculated 30 days after sowing. No. and wt. of seeds produced by test plants inoculated at the primary leaf stage were reduced in relation to the same yield components analyzed for bean plants inoculated 20 days later. The necrosis-inducing BCMV NL 3 strain proved highly transmissible in the seed of the navy cv. Sanilac and Michelite, commonly cultivated in regions where this necrotic BCMV strain constitutes a production problem. (AF)

0155

30649 TRAKLE, B.S. 1986. Abiotic transmission of southern bean mosaic virus in soil. Australian Journal of Biological Sciences 39(4):353-359. En., Sum. En., 17 Ref., Il. [Dept. of Microbiology, Univ. of Queensland, St. Lucia, Qld. 4067, Australia]

Phaseolus vulgaris. Bean southern mosaic virus. Disease transmission. Australia.

When soil in pots was infested with BSMV, it became infective for highly susceptible Phaseolus vulgaris bait plants. Soil could be infested by adding either infected plant tops or roots or by growing infected plants in it. Release of BSMV by roots of P. vulgaris cv. Red Kidney reached a max. at flowering and thereafter declined, but some virus was still recovered in drainage water when the plants were dead. When grown in infested soil P. vulgaris cv. Bountiful was more susceptible to infection at 26 degrees Celsius than at 21 or 32 degrees Celsius, temp. which were less favorable for plant growth. The addition to virus-infested soil of tomato roots carrying nematodes (Meloidogyne sp.), fungi, and other soil biota did not increase virus infection in bait plants. It is concluded that BSMV resembles tobacco mosaic virus in being able to infect plant roots abiotically in infested soil. (AS) See also 0017 0106 0180 0185

E05 Nematodes

0156

28679 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1982. Principales nematodos que atacan el frijol y su control; unidad audiotutorial. (Main nematodes attacking beans and their control; audiotutorial unit). Contenido científico Varón de Agudelo, F.; Riedel, R.M.; producción Ospina O., H.F.; Flor M., C.A. Cali, Colombia. 94 diap. color 5 x 5 cm.; 1 cassette 35 min.; guión 10p.; guía de estudio 40p. Es., Il.

Phaseolus vulgaris. Nematodes. Nematode control. Colombia.

The 2 main nematode genera that attack bean plants are identified and the symptom. they cause, mainly on the roots, are described. Several methodologies for the identification of nematodes in the lab. are described in detail and recommendations are given on their control. Finally, the methodology for obtaining var. resistance is indicated. (CIAT)

0157

29917 [illegible] F., L.A.; VARGAS G., E. 1984. El nematodo foliar Aphelenchoides besseyi Christie (Nematoda: Aphelenchoididae) como causante de la falsa mancha angular del frijol en Costa Rica. (The leaf nematode Aphelenchoides besseyi (Nematoda:Aphelenchoididae) as causal agent of the false angular spot of beans in Costa Rica). Agronomía Costarricense 8(1):65-68. Es., Sum. En., Es., 2 Ref., Il.

Phaseolus vulgaris. Aphelenchoides besseyi. Leaves. Symptomatology. Identification. Etiology. Hosts and pathogens. Costa Rica.

The presence of the leaf nematode Aphelenchoides besseyi that causes necrotic spots on bean leaves is reported for the 1st time in Atenas (Alajuela, Costa Rica). These symptoms are easily confused with those caused by the fungus Isariopsis griseola on the same plant. Information on the authorized species identification of the nematode is included. Some notes are given on the suspected influence of environmental factors that favor the population increase of the nematode and the appearance of the disease. Melampodium divaricatum, a weed commonly found associated with beans under field conditions, was also found to be a host. (AS)

0158

29733 WILCOX, D.A.; LORIA, R. 1986. Water relations, growth, and yield in two snap bean cultivars infected with root knot nematode, Meloidogyne hapla (Chitwood). Journal of the American Society for Horticultural Science 111(1):34-38. En., Sum. En., 25 Ref., Il. [Dept. of Vegetable Crops & Plant Pathology, Cornell Univ., Long Island Horticultural Research Laboratory, Riverhead, NY 11901, USA]

Phaseolus vulgaris. Snap beans. Nematodes. Cultivars. Inoculation. Transpiration. Leaf area. Yields. Resistance. USA.

Seedlings of snap bean cv. Strike and Kentucky Wonder were inoculated with 0, 6000, 12,000, or 18,000 Meloidogyne hapla larvae/pot. Leaf xylem potential, stomatal conductance, transpiration, root hydraulic conductivity, leaf area, and plant wt. were measured 4 wk. after inoculation. In a 2nd expt., inoculated plants were grown for 7 wk. to obtain yield data. Leaf area, xylem potential, and yield were significantly reduced by nematode infection. The 2 cv. differed in their response to M. hapla. Yield was reduced more at high nematode populations in Kentucky Wonder than in Strike. This differential response also occurred with xylem potential. There was a trend toward decreased hydraulic conductivity in infected Kentucky Wonder, but not Strike roots. Cv. tolerance in beans appears to be related to the effects of nematodes on plant water relations. (AS) See also 0185

E06 Physiological Disorders

C159

29931 ADOMAIT, E.J.; ENSING, J.; HOFSTRA, G. 1987. A dose-response function for the impact of O3 on Ontario-grown white bean and an estimate of economic loss. Canadian Journal of Plant Science 67(1):131-136. En., Sum. En., Fr., 20 Ref. [Dept. of Economics, Univ. of Guelph, Guelph, Ontario, Canada N1G 2W1]

Phaseolus vulgaris. Ozone. Yields. Temperature. Rainfall. Prices. Income. Mathematical model. Canada.

A function for O3 dose and yield response in white bean was developed using data from antioxidant trials (EDU; (N-2-(2-oxo-1-imidazolidinyl) ethyl-N'-phenylurea)) over a 4-yr period. The best fitting dose-response function was obtained only when weather factors were included. Mean reduction in yield associated with variable O3 dose over a 4-yr period was 13 percent. Assuming adaptive expectations, the stock adjustment model most accurately estimated the supply curve for white bean. Factors used in estimating white bean supply included hectares planted, price, yield, and insurance premiums. Based on the effect of yield reductions on producer surplus, the short-term loss due to O3 in real av. income is approx. 15 percent and the long-term loss is approx. 12 percent of real av. income. (AS)

0160

28974 BIDDINGTON, N.L. 1986. Mechanically-induced stress in plants. Span (England) 29(1):38-40. En., Sum. En., 12 Ref., Il. [National Vegetable Research Station, Wellesbourne, Warwickshire CV35 9EF, England]

Phaseolus vulgaris. Snap beans. Plant injuries. Mechanical damage. Auxins. Gibberellins. England.

The effects of mechanically-induced stress in plants (among them French beans), caused either naturally by wind or rain, or artificially by shaking or blowing, are reviewed. In field expt. with French beans, it was found that increased wind speeds resulted in reduced extension growth, increased stem diameter, and increased secondary xylem production. The effects of using windbreaks, plant breeding methods, and/or growth regulators to modify mechanically-induced stress in the field are discussed. Finally, the practical uses of mechanically-induced stress are mentioned as well as the effects of ethylene, gibberellins, and auxins in mechanically-induced stress responses in French beans. (CIAT)

0161

29696 GRIFFITH, S.M.; CAMPBELL, W.F. 1987. Effects of sulfur dioxide on nitrogen fixation, carbon partitioning, and yield components in snapbean. Journal of Environmental Quality 16(1):77-80. En., Sum. En., 19 Ref., Il. [Dept. of Agronomy & Plant Genetics, Univ. of Minnesota, St. Paul, MN, USA]

Phaseolus vulgaris. Snap beans. Air pollution. SO2. Nitrogen fixation. Carbon fixation. Metabolism. Biochemistry. Laboratory experiments. USA.

A study was carried out to determine if N2-fixation, C partitioning, and plant productivity of snap bean were affected under short-term, low-level SO2 exposures. Plants were exposed 29 days after planting (7 days before anthesis) to 0, 18, and 36 micromoles SO2/cubic meter for 4 h/day for 5 days in a fumigation chamber. On the last day of SO2 treatment, plants were also exposed to (14)CO2 to determine changes in C partitioning patterns. At these concn., there was no visible damage to plant tissue and no significant changes in dry wt. or yield components. Only the 36 micromoles SO2/cubic meter treatment reduced C2H2 reduction rates, but recovery to near control rates occurred within 24 h after SO2 removal. Leaves of plants treated with 18 micromoles SO2/cubic meter exported more of their total assimilated (14)C than control plants, while those treated with 36 micromoles SO2/cubic meter retained greater amounts. Retention of (14)C at the 36 micromoles SO2/cubic meter level may account for the inhibition of C2H2-reduction because of less photosynthate arriving at the root nodules. These data suggest that SO2 levels that do not cause visible injury may interfere with C metabolism and transport in snap bean. (AS)

0162

28904 WEINSTEIN, L.H.; KAUR-SAWHNEY, R.; RAJAM, M.V.; WETTLAUFER, S.H.; GALSTON, A.W. 1986. Cadmium-induced accumulation of putrescine in oat and bean leaves. Plant Physiology 82(3):641-645. En., Sum. En., 23 Ref. [Boyce Thompson Inst., Tower Road, Ithaca, NY 14853, USA]

Phaseolus vulgaris. Leaves. Cd. Plant physiological disorders. Metabolism. USA.

The effects of Cd(2+) on putrescine, spermidine, and spermine titers were studied in oat and bean leaves. In bean leaves, there was Cd(2+)-induced accumulation of putrescine in the free and soluble conjugated fractions, but not in the insoluble fraction. This suggests a rapid exchange between putrescine that exists in the free form and putrescine found in acid-soluble conjugated forms. It is concluded that Cd(2+) can act like certain other stresses (K(+) and Mg(2+) deficiency, excess NH4(+), low pH, salinity, osmotic stress, wilting) to induce substantial increases in putrescine in plant cells. (AS (extract))

F00 PEST CONTROL AND ENTOMOLOGY

See 0213

F01 Injurious Insects, Mites and their Control

0163

29966 ALVARADO-RODRIGUEZ, B.; LEIGH, T.F.; FOSTER, K.W.; DUFFEY, S.S. 1987. Life tables for Lygus hesperus (Heteroptera:Miridae) on susceptible and resistant common bean cultivars. Environmental Entomology 16(1):45-49. En., Sum. En., 22 Ref., Il. [Nor-Cal Wild Rice, P.O. Box 128, Davis, CA 95617, USA]

Phaseolus vulgaris. Lygus hesperus. Genotypes. Resistance. Insect biology. USA.

The plant bug, Lygus hesperus, was reared on 5 common bean genotypes, 3 of which were previously identified as resistant (BAT 1081, BAT 1299, and CIAT 5979) and 2 as susceptible (Red Kidney and CIAT 5683). Age-specific life table parameters were estimated as a means to measure plant resistance to L. hesperus. Under both field and lab. conditions, fewer bugs survived to the adult stage on the resistant cv. than on the susceptible cv. Female lygus bugs reared on the resistant genotypes also had lower gross reproductive rates, net reproductive rates, and intrinsic rates of increase than those bugs held on the susceptible genotypes. These life table values for CIAT 5683 were significantly greater than for all other cv. Resistance had no effect on mean generation time. Finite rates of increase and population doubling times were significantly lower on resistant cv. These life table results confirm resistance to lygus bugs in common bean cv. based on reduced survivorship to adulthood, fecundity, and longevity of females. (AS)

0164

29641 AMBEKAR, J.S.; POKHARKAR, D.N.; PAWAR, D.B.; PATIL, B.D.; POKHARKAR, R.N. 1985. Comparative efficacy of insecticides against stem fly on French bean. Journal of Maharashtra Agricultural Universities 10(3):300-301. En., Sum. En., 7 Ref. [College of Agriculture, Pune-411 005, India]

Phaseolus vulgaris. Snap beans. Ophiomyia phaseoli. Insecticides. India.

Field expt. were conducted during 1981-84 to evaluate the best insecticide for the control of stem fly (Ophiomyia phaseoli), a destructive pest of French bean in Pune region, India. Results revealed that 2 sprayings with 0.05 percent monocrotophos was the most effective in controlling the stem fly. (AS)

0165

28666 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1981. Principales crisomélidos que atacan el frijol y su control; unidad audiotutorial. (Main Chrysomelidae attacking beans and their control; audiotutorial unit). Contenido científico Cardona M., C.; García, J.E.; producción Ospina O., H.F.; López G.; M. Cali, Colombia. 80 diap. color 5 x 5 cm.; 1 cassette 20 min.; guión 12p.; guía de estudio 24p. Es., Il.

Phaseolus vulgaris. Diabrotica balteata. Cerotoma facialis. Insect biology. Plant injuries. Insect control. Cultural control. Chemical control. Colombia.

The biology, habits, importance of damage, and control of the 2 most important Chrysomelidae attacking beans plants, Diabrotica balteata and Cerotoma facialis, are described. The differences that exist between the damage caused to seedlings and the symptoms that appear due to the use of inferior quality seed are illustrated. Recommendations are made on chemical and cultural control since var. resistance (genetic control) has not yet been found. (CIAT)

0166

28670 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1980. El lorito verde Empoasca kraemeri (Ross y Moore) y su control; unidad audiotutorial. (The leafhopper Empoasca kraemeri and its control; audiotutorial unit). Producción Ospina O., H.F.; asesoría científica Cardona M., C.; Schoonhoven, A. Van; García, J.E. Cali, Colombia. 84 diap. color 5 x 5 cm.; 1 cassette 31 min.; guión 17p.; guía de estudio 41p. Es., Il.

Phaseolus vulgaris. Empoasca kraemeri. Insect biology. Symptomatology. Insect control. Colombia.

The biology and habits of the leafhopper Empoasca kraemeri and the symptoms its attack produces on bean plants are described in detail. These symptoms

are differentiated from similar ones. The different control methods (cultural, biological, chemical, and genetic) are discussed. Genetic control is considered the most reliable, safe, and economic alternative. Several methodologies are given that allow the plant breeder to obtain higher levels of resistance in commercial var. (CIAT)

0167

29782 EICHELKRAUT M., K. 1987. Biología, aspectos ecológicos y cría masal de Bemisia tabaci (Gennadius) (Hemiptera-Homoptera: Aleyrodidae). (Biology, ecological aspects, and mass rearing of Bemisia tabaci (Hemiptera-Homoptera: Aleyrodidae)). Tesis Bióloga-Entomóloga. Cali, Colombia, Universidad del Valle. 98p. Es., Sum. Es., 59 Ref., Il.

Phaseolus vulgaris. Bemisia tabaci. Insect biology. Trialeurodes vaporariorum. Cultivars. Resistance. Bean golden mosaic virus. Colombia.

A mass rearing of Bemisia tabaci was successfully established at CIAT during 1986. Host plants used were egg-plant and pigeon pea. The life cycle of B. tabaci was 28.3 plus or minus 7.9 days in beans under field conditions and 25.3 plus or minus 2.0 days in the greenhouse. The whitefly Trialeurodes vaporariorum was also found in the bean crop. In field trials the highest populations of immature stages of B. tabaci occurred during the 1st days of July and those of T. vaporariorum at the end of Aug. 1986. B. tabaci preferably occurs on cotyledonary leaves of the bean plants in the field, while T. vaporariorum is localized on trifoliate leaves. It was determined that the best time to survey both B. tabaci and T. vaporariorum is 30-35 days after planting in cotyledonary leaves for Bemisia and trifoliate leaves for Trialeurodes. Twenty-six bean var. were assessed as to whitefly populations and it was found that several BGMV-susceptible var. had a significantly larger no. of B. tabaci pupae while several BGMV- resistant var. had a lower no. of insects. The adequate sample size for whiteflies was 10 leaves/var./replicate. (AS-CIAT)

0168

29928 JARRY, M.; DEBOUZIE, D.; CHACON, A. 1987. Influence de quelques variables liées à la plante Phaseolus vulgaris sur la ponte d'Acanthoscelides obtectus dans la nature. (Effect of some of the variables associated to plants of Phaseolus vulgaris on the egg laying of Acanthoscelides obtectus in the field). Entomologia Experimentalis et Applicata 43(2):105-113. Fr., Sum. Fr., En., 16 Ref., Il. [I.B.E.A.S., UA CNRS 340, Avenue de l'Université, F-64000 Pau, France]

Phaseolus vulgaris. Pods. Acanthoscelides obtectus. Maturation. France.

The influence of some of the variables associated to plants of Phaseolus vulgaris (date of maturation of the pods, height, and no. of seeds/pod) on the egg laying of the bean weevil Acanthoscelides obtectus was tested. All the pods of 20 Phaseolus vulgaris plants, grown in field conditions, were regularly examined during growth time and then collected. Adult density was estimated by counting, several times a day, the no. of adults observed on the pods of the 20 selected plants. Multifactorial analysis was applied to the data. The results reveal a good correlation between the no. of eggs laid into the pods and the no. of days when adults were observed on the same pod. Egg laying is markedly influenced by the date of maturation of the pods. Contamination of pods by bruchids is higher in places where weeds--presumable feeding sites for the adults--are abundant. Other variables seem to be less important. A review of the data shows a strong aggregation of the oviposition on certain pods which in general mature early, but the same aggregative pattern can be observed when the females of A. obtectus can choose among several pods of the same state of maturity on the same plant. These observations disprove the existence of a marking pheromone which would prevent repeated oviposition. (AS)

0169

29644 KABISSA, J.; FRONK, W.D. 1986. Bean foliage consumption by Mexican bean beetle (Coleoptera: Coccinellidae) and its effect on yield. Journal of the Kansas Entomological Society 59(2):275-279. En., Sum. En., 8 Ref. [Ilonga Agricultural Research Inst., Ilonga, Kilosa, Tanzania]

Phaseolus vulgaris. Epilachna varivestis. Foliage. Plant injuries. Yields. Laboratory experiments. Tanzania.

Bean foliage consumption by Epilachna varivestis larvae was determined under greenhouse conditions at 22-26 degrees Celsius to be 14.3 square centimeters/larva, of which 87 percent was consumed during the final 2 instars. Adult consumption was 4.5 square centimeters/24 h. Dry wt. consumption for larvae and adults was also determined. Percentage yield loss due to 2nd, 3rd, and 4th instars and adults feeding to the end of the season at a density of 50 insects/5 plants was determined to be 2.0, 2.1, 8.3, and 54.9 percent of the total loss, resp. The duration and survival of larval instars and pupae in the field are given. (AS)

0170

29750 LABOUGLE, J.M.; PAIVA, M.R.S. DE 1983. Importancia do Planalto Mexicano como centro secundario de dispersao de insectos. (Importance of the Mexican Highlands as a secondary dispersal center of insects). Boletim da Sociedade Portuguesa de Entomologia 2(3):no.33:25-35. Pt., Sum. En., 20 Ref., Il.

Phaseolus vulgaris. Epilachna varivestis. Geographical distribution. Mexico.

The geographical distribution and dispersal of Epilachna varivestis are analyzed and related to the distribution of its main host, Phaseolus vulgaris, and of 1 of its parasites, Aplomyopsis epilachnae. It is pointed out that the origin of these species should be regarded as a coevolutive process, resulting from a continuous and directed pressure of selection to which the Mexican Highlands region was submitted. The elevation of this central area, which took place after the Miocenic-Oligocenic geological period, brought about a profound change of the climatic and ecological conditions that were responsible for the origin of several plant and animal species including some insects of economic importance. (AS)

0171

29957 LINZ, D.; COSTA, E.C.; BLUME, E.; MINUSSI, E. 1986. Microflora em sementes de feijao danificadas por pentatomideos. (Microflora in bean seeds damaged by pentatomids). Revista do Centro de Ciencias Rurais 16(3):189-201. Pt., Sum. Pt., En., 18 Ref., Il. [Centro de Ciencias Rurais da Univ. Federal de Santa Maria, 97.119, Santa Maria-RS, Brasil]

Phaseolus vulgaris. Seeds. Piezodorus guildinii. Nezara viridula. Germination. Seed characters. Nematospora. Eremothecium. Brazil.

A study was conducted in Santa Maria (Rio Grande do Sul, Brazil) to determine the types and quantity of endogenous pathogens in bean seeds damaged by the pentatomids Piezodorus guildinii and Nezara viridula. The microflora determination in previously disinfected seeds was done by the blotter and PDA methods. Germination percentage decreased with increasing insect infestation levels. The percentage of Nematospora colonies increased with the increase in the no. of N. viridula up to 6 insects/3 plants. Besides Nematospora, Eremothecium was observed as a causal agent of yeast spot disease in bean. The occurrence of Nematospora was more evident in seeds severely damaged by the stink bugs. (AS)

0172

29964 RUPPEL, R.F. 1986. Damage to dry beans by different stages of Mexican bean beetle. Michigan Dry Bean Digest 11(1):10-11. En., 7 Ref., Il.

Phaseolus vulgaris. Epilachna varivestis. Plant injuries. Insect biology. USA.

Damage (leaf area consumption) to beans caused by the different stages of Epilachna varivestis in Michigan, USA, is detailed and estimated. The different stages of the pest vary in no., duration, and amount consumed/day. The total amount consumed by each stage can be determined by simply multiplying these 3 factors. In spite of their vastly greater no., the 1st larval stage only consumes as much as old adults (overwintered adults). The 3rd larval stage consumes as much as old adults and the 1st 2 larval stages combined, while the 4th larval stage eats as much as all of the earlier stages. The greatest amount of feeding is done by the new adults as they eat over twice as much as all of the other stages combined. Thus 1 pair of old adults and their progeny would consume 1.17 square meters of bean leaves. (CIAT)

0173

29706 TENG, H.J.; WADDILL, V.; SLANSKY, F.; STRAYER, J. 1984. Performance and host preference of adult banded cucumber beetles, Diabrotica balteata, when offered several crops. Journal of Agricultural Entomology 1(4):330-338. En., Sum. En., 11 Ref., Il. [Inst. of Zoology, Academic Sinica Nankang, Taipei, Taiwan, R.O.C.]

Phaseolus vulgaris. Diabrotica balteata. Resistance. Plant injuries. Leaves. USA.

Fifteen crop plants, among them bush beans, were evaluated to determine performance and host preference of adult banded cucumber beetles (Diabrotica balteata). In no-choice tests, greatest fecundity and longevity occurred on broccoli, cauliflower, and potato, even though equal or greater amounts of leaf tissue were consumed on soybean, 3 var. of sweet potato, bell pepper, bush bean, and tomato. In multiple-choice tests, broccoli, bell pepper, cauliflower, and bush bean were more preferred for feeding by D. balteata adults than potato and the other plants; however, D. balteata adults laid most eggs on potato, tomato, sweet corn, bush bean, and Morado (sweet potato). Elytral color remained yellow for adults feeding on the legumes and on beet, but on the other plants the elytra turned green among various percentages of adults. (AS) See also 0067 0081 0094

G00 GENETICS AND PLANT BREEDING

0174

29679 BROGLIE, K.E.; GAYNOR, J.J.; BROGLIE, R.M. 1986. Ethylene-regulated gene expression: molecular cloning of the genes encoding an endochitinase from Phaseolus vulgaris. Proceedings of the National Academy of Sciences of the United States of America. En, Sum. En., 36 Ref., Il. [The E.I. du Pont de Nemours & Co., Inc., Central Research & Development Dept., Experimental Station, Wilmington, DE 19898, USA]

Phaseolus vulgaris. Genes. RNA. DNA. Analysis. USA.

A full-length copy of bean leaf chitinase mRNA has been cloned. The 1146-base-pair insert of pCH18 encodes the 27-residue amino-terminal signal peptide of the precursor and 301 residues of the mature protein. Utilizing pCH18 as a hybridization probe, it was shown that the increase in translatable chitinase mRNA seen upon ethylene treatment of bean seedlings is due to a 75- to 100-fold increase in steady-state mRNA levels. Southern blot analysis of bean genomic DNA revealed that chitinase is encoded by a small, multigene family consisting of approx. 4 members. From the nucleotide sequence analysis of 5 additional chitinase cDNA clones, it

appears that at least 2 of these genes are expressed. Three of the bean chitinase genes have been isolated from a Sau3A genomic library and partially characterized. (AS)

0175

29787 FELIX, J.F.; PREVILLON, G.; MILFORT, N. 1987. Contribution a la constitution d'une banque de germoplasmes de haricot (Phaseolus vulgaris L.) a partir de matériel végétal local et introduit. (Contribution to the establishment of a bean germplasm bank from local and introduced plant material). Recherche et Développement Rural 3(1):5-31. Fr., Sum. Fr., En., Es., 8 Ref. [Dept. de Phytotechnie, Faculté d'Agronomie et de Médecine Vétérinaire, Damien, Haiti]

Phaseolus vulgaris. Germplasm. Plant introductions. Selection. Adaptation. Bean golden mosaic virus. Plant architecture. Spacing. Planting. Land preparation. Maturation. Flowering. Cultivation. Haiti.

An inventory of local bean material was carried out in Haiti and introduced material was assessed to select the best var. and constitute a germplasm bank. Collections were carried out in the 4 major production zones for the local material, and IBYAN, International BGMV Nursery, adaptation trials for advanced CIAT lines, and adaptation trials for N-fixing var. were carried out with introduced materials. These trials were located in exptl. plots of the Faculté d'Agronomie et de Médecine Vétérinaire in Damien, within a colaborative bean improvement program with CIAT. The best materials were Ica Tamazulapa (from Guatemala) and Damien 359, 554, 551, 450, and 544 (from CIAT). Data is included for each regarding architecture, planting densities and distances, soil preparation, days to 50 percent bloom and to physiological maturity, irrigation frequency, weeding, fertilization, disease and pest resistance, and yield (kg/ha). (CIAT) See also 0062 0124 0213

G01 Breeding, Selection and Germplasm

0176

29661 BANNEROT, H.; FOURY, C. 1986. Utilisation des resources génétiques et création variétale. (Use of genetic resources and variety breeding). Bulletin Technique d'Information no.407:93-106. Fr., 43 Ref., Il. [Station de Génétique et d'Amélioration des Plantes, I.N.R.A., route de St-Cyr, 78000 Versailles, France]

Phaseolus vulgaris. Snap beans. Plant breeding. Research. Technology. Costs. France.

Outstanding examples regarding the evolution of crop yields due to advances in genetics are cited. The role of the most commonly used genetic resources, such as operators and their concepts about innovation, richness of genetic heritage, breeding types and fields, breeding methodologies and their limitations is briefly discussed. Several examples of disruptive breeding are given; results of work carried out in France with snap beans under greenhouse conditions are mentioned, highlighting that in spite of the high yields obtained, this technology is not justified from the economic viewpoint, but is rather recommended to more tropical countries with less expensive labor. (CIAT)

0177

29910 BEEBE, S. 1987. Programa de mejoramiento 1981-1986. (Breeding program, 1981-1986). In Taller de Mustia Hilachosa (Thanatephorus cucumeris), 2, San José, Costa Rica, 1986. Conferencias. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Regional de Frijol para Centroamérica y el Caribe. pp.124-128. Es.

Phaseolus vulgaris. Plant breeding. Resistance. Rhizoctonia solani. Colombia. Central America. Caribbean.

A brief account of the bean breeding program for resistance to Thanatephorus cucumeris from 1981 to 1986 at CIAT and for Central America and the Caribbean is presented. Black and red bean parents used in the crossing programs are listed. While population selections have all been conducted under field conditions in Esparza, Costa Rica, inoculation tests under moist chamber conditions have been conducted at CIAT. The fact that resistance remains stable across environments for some sources, but not for the particular case of BAT 93 progeny, is discussed. (CIAT)

0178

29967 BELIVANIS, T.; DORE, C. 1986. Interspecific hybridization of Phaseolus vulgaris L. and Phaseolus angustissimus A. Gray using in vitro embryo culture. Plant Cell Reports 5(5):329-331. Fr., Sum. En., 10 Ref., Il. [INRA, Station de Génétique et d'Amélioration des Plantes, F-78000 Versailles, France]

Phaseolus vulgaris. Phaseolus angustissimus. Hybridizing. Embryo. Seeds. Hybrids. France.

Five different heterozygous Phaseolus vulgaris plants with male sterile dominant genes were pollinated with P. angustissimus. Embryos were excised 13-23 days after pollination and cultured on Monnier's medium, where they developed into plantlets. No mature seeds containing viable embryos developed on the parent plants. The leaf shape of the hybrid plants was intermediate between those of the parents with a great variability between hybrids. Hybrids were diploid (2n = 22) and sterile. (CIAT)

0179

28680 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1986. Mejoramiento del frijol por introducción y selección; unidad audiotutorial. (Bean improvement through introduction and screening; audiotutorial unit). Contenido científico Voysest, O.; López, M.; producción Fernández O.; F. Cali, Colombia. 94 diap. color 5 x 5 cm.; 1 cassette 30 min.; guión 16p.; guía de estudio 32p. Es., Il.

Phaseolus vulgaris. Plant breeding. Plant introductions. Selection. Colombia.

The necessary steps to improve beans through introduction (importation of genetic material) are described in detail. The different types of trials as well as the selection criteria used to reach the stage of seed multiplication and the official registration before the responsible institution are included. (CIAT)

0180

29949 KRARUP H., A. 1986. Choshuenco, un nuevo cultivar de frejol para verde. Nota científica. (Choshuenco, a new snap bean cultivar. Scientific note). Agro Sur 14(2):131-132. Es., Sum. En. [Inst. de Producción y Sanidad Vegetal, Facultad de Ciencias Agrarias, Univ. Austral de Chile, Casilla 567, Valdivia, Chile]

Phaseolus vulgaris. Snap beans. Cultivars. Colletotrichum lindemuthianum. Bean common mosaic virus. Xanthomonas campestris pv. phaseoli. Resistance. Yields. Crossbreeding. Chile.

The new snap bean cv. Choshuenco, originated at the Santa Rosa Exptl. Station of the U. Austral of Chile, was registered. Topmost and Apolo were used as parents. Outstanding characteristics of this cv. are described, highlighting its resistance to anthraenose, common mosaic, and common bacterial blight. A comparative table of yields with the cv. Apolo and Cristal Bayo is included. (CIAT)

0181

29698 LYONS, M.E.; DICKSON, M.H.; HUNTER, J.E. 1987. Recurrent selection for resistance to white mold in Phaseolus species. Journal of the American Society for Horticultural Science 112(1):149-152. En., Sum. En., 21 Ref. [16210 SE 24th St., Bellevue, WA 98008, USA]

Phaseolus vulgaris. Phaseolus coccineus. Sclerotinia sclerotiorum. Selection. Crossbreeding. Resistance. USA.

Recurrent selection was used to breed Phaseolus vulgaris and P. coccineus for resistance to white mold disease, caused by Sclerotinia sclerotiorum. Twenty diverse genotypes selected for resistance to white mold formed the cycle 0 population. These lines were intercrossed in a partial diallel, and the F2 progeny were tested for resistance to white mold using a detached blossom/ascospore technique. Twenty single-plant selections were made, and the F3 progeny of these selections formed the cycle 1 population. A 2nd cycle of intercrossing, evaluation, and selection was completed, and genetic gain was determined by evaluating disease resistance of the selfed progeny derived from the cycle 0, 1, and 2 populations. There was a highly significant linear improvement in mean disease response from cycle 0 to cycle 2. When a subjective rating was used to assess disease response, the av. gain/cycle was 0.52 rating units, and the percentage gain from cycle 0 to cycle 2 was 31 percent. When measurement of lesion length (cm) on the main stem was used to assess disease response, the av. gain/cycle was 1.96 cm, and the percentage gain from cycle 0 to cycle 2 was 50 percent. The results of this study indicate that recurrent selection may be a useful technique for the development of resistance to white mold in Phaseolus species. (AS)

0182

29902 MORALES L., A. 1987. Mustia hilachosa en Costa Rica: avances de la investigación en mejoramiento genético del frijol común. (Web blight in Costa Rica: research progress in bean breeding). In Taller de Mustia Hilachosa (Thanatephorus cucumeris), 2, San José, Costa Rica, 1986. Conferencias. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Regional de Frijol para Centroamérica y el Caribe. pp.1-50. Es.

Phaseolus vulgaris. Germplasm. Cultivars. Resistance. Rhizoctonia solani. Yields. Plant breeding. Costa Rica.

Bean materials with the highest yields and tolerance to Thanatephorus cucumeris, identified in different bean breeding trials conducted in Costa Rica during 1981-86, are listed. Procedures and results are briefly discussed. In the 1986 International Web Blight Nursery, outstanding bean cv. were BAE 73, XAN 225, HT 7700, XAN 205, BAE 377, MUS 37, MUS 30, A 237, ICTA OSTUA, REVOLUCION 81, and HT 7719. In segregating population trials conducted since 1981, the black-seeded line HT 7719 (Porrillo Sintético x BAT 76) has proven tolerant to the disease and stable in yields, and thus will be released as a new var. in 1987. Results are also reported for promising materials obtained from evaluations of advanced F4-F6 bean lines, adaptation nurseries, and national preliminary nurseries since their initiation until 1986. (CIAT)

0183

29618 PARKER, J.H.; MICHAELS, T.E. 1986. Simple genetic control of hybrid plant development in interspecific crosses between Phaseolus vulgaris L. and P. acutifolius A. Gray. Plant Breeding 97(4):315-323. En., Sum. En., De., 30 Ref. [Allelix, Inc. Mississauga, Ontario, L4V, 1P1, Canada]

Phaseolus vulgaris. Phaseolus acutifolius. Hybrids. Backcrossing. Canada.

Crosses were performed between 9 Phaseolus vulgaris lines (as females) and 7 P. acutifolius lines (as males) to examine parental compatibility for the

production of vigorous hybrid and backcross plants. In vitro embryo rescue techniques were required to secure hybrid and backcross progeny following interspecific crossing. Seedling development appeared to be dependent on which allele the P. vulgaris parent carried at an interspecific incompatibility locus. Seven of the 9 P. vulgaris lines tested carried an allele at this locus, which interacted with a nuclear factor in the P. acutifolius genome resulting in stunted, sublethal hybrids. The lines ICA Pijao and Sacramento Light Red Kidney did not carry this allele and produced vigorous hybrid progeny in combination with all P. acutifolius parents. Intensive backcrossing produced progeny which also segregated for sublethal and viable plant development. The observed segregation patterns suggest that a bridge crossing scheme would facilitate the introgression of P. acutifolius germplasm into incompatible P. vulgaris lines. Similarities with an intraspecific incompatibility system are discussed. (AS)

0184

29908 SALADIN G., F. 1987. Mustia hilachosa del frijol: importancia y desarrollo de actividades de investigación en República Dominicana. (Web blight of beans: importance and research activities carried out in the Dominican Republic). In Taller de Mustia Hilachosa (Thanatephorus cucumeris), 2, San José, Costa Rica, 1986. Conferencias. Centro Internacional de Agricultura Tropical. Proyecto Regional de Frijol para Centroamérica y el Caribe. pp.105-117. Es., 3 Ref., Il.

Phaseolus vulgaris. Resistance. Cultivars. Rhizoctonia solani. Selection. Chemical control. Yields. Disease transmission. Intercropping. Zea mays. Dominican Republic.

The importance that web blight (Thanatephorus cucumeris) has reached in bean crops of the Dominican Republic is discussed and research results in bean breeding for resistance and control of the disease are reported. Eighteen materials were selected as promising for resistance to T. cucumeris from the International Web Blight Nursery planted in 1984 and harvested in 1985. Results are also given of the 1st National Web Blight Nursery. Chemical control trials showed that the highest bean yields (1.74 t/ha) were obtained with maneb, followed by triphenyltin acetate (1.69 t/ha), benomyl (1.50 t/ha), and the untreated control (1.43 t/ha). Seed transmission tests showed that 17 days after planting, T. cucumeris incidence was 14.5 percent for var. BAT 1155 (susceptible), 1.3 percent for Talamanca (resistant), and 2.0 percent for MUS-1. (CIAT)

0185

29800 SCHOONHOVEN, A. VAN; PASTOR-CORRALES, M.A. 1987. Standard system for the evaluation of bean germplasm. Cali, Colombia, Centro Internacional de Agricultura Tropical. 53p. En., 4 Ref., Il.

Phaseolus vulgaris. Germplasm. Agronomic characters. Viroses. Mycoses. Bacterioses. Resistance. Noxious animals. Drought. pH. Colombia.

A standard system for the evaluation of bean germplasm under field conditions is described, including a table with the developmental stages of the common bean plant which is used in the proposed system. This system has been tested in Colombia and many countries in Latin America, Africa, and other regions. Such evaluation system considers the following measurements: general agronomic characteristics (seed color, size, and brilliance; growth habit; days to flowering and maturity; vegetative and reproductive adaptation; nodulation), damage caused by diseases (viral, fungal, and bacterial), nematodes, and arthropods (bean flies, aphids, red and white spider mites, leafhoppers and leaf feeders, bean pod weevils, and bruchids), and tolerance to soil and climatic factors (drought and acid soils). Each one of the above mentioned measurements is explained in detail. (CIAT)

0186

29906 TALLER DE MUSTIA HILACHOSA (THANATEPHORUS CUCUMERIS), 2, San José, Costa Rica, 1986. 1987. Informe técnico de las actividades desarrolladas por el Programa de Frijol de Guatemala en la Región IV durante 1985. (Technical report of activities conducted by the Guatemalan Bean Program in Region IV during 1985). In_____. Conferencias. Cali, Colombia, Centro Internacional de Agricultura Tropical. Proyecto Regional de Frijol para Centroamérica y el Car b. pp.85-101. En.

Phaseolus vulgaris. Germplasm. Cultivars. Resistance. Rhizoctonia solani. Selection. Yields. Guatemala.

Results of bean research activities conducted in Region IV (southern coast) of Guatemala in 1985 are summarized, with special emphasis on the results of the International Web Blight Nursery (VIM). The 1985 VIM was planted in Cuyuta in both May and Sept. with 136 entries. Var. Talamanca was used as the resistant control and BAT 155 as the susceptible control. Forty-three entries were selected as sources of tolerance to Thanatephorus cucumeris, and are recommended to be included as parents in CIAT's crossing programs. Results of the VIM (advanced lines) and preliminary yield trial of advanced lines with tolerance to T. cucumeris are also reported. (CIAT)

0187

29695 WOOD, P. 1986. The Genetic Resources Unit at CIAT. IBPGR/E ILCA Germplasm Newsletter no.11:22-25. En. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Phaseolus vulgaris. Germplasm. Cultivars. Phaseolus coccineus. Phaseolus acutifolius. Phaseolus lunatus. North America. Europe.

The work of the genetic resources unit at CIAT is described. The new collections, together with previously collected Phaseolus vulgaris, P. coccineus, P. acutifolius, and P. lunatus land race germplasm obtained from national collections in North America and Europe, containing many old commercial var., now form the largest and most diverse collection of Phaseolus beans in the world. There are more than 35,000 samples of which only 2 percent are estimated as duplicates. (CIAT)

0188

20013 ZAMBIA. MINISTRY OF AGRICULTURE AND WATER DEVELOPMENT. 1983. Grain Legume Research Team. Annual Report 1982-83. Chipata, Msekera Regional Research Station. 82p. En., Sum. En., 11 Ref.

Phaseolus vulgaris. Plant breeding. Genotypes. Germplasm. Resistance. Ophiomyia phaseoli. Diseases and pathogens. Zambia.

The long-term objective of the Grain Legume Research Team of the Ministry of Agriculture and Water Development of Zambia is indicated: increased productivity of bean, cowpea, and Bambara groundnut in the country through breeding cv. with high yield potential and resistance to the major pests and diseases. Substantial collections of the major grain legumes have been assembled at Msekera, and some 1321 accessions evaluated. Collaboration with international agricultural research centers (CIAT in Colombia for beans) has proved to be of utmost importance. Trials have led to the identification of bean genotypes (BAT 1253 and BAT 1254) that substantially outyielded the local control cv. Preliminary results from cooking time tests with bean showed that higher yielding cv. cooked quicker than the local control Mirampfu Speckled Sugar. The importance of the bean stem fly (Ophiomyia phaseoli) to bean production is paramount. Available information of resistance to this pest is scanty and, for the moment, the use of seed dressings is unavoidable. Common blight and rust are among the major diseases of bean at lower elevations (1000-1400 m), whereas anthracnose, angular leaf spot, and Ascochyta blight increase in severity at higher

elevations (1400-1700 m). BCMV is widespread but apparently seldom damaging in the main bean producing areas of Northern Province. Host plant resistance is available against all these diseases so that chemical control is unlikely to be necessary if adequate levels of combined resistance are built up in appropriate backgrounds. Beans are grown either as sole or as relay crop in rotation with cassava, maize, or Eleusine coracana. In most cases beans are grown as a mixture of types (yellow and white is a common blend), and most are facultative climbers (habit type 3). (AS (extract))
See also 0017 0102 0137 0140 0141 0149 0163

H00 NUTRITION

0189

29628 AGBO, G.N.; UEBERSAX, M.A.; HOSFIELD, G.L.; MARKAKIS, P. 1986. Water uptake and flour gelatinization of three dry bean cultivars (Phaseolus vulgaris L.). Journal of Food Science 51(3):850-851. En., Sum. En., 10 Ref., Il.

Phaseolus vulgaris. Cultivars. Palatability. Starch content. Bean flour. Human nutrition. USA.

The water uptake and starch pasting of 3 dry bean cv. Sanilac, San Fernando, and Nep-2, were examined in an effort to understand certain palatability differences among them. Sanilac displayed the highest water uptake, followed by Nep-2, and that by San Fernando. Brabender amylograms on whole bean and decorticated bean flours did not show sharp pasting peaks, but paste viscosity of all cv. increased on cooling, indicating retrogradation occurred. The San Fernando flour pastes were the least viscous among the 3 cv.; the pastes of the other 2 cv. differed slightly in viscosity. Water absorption and pasting viscosity do not fully explain differences in palatability among these cv. (AS)

0190

29101 AYOADE, J.A.; MAKHAMBERA, T.P.E. 1984. Alternativas para la sustitución del maíz en dietas para cerdos. 1. Reemplazo del maíz por vainas de frijol en dietas de cerdos en crecimiento-engorde en los trópicos . (Alternatives for the substitution of maize in swine diets. 1. Replacement of maize by bean pods in diets for growing-finishing pigs in the tropics). Producción Animal Tropical 9(3):212-214. Es., Sum. Es., 5 Ref. [Depto. de Producción Ganadera, Univ. de Malawi, Apartado Postal 219, Lilongwe, Malawi]

Phaseolus vulgaris. Laboratory animals. Diets. Nutritive value. Animal nutrition. Malawi.

Four groups of 4 male Large White and Landrace crossbred pigs, with an initial wt. of 13 kg, received a maize-based diet (50 percent) with or without 5, 10, or 15 percent dried and ground bean pods substituting the maize. Results indicated that the resp. values of mean daily wt. gain (kg/day) were 0.57, 0.48, 0.50, and 0.44; feed intake (kg/kg wt. gain), 3.50, 3.98, 3.82, and 3.62; carcass yield, 66.35, 67.86, 67.89, and 68.07; and cold-graded meat value, 0.64, 0.66, 0.66, and 0.66. The inclusion of bean pods in the diet had a significant effect (P less than 0.05) on the parameters measured. (AS-CIAT)

0191

29705 LAYER, P.; CARLSON, G.L.; DIMAGNO, E.P. 1985. Partially purified white bean amylase inhibitor reduces starch digestion in vitro and inactivates intraduodenal amylase in humans. Gastroenterology 88(6):1895-1902. En., Sum. En., 35 Ref., Il. [Gastroenterology Unit, Mayo Clinic & Foundation, Rochester, MN 55905, USA]

Phaseolus vulgaris. Enzymes. Digestibility. Biochemistry. USA.

Whether commercial, bean-derived alpha-amylase inhibitor preparations failed to decrease starch digestion in humans because of insufficient antiamylase activity, destruction by gastrointestinal secretions, or decreased activity in the presence of starch was investigated. A simple partial purification procedure to markedly concentrate the inhibitor (6-fold to 8-fold by total protein content, and 30-fold to 40-fold by dry wt.) was used. Compared with a commercial preparation and crude bean extract, this partially purified inhibitor inactivated intraduodenal, intraileal, and salivary amylase in vitro faster and more completely (P less than 0.001); its specific activity was not affected by exposure to gastric juice and was only minimally reduced by duodenal juice. Whereas the rate of amylase inhibition by inhibitor was markedly slowed in the presence of nondietary liquid starch, dietary solid starch had only a minimal effect. Consequently, the partially purified inhibitor had no effect on liquid starch digestion, but decreased in vitro digestion of dietary starch in a dose-dependent manner (P less than 0.001). Perfusion of the partially purified inhibitor (2.0, 3.5, or 7.0 mg/ml at 5 ml/min) into the duodenum of humans rapidly inhibited more than 94.0, 99.0, and 99.9 percent of intraluminal amylase activity. It was concluded that commercial amylase inhibitors failed to decrease starch digestion in vivo mainly because they have insufficient antiamylase activity; however, a partially purified inhibitor with increased specific activity is stable in human gastrointestinal secretions, slows dietary starch digestion in vitro, rapidly inactivates amylase in the human intestinal lumen, and, at acceptable oral doses, may decrease intraluminal digestion of starch in humans. Such an inhibitor therefore deserves study. (AS)

0192

38914 LEVY-BENTCHOM, A.; GARCIA, B. 1980. Digestibility of the globulin fraction of Phaseolus vulgaris seeds in mice. Nutrition Reports International 34(4):509-516. En., Fran. En., 29 Ref., Il. [Centro de Biologia Celular, Escuela de Biologia, Apartado 21201, Venezuela]

Phaseolus vulgaris. Seeds. Digestibility. Toxicity. Proteins. Animal physiology. Cooking. Venezuela.

The globulin fraction of Phaseolus vulgaris seeds was extensively purified. Only 1.3 percent of the original polyphenol content, 2.1 percent of the hemagglutinating activity, and 1.2 percent of the antitryptic activity remained in the globulin fraction. Low toxicity was demonstrated in this fraction by intraperitoneal injections in mice and by in vitro incubation with rat enterocytes. Wt. loss was observed in mice fed on the raw globulin fraction as compared with casein-fed controls; this was not attributable to a reduction in food ingestion. Protein digestibility was improved by cooking. No pancreatic hypertrophy was shown in mice fed on the raw globulin fraction but spleen atrophy was observed. (AS)

0193

39001 OLIVEIRA, A.C. DE; SGARBIERI, V.C. 1980. Effect of diets containing dry beans (Phaseolus vulgaris L.) on the rat excretion of endogenous nitrogen. Journal of Nutrition 116(12):2387-2392. En., Sum. En., 32 Ref. [Depto. de Planejamento Alimentar e Nutricao, Faculdade de Engenharia de Alimentos e Agricola, Univ. Estadual de Campinas, 13.100 Campinas-SP, Brazil]

Phaseolus vulgaris. Laboratory animals. Diets. Proteins. Digestibility. Glycine. N. Nutritive value. Brazil.

Wistar rats of 60.5 plus or minus 5.0 g fasted for 24 h were injected intraperitoneally with 10 microcurie of ((14)C)glycine. From 1 to 2 h after injection the rats were fed a diet containing 10.53 plus or minus 0.75 percent protein provided by dry beans or casein, or a protein-free

diet and submitted to a 4-day N balance. Radioactivity in the feces of rats fed casein, cooked beans, and raw beans was roughly 2, 5, and 10 times greater, resp., than in the feces of those fed the protein-free diet. Apparent protein digestibility showed a strong negative linear correlation (r = -0.9805, P equal to or less than 0.01) with radioactivity in the feces. Positive correlation (P equal to or less than 0.01) was demonstrated between radioactivity and either total C or total N in the feces of rats injected with ((14)C)glycine. Mean value for the radioactivity in the urine of rats fed the different diets did not differ significantly (P equal to or less than 0.05). Endogenous N excretion of rats on bean diets was estimated by the ratio of total endogenous N:marker N, based on the protein-free diet. The results indicated that rats fed bean-containing diets excreted significantly more endogenous N than those fed the casein diet, even though the casein diet had stimulated twice as much endogenous excretion than the protein-free diet. As a consequence, apparent digestibility and BV of bean protein are generally underestimated, although the real BV was not affected by the endogenous N excretion of the rat. (AS)

0194

28188 PACHICO, D.; SERE, C. 1985. Food consumption patterns and malnutrition in Latin America: some issues for commodity priorities and policy analysis. In Centro Internacional de Agricultura Tropical. Trends in CIAT Commodities. Cali, Colombia. Internal Document Economics 1.10. pp.27-53. En., Sum. En., 29 Ref.

Phaseolus vulgaris. Human nutrition. Socioeconomic aspects. Statistical data. Latin America.

A few salient aspects of food and nutrition in Latin America are reviewed. Aspects considered are: the intra-regional variation in diets and the influence of urbanization on food consumption habits; the nature and extent of malnutrition in Latin America; the influence of several economic factors (income, growth, trade, and external debt) on food consumption and policy alternatives for ameliorating malnutrition. Finally, some tentative implications are drawn for a nutrition-oriented research agenda. Statistical data are included. (CIAT) See also 0017 0213

H01 Foods and Nutritive Value

0195

30643 ANGELIS, R.C. DE; FINOT, P.A.; BESSON, R.; VODOZ, G.; ROGANO, R.N.; GIULI, G.G.; VECCHIA, M.G. 1985. Bioavailability of mineral elements in the brazilian basic food system of rice and beans. Nutrition Research 5(9):969-981. En., Sum. En., 30 Ref. [Centro de Nutricao, Depto. de Fisiologia e Biofisica, Inst. de Ciencias Biomédicas da Universidade de Sao Paulo, Caixa Postal 04365, 01.000 Sao Paulo-SP, Brasil]

Phaseolus vulgaris. Laboratory animals. Diets. Nutritive value. Zn. Ca. Brazil.

A mineral balance sheet and a fortification test were used to detect the limiting minerals and trace elements in 10-day diets of rice and red beans (RB) or RB supplemented with milk (RBM), fed to 20 male Wistar weanling rats. Body wt. gain, food intake, and food conversion efficiency were significantly higher in RBM groups than in RM ones. The balance sheet indicated negative retention of Mn, Fe, Zn, Ca, Co, Cu, Cr, Mo, and P in the RB group, with a significative improvement only for Ca in the RBM group. Fortification of the RB diet with Ca and P, or with Zn enhanced the growth rate; this is attributed to the low level of Ca in the RB diet and to the low bioavailability of Ca and Zn in the presence of phytic acid and fiber. (AS)

0196

28935 BAHNASSEY, Y.; KHAN, K.; HAPROLD, R. 1986. Fortification of spaghetti with edible legumes. 1. Physicochemical, antinutritional, amino acid, and mineral composition. Cereal Chemistry 63(3).210-215. En.. Sum. En., 24 Ref. [Dept. of Cereal Science & Food Technology, Fargo, ND 58105, USA]

Phaseolus vulgaris. Bean flour. Protein content. Ash content. Fiber content. Fat content. Mineral content. USA.

Legume flour was obtained by dry milling nonroasted and roasted seeds of navy bean, pinto bean, and lentil. Protein concentrates were extracted from the legume flours by acid precipitation from dilute alkali solution. Comparison of the chemical composition of the legume flours and their protein concentrates with durum wheat semolina showed that all legume flours contained significantly higher protein, ash, fiber, and fat contents than durum semolina. Fortified spaghetti was prepared from blends of legume flour or protein concentrate with a strong gluten durum semolina. Protein, ash, and fiber contents of the fortified spaghetti exceeded the levels for the control spaghetti. Navy bean contained the highest amount of trypsin inhibitor and hemagglutinin activity, followed by pinto bean and lentil. Legume flours also contained higher levels of both activities than protein concentrates. Legume flours and their protein concentrates had a relatively higher level of most amino acids than durum semolina. Mineral content of legume flour, protein concentrates, and fortified spaghetti was considerably higher than that of the semolina or control spaghetti. (AS (extract))

0197

28936 BAHNASSEY, Y.; KHAN, K. 1986. Fortification of spaghetti with edible legumes. 2. Rheological, processing, and quality evaluation studies. Cereal Chemistry 63(3):216-219. En., Sum. En., 20 Ref. [Dept. of Cereal Science & Food Technology, North Dakota State Univ., Fargo, ND 58105, USA]

Phaseolus vulgaris. Human nutrition. Bean flour. Organoleptic properties. Uses. USA.

Spaghetti was prepared from durum wheat semolina, blended with 3 percent vital wheat gluten, and fortified with 0, 5, 10, 15, 20, and 25 percent of nonroasted or roasted navy, pinto, or lentil flours or their protein concentrates, to increase protein quantity. Supplementing semolina with legume flours or protein concentrates caused an increase in farinograph water absorption except for blends containing 25 percent of nonroasted and roasted pinto bean flour, in which a slight decrease was noticed. Dough development time and stability were higher for blends containing navy or pinto bean flours. A decrease in the mechanical tolerance index was obtained for blends containing different levels of navy or pinto bean flour or protein concentrates. Fortified spaghetti shattered earlier than control spaghetti. Cooking loss of fortified spaghetti was higher as the level of substitution increased and higher for spaghetti containing protein concentrates than for spaghetti containing legume flours. Firmness scores of fortified spaghetti increased with level of fortification. Taste panel evaluation showed that spaghetti supplemented with up to 10 percent of legume flours or protein concentrates was acceptable for all parameters tested. All panel members showed preference for spaghetti containing legume flours over spaghetti containing protein concentrates; however, spaghetti containing 10 percent protein concentrates was also acceptable. Spaghetti made from roasted samples was preferred. A beany taste was reported for spaghetti containing 25 percent of nonroasted legume flours or protein concentrates. (AS)

0198

29617 OLIVEIRA, A.C. DE; SGARBIERI, V.C. 1986. The influence of rat endogenous nitrogen excretion on the assessment of bean protein quality. Journal of Nutritional Science and Vitaminology 32(4):425-436. En., Sum.

En., 28 Ref., Il. [Depto. de Planejamento Alimentar e Nutricao, Faculdade de Engenharia de Alimentos, Univ. Estadual de Campinas, 13.100 Campinas-SP, Brasil]

Phaseolus vulgaris. Proteins. Digestibility. Protein content. Nutritive value. Brazil.

The interference of rat endogenous N excretion with the assessment of digestibility and BV of dry bean protein was studied. Dry bean plants were cultivated under ((15)NH4)2.SO4 fertilization and at harvest dry beans had 1.080 atoms percentage of (15)N-excess. N balance studies indicated that bean protein digestibility and BV were higher when N-balance was based on (15)N-excess as compared with total N, both for undenaturated and heat-denaturated protein. The (15)N-balance also showed that heat treatment significantly improved (P equal to or less than 0.05) the digestibility of bean protein in the integral flour and in protein isolate while the BV decreased for both materials. Results indicated that the conventional methods employed for calculation of bean protein digestibility and BV, based on total N balance and protein-free diet, underestimate these indices of protein quality. (AS)

0199

29669 SGARBIERI, V.C.; ANTUNES, P.L.; JUNQUEIRA, R.G. 1982. Algumas propriedades fisicoquímicas e nutricionais das proteínas de feijao (Phaseolus vulgaris, L., var. Rosinha G2). (Some physicochemical and nutritional properties of proteins of bean var. Rosinha G2). Ciencia e Teenologia de Alimentos 2(1):1-20. Pt., Sum. Pt., En., 40 Ref., Il.

Phaseolus vulgaris. Seeds. Proteins. Digestibility. Temperature. Biochemistry. Animal nutrition. Brazil.

The 2 main protein fractions of beans are globulins and albumins, which are deficient in met. Supplementation with DL-met. plus L-cysteine increased the PER of the whole ground seed from 1.17 to 2.47 and those of isolated proteins from values lower than 1.0 to values equal or higher than 4.0. The in vivo digestibility was 59 percent for the whole ground bean and between 72-83 percent for the isolated protein fractions autoclaved 15 min at 121 degrees Celsius. The apparent BV (28-33 percent) were very low compared with the casein (84 percent). The biological availability of met. was the highest (51 percent) in the globulin fraction and very low (5.8 and 4.6 percent) for the albumin fraction and insoluble residue, resp. The trypsin and chymotrypsin inhibitor was stable in aqueous solutions at 97 degrees Celsius. Inactivation at this temp. was possible in alkaline solution or by the action of disulfide bond reducing agents. The introduction of inhibitor (1 percent of casein) in the rat diet did not cause any detrimental effect on growth, apparent digestibility, and BV; on the other hand, 0.5 percent lectin, same base, was detrimental to growth, digestibility, and BV. (AS)

I00 MICROBIOLOGY

See 0213

I01 Rhizobium spp., Nitrogen Fixation and Nodulation

0200

29921 BEUNARD, P.; MICHELLON, R. 1986. Effet de l'inoculation du haricot par deux souches de Rhizobium phaseoli. (Effect of inoculating beans with two strains of Rhizobium phaseoli). Agronomie Tropicale 41(2):128-131. Fr., Sum. Fr., En., Es., 13 Ref. [IRAT-CIRAD, BP 5035, 34032 Montpellier Cedex, France]

Phaseolus vulgaris. Cultivars. Rhizobium phaseoli. Strains. Inoculation. Nitrogen fixation. France. Reunion. Colombia. Haiti.

Greenhouse and field trials were conducted in France and Reunion, resp., to study the response of 2 bean var. (Maclat and Triomphe de Farey) to inoculation with 2 Rhizobium phaseoli strains (HPE and CIAT 407 from Haiti and Colombia, resp.). The heterogeneity of both greenhouse and field results did not allow any conclusion to be reached; however, it appears that var. breeding and the choice of efficient R. phaseoli strains help avoid the massive use of fertilizers. Expt. should be carried out with var. having high N fixation. (CIAT)

0201

29920 BUTTERY, B.R.; PARK, S.J.; FINDLAY, W.I. 1987. Growth and yield of white bean (Phaseolus vulgaris L.) in response to nitrogen, phosphorus and potassium fertilizer and to inoculation with Rhizobium. Canadian Journal of Plant Science 67(2):425-432. En., Sum. En., Fr., 14 Ref., 11. [Research Station, Agriculture Canada, Harrow, Ontario, Canada N0h 160]

Phaseolus vulgaris. Cultivars. Rhizobium phaseoli. Inoculation. Acetylene reduction. Yields. Fertilizers. N. P. K. Water stress. Nodulation. Canada.

The performance of 2 white bean cv. (Fleetwood and Kentwood), with and without inoculation with Rhizobium, in an exptl. area (Ontario, Canada) subjected to different levels of N, P, and K, was examined. A significant response to nitrate was observed in the 1st yr and in the 2 yr combined, but not in the 2nd yr on its own. Yield in the 2nd yr was about half of that in the 1st yr, possibly because of water stress. Bean yield was lowest at zero nitrate, about equally high for 112 and 224 kg N/ha, but lower at 336 kg N/ha. Annual application of K and P (compared with no application for 1 yr) did not affect bean yield, but increased plant dry wt. after 24 days in 1984 and the 2 yr combined, after 38 days in 1984, and after 52 days in 1983, and also increased the no. of days to maturity. Nitrate effects on the dry wt. of samples taken during the growing season were similar to those for bean yield. Acetylene reduction rates (1st yr) and nodule wt. were highest at zero N and declined to very low values at 336 kg N/ha. Acetylene reduction rate/plant reached a max. value early in the season and declined to low values before bean filling was complete. Rhizobium inoculation had no discernible effects on dry wt. or yield, but a small significant effect on days to maturity. Results indicated that these white bean cv. are unable to fix sufficient N to produce max. yield. (AS)

0202

29751 CHUI, J.N.; NADAR, H.M. 1984. Evaluation of effects of Rhizobium phaseoli strains on nodulation, dry matter and grain yield of two bean (Phaseolus vulgaris) varieties. East African Agricultural and Forestry Journal 44(Special issue):109-112. En., Sum. En., 16 Ref.

Phaseolus vulgaris. Rhizobium phaseoli. Strains. Cultivars. Nodulation. Yields. Kenya.

Greenhouse trials were conducted to determine the availability of indigenous rhizobia and to compare the effectiveness of 2 Rhizobium strains (NU 405 and NU 439) on 2 bean var. (Mwezi Moja and Zebra). Results confirmed the effectiveness of indigenous rhizobia in the soil for nodulating both bean var. Shoot DM, pod wt., total DM yield at maturity (88 days after planting), and seed yields were highest in Mwezi Moja inoculated with NU 439 and Zebra inoculated with a 3-strain mixture (3-NS) obtained from the NifTAL Project, Hawaii; however, the increase in seed yields by 2-5 percent after inoculation was nonsignificant. Since there were no consistent effects of different strains on the yield components measured at flower initiation, pod filling, and maturity, it is suggested

that there is a Rhizobium sp. specificity for the 2 var. Further work should be done under field conditions. (CIAT)

0203

29983 GOI, S.R.; NEVES, M.C.P. 1987. Efeito da cultivar, estirpe de Rhizobium e nitrogenio mineral na producao de ureidos em soja, feijao e leucena. (Effect of cultivar, Rhizobium strain, and mineral nitrogen on ureide production in soybean, common beans, and leucena). Pesquisa Agropecuaria Brasileira 22(2):163-170. Pt., Sum. Pt., En., 29 Ref., Il. [UFRRJ, Depto. de Ciencias Ambientais, Inst. de Floresta, Caixa Postal 23851, Seropédica, Itaguai-RJ, Brazil]

Phaseolus vulgaris. Rhizobium. Fertilizers. N. Nodulation. Nitrogen fixation. Brazil.

The effects of the cv. and Rhizobium strain on ureide transport in soybean and of mineral N on ureide production and transport in soybean, common bean, and Leucaena were studied. In the glasshouse, a significant decrease was found in the ureide percentage in the xylem sap of soybean and common bean supplied with nitrate-N. Applying ammonium-N 24 h before harvesting decreased ureide production only when nitrogenase activity was significantly inhibited. Changes in ureide conc. in root and leaf extracts reflected the changes in nodulation and ureide production of nodulated soybean and common bean but not in Leucaena. (AS (extract))

0204

29962 McARLSON, C.L.; BAIRD, L.M. 1987. Relationship of plant development to nodulation in determinate and indeterminate beans. Journal of the American Society for Horticultural Science 112(2):510-513. En., Sum. En., 16 Ref., Il. [Dept. of Botany, Connecticut College, New London, CT 06320, USA]

Phaseolus vulgaris. Determinate cultivars. Indeterminate cultivars. Rhizobium phaseoli. Nodulation. Cultivars. USA.

The relationship of plant growth habit to establishment of a successful symbiosis between Phaseolus vulgaris and Rhizobium phaseoli was examined. A determinate (Sanilac) and an indeterminate (Puebla 152) bean cv. were inoculated with a pure culture of R. phaseoli 127K44, and plant development was measured using the plastochron index. Time required to nodulate as determined by nodule count did not vary between plant types. The timing, duration, and overall success of the symbiosis as measured by increased acetylene reduction, dry wt., and transport of ureides and amino acids were related to the period of exponential leaf expansion in both the determinate and indeterminate cv. (AS)

0205

28887 MOXLEY, J.C.; HUME, D.J.; SMITH, D.L. 1986. N2 fixation and competitiveness of Rhizobium phaseoli strains isolated from Ontario soils. Canadian Journal of Plant Science 66(4):825-836. En., Sum. En., Fr., 29 Ref. [Dept. of Crop Science, Univ. of Guelph, Guelph, Ontario, Canada N1G 2W1]

Phaseolus vulgaris. Rhizobium phaseoli. Nitrogen fixation. Strains. Yields. Nodulation. Cultivars. Inoculation. Fertilizers. N. Canada.

An expt. was conducted to determine (1) the effectiveness of Rhizobium phaseoli strains in Ontario soils (Canada); (2) if inoculation with an indigenous, effective strain could improve N2 fixation or yield, and (3) the competitiveness of inoculant strains by measuring the recovery of applied strains in nodules using serology. Composite soil samples (1 g) from 36 of 37 farm sites across Ontario caused nodulation on either white bean cv. Ex Rico 23 or Seafarer, indicating that R. phaseoli was widely

distributed; however, ratings of nodulation indicated a wide range of effectiveness. Five selected strains isolated from these soils were compared with 5 strains from culture collections for effectiveness. The strains were used to inoculate Ex Rico 23 or Seafarer grown in sterile, N-free culture in Leonard jars. The best field-isolated strains caused just as much N accumulation as the best strains from culture collections. Strain S1, selected as a consistently good N2 fixer, failed to cause increases in yield when used as an inoculant in field trials in Elora and Mitchell in 1980 and 1981. Inoculation with strain S1 did cause some increases in percent seed protein and nodule dry wt. with Ex Rico 23 in Elora in 1980. Three other strains tested each year failed to show any improvements in yield, seed N, or nodulation in either year. Recovery of inoculant strains ranged from 0 to 31 percent. In Mitchell in 1981, 100 kg of fertilizer N/ha increased yields over all inoculation treatments. Indigenous strains appeared to be only partially effective N2 fixers and inoculant strains generally were poor competitors against those already present in the soils. (AS)

0206

29953 PLAYDS, D.; TRINCHANT, J.C.; RIGAUD, J. 1986. Proteases from French-bean nodule host-cells: in vitro effects on bacteroids. Physiologie Vegetale 24(6):697-705. En., Sum. En., Fr., 20 Ref., Il. [Laboratoire de Biologie Végétale, Faculté des Sciences et des Techniques, Parc Valrose, 06034 Nice Cedex, France]

Phaseolus vulgaris. Snap beans. Rhizobium phaseoli. Enzymes. Nodulation. Amino acids. Cell walls. France.

Two proteases having acidic and alkaline pH optima, characteristic of senescing nodules of French beans, were preincubated with Rhizobium phaseoli bacteroids isolated from functional nodules. A drop in bacteroid C2H2 reduction was mainly obtained in the presence of the protease exhibiting optimal activity at acidic pH, whereas the other protease induced a lower O2 requirement for optimal C2H2 activity. A similar dual effect was observed in C2H2 reduction of bacteroids isolated from old nodules of French beans. During bacteroid incubations with each of these proteases, the release of amino acids revealed a partial digestion of the peptidoglycan of the cell wall. (AS)

0207

29947 RAMOS, M.L.G.; MAGALHAES, N.F.M.; BODDEY, R.M. 1987. Native and inoculated rhizobia isolated from field grown Phaseolus vulgaris: effects of liming an acid soil on antibiotic resistance. Soil Biology and Biochemistry 19(2):179-185. En., Sum. En., 53 Ref., Il. [EMBRAPA, Programa Nacional de Pesquira em Biologia do Solo, Seropedica 23.851, Rio de Janeiro, Brasil]

Phaseolus vulgaris. Rhizobium. Strains. Agricultural lime. Timing. pH. Isolation. Nodulation. Brazil.

The tolerance to growth in acid culture medium (pH 4.6), and to several antibiotics, of rhizobia isolated from Phaseolus vulgaris plants was determined in limed and unlimed field plots. The plants were originally inoculated with Rhizobium strain CO5 and isolates were made after 5 successive crops of beans (only inoculated at the 1st crop) during a 2-yr period, and simultaneously from plots planted to beans for the 1st time. Rhizobium isolates identified as CO5 using immunodiffusion were all found to be identical to the original CO5 strain in their tolerance to acidity and resistance to 7 antibiotics; however, the isolates of native soil rhizobia from unlimed plots were found to be more tolerant to acid conditions and less tolerant to chloramphenicol and kanamycin than those isolated from limed plots. The differences in antibiotic resistance between lime treatments were greater in isolates from plots planted 5 times with beans than in those taken from plots never planted to this crop. The

antibiotic-resistant Rhizobium isolates, mainly originating from limed plots, showed predominantly large, flat, wet, translucent colonies on yeast mannitol agar plates. The antibiotic sensitive isolates, mainly originating from unlimed plots, showed predominantly small, dry, opaque, circular colonies on yeast mannitol agar plates. Results confirmed that in vitro evaluation of acid tolerance reflected the ability of Rhizobium strains to nodulate legumes growing in acid soil conditions. That significant antibiotic production may occur in the plant-soil system was considered as an explanation for the observed differences in antibiotic resistance between native rhizobia isolated from limed and unlimed plots. (AS)

0208

29951 RAMOS, M.L.G.; BODDEY, R.M. 1987. Yield and nodulation of Phaseolus vulgaris and the competitivity of an introduced Rhizobium strain: effects of lime, mulch and repeated cropping. Soil Biology and Biochemistry 19(2):171-177. En., Sum. En., 35 Ref., Il. [EMBRAPA, Programa Nacional de Pesquisa em Biologia do Solo, Seropédica, 23851, Rio de Janeiro, Brasil]

Phaseolus vulgaris. pH. Agricultural lime. Rhizobium. Strains. Nodulation. Yields. Inoculation. Temperature. Germination. Seedlings. Pods. Brazil.

Common beans were planted in the field on an acid soil (pH 5.3) to investigate the effects of lime and mulch on plant nodulation and yield, and the competitivity for nodule occupancy of an introduced strain of Rhizobium (R. leguminosarum biovar phaseoli). The plots were planted 5 times during a 2-yr period and at the 1st planting the seeds were inoculated with a peat-based inoculum of strain CO5. At subsequent plantings the seeds were inoculated with macerated nodules taken from plants from the previous crop from the same lime-mulch treatment. At the final planting each plot was subdivided and inoculated either with the original CO5 strain, an acclimatized CO5 strain (isolated from the 4th crop and identified as CO5 using immunodiffusion), or with macerated nodules as before. Throughout the expt. there were no significant effects of any inoculum on nodulation or yield of the bean plants. This was probably due to the low competitivity of the introduced strain which occupied at max. 31 percent of the nodules in the unlimed plots and less than 19 percent in the limed plots. In general, mulch had a negative effect on nodulation and yield although at the 3rd crop (March 1983) when soil temp. were high at the early stages of plant growth, mulch improved germination and the survival of the seedlings such that pod yield was more than 3 times greater than in unmulched plots. At the final crop, CO5 occupied at max. only 24 percent of the nodules in the unlimed plots and a far lower proportion (0-2 percent) in the limed plots. The acclimatized strain showed a consistent tendency (statistically insignificant) to be more competitive for nodule sites than the original CO5 strain. (AS)

0209

28642 VANDENBOSCH, K.A.; NOEL, K.D.; KANEKO, Y.; NEWCOMB, E.H. 1985. Nodule initiation elicited by noninfective mutants of Rhizobium phaseoli. Journal of Bacteriology 162(3):950-959. En., Sum. En., 46 Ref., Il. [Dept. of Botany, Univ. of Wisconsin, Madison, WI 53706, USA]

Phaseolus vulgaris. Rhizobium phaseoli. Strains. Nodulation. USA.

Rhizobium phaseoli CE106, CE110, and CE115, originally derived by transposon mutagenesis, induced the formation of uninfected root nodule-like swellings on bean. Bacteria densely colonized the root surface, and root hair curling and initiation of root cortical cell divisions occurred normally in mutant-inoculated seedlings, although no infection threads formed. The nodules were ineffective, lacked leghemoglobin, and were anatomically distinct from normal nodules. Ultrastructural specialization for ureide synthesis, characteristic of legumes that form determinate nodules, was absent. Colony morphology of

the mutant strains on agar plates was less mucoid than that of the wild type, and under some cultural conditions, the mutants did not react with Cellufluor, a fluorescent stain for beta-linked polysaccharide. These observations suggest that the genetic lesions in these mutants may be related to extracellular polysaccharide synthesis. (AS) See also 0161 0211

J00 ECONOMICS AND DEVELOPMENT

0210

29792 GRAF, W.; TRUTMANN, P. 1987. Results and methodology of diagnostic trials on common beans (Phaseolus vulgaris) in Rwanda: a critical appraisal. Cali, Colombia, Centro Internacional de Agricultura Tropical. 10p. En., Sum. En., 5 Ref., Il. [CIAT Great Lakes Bean Program, BP 138, Butare, Rwanda]

Phaseolus vulgaris. Developmental research. Experiment design. Technology. Rwanda.

The national bean program of the Institut des Sciences Agronomiques du Rwanda carried out on-farm diagnostic trials in collaboration with CIAT, in 6 natural zones of Rwanda between 1984-86. Three designs were used: plus one, minus one, and plus one extended. Plus one trials tended to underestimate the importance of soil fertility as a yield constraint but showed clearly the importance of diseases. Minus one designs made the importance of both factors visible and plus one trials showed a strong positive interaction when disease control was combined with fertilization. None of the described designs, however, is able to completely explain the interactions between tested factors. Given the various advantages and disadvantages described above, the researchers recommend that if diagnostic trials are determined to be necessary in an area, a considerable effort should be done to find representative sites off-farm (schools, etc.) to permit the installation of complete factorial trials. In addition, several plus one trials could be established on-farm, which would combine a powerful design and trials making the interaction with farmers easy and allowing direct conclusions to be made on the potential effect of new technologies and interactions. Plus one designs alone may be appropriate when no interactions are expected, but in this case one should seriously think of testing different levels of a treatment and consider the trial as a step in technology testing rather than a diagnostic trial. The methodology to use also depends on resources available to the research program. For Rwanda it is recommended that the research program be focussed on technologies that control both diseases and fertility at the same time or to target technologies to situations where 1 factor is controlled through existing practices, such as disease control through the use of climbing beans. Technologies to control pests should have 2nd priority but can play an important role in some areas from season to season. Therefore it may still be justified to carry out research on technologies that seem easy to generate and diffuse, such as seed treatment against the beanfly with endosulfan. (AS)

0211

28830 INSTITUT DE RECHERCHES AGRONOMIQUES TROPICALES ET DES CULTURES VIVRIERES. 1983. Cultures maraicheres: le haricot vert. (Horticultural crops: field beans). In_____. Rapport Annuel 1983. Francia. pp.174,180. Fr.

Phaseolus vulgaris. Snap beans. Cultivars. Yields. Rhizoctonia solani. Sclerotium rolfsii. Rhizobium. Inoculation. N. Developmental research. Burkina Faso. Martinique. Reunion.

Results are given of research on snap beans and dry beans carried out by the Institut de Recherches Agronomiques Tropicales et des Cultures Vivrieres during 1983. Of the 4 snap bean var. (Arian, Belna, Molgane, and 76 C1) studied during the dry season in Upper Volta, the former 2 performed better, yielding up to 9 t/ha 25 days after planting. There was no significant difference between the 6 dry bean var. studied at the end of the rainy season in Martinique; mean yields were 1.5 t/ha due to Rhizoctonia solani and Sclerotium rolfsii attacks. In Reunion there were no significant differences between bean var. Pompadour 109, Petit Rouge, and Noir; mean yields ranged from 700 to 1100 kg/ha due to drought. Finally, in a seed inoculation study of bean var. Marlat with Rhizobium strains (among them CIAT 107), it was found that higher N doses decrease atmospheric N fixation but increase grain production. (CIAT)

0212

29938 JANSSEN, W. 1988. Snap beans in the developing world. In_____.; López S., J.; González V., F. Snap beans: present status in the developing world and bibliography of research (1919-1987). Cali, Colombia, Centro Internacional de Agricultura Tropical. pp.1-26. En., 27 Ref. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Phaseolus vulgaris. Snap beans. Yields. Production. Consumption. Income. Chemical control. Injurious insects. Diseases and pathogens. Processing. Marketing. Prices. Latin America. Africa. Asia.

The present status of snap beans in the developing world is reviewed. Socioeconomic aspects are mainly discussed. Production, marketing, and consumption features are described and the future potential for the crop is outlined. Constraints to production increases are discussed and the opportunit s for research and development of the crop are defined. (CIAT)

0213

29937 JANSSEN, W.; LOPEZ S., J.; GONZALEZ V., F. 1988. Snap beans: present status in the developing world and bibliography of research (1919-1987). Cali, Colombia, Centro Internacional de Agricultura Tropical. 411p. En., 922 Ref.

Phaseolus vulgaris. Snap beans. Economics. Yields. Production. Consumption. Income. Chemical control. Injurious insects. Diseases and pathogens. Processing. Marketing. Prices. Latin America. Africa. Asia.

The present status of snap beans in the developing world is reviewed in the leading paper accompanying this publication. Socioeconomic aspects are mainly discussed. Production, marketing, and consumption features are described and the future potential for the crop is outlined. Constraints to production increases are discussed and the opportunities for research and development of the crop are defined. The bibliography contains 922 references to research on snap beans. Most of the documents (761) are available at CIAT. References are organized by disciplines and are complemented with author and subject indexes. The institutions identified by the Bean Information Center as carrying out research on snap beans are listed in the enclosed preliminary directory, which also includes the names of the snap bean researchers recorded in the CIAT database and the participants in the Workshop on Snap Bean Breeding held at CIAT in 1987. (CIAT)

0214

29785 SANTOS, Z.A.P.S. 1986. Evolucao tecnologica das culturas estudadas: feijao. (Technological evolution of studied crops: beans). In_____. O uso da funcao logística e a evolucao tecnológica das culturas do arroz, banana, feijao e tomate. Sao Paulo, Brasil, Instituto de Economia Agrícola. Secretaria de Agricultura e Abastecimento. Relatorio de Pesquisa no.4. pp.22-28,39-41. Pt., 25 Ref.

Phaseolus vulgaris. Yields. Brazil.

The technological evolution that bean cultivation has undergone in the state of Sao Paulo, Brazil, during the period 1948-80 is reviewed. Information is given on how the area under cultivation and av. yields have changed from one year to another during the period, and an analysis is made of factors that have affected these changes. (CIAT)

0215

28233 SECRETARIA DE AGRICULTURA DE ANTIOQUIA. COLOMBIA. 1985. Granos: frijol. (Grains: dry beans). Antioquia Agropecuaria no.2:15-16,18-19. Es.

Phaseolus vulgaris. Production. Statistical data. Yields. Prices. Trade. Colombia.

Data are analyzed and tables are included on area planted and harvested (ha), yield (kg/ha), production (t), and prices to bean producers, wholesalers, and retailers for the 2nd semester of 1984, and for the 1st and 2nd semesters of 1985, in integrated rural development areas (municipalities of El Carmen, Marinilla, and San Vicente) and diversification zones of Antioquia, Colombia. A table with data on bean imports for the 4 trimesters of 1984 and 1985 is also included. (CIAT) See also 0081 0096 0176 0195

K00 FIELD PLOT TECHNIQUE

See 0210

L00 GRAIN STORAGE

0216

29993 HALL, J.S. 1986. Reducción de las pérdidas de frejol seco almacenado del pequeño agricultor en la Sierra Ecuatoriana. (Reduction of dry bean storage losses of small farmers in the highlands of Ecuador). Tesis Mag.Sc. Ithaca, New York, Cornell University. 158p. Es., Sum. En., 74 Ref., Il. También en inglés.

Phaseolus vulgaris. Seed. Storage. Deterioration. Water content. Seed treatment. Ecuador.

An attempt was made to identify the factors that cause postharvest deterioration of dry bean seed in Pimampiro, Ecuador, and to develop practical methods that growers can use to minimize seed losses in storage. Seeds that were stored were found to be of low quality and showed an advanced stage of prestorage deterioration. Quality deterioration after 5 mo. for seeds dried and stored properly was very slight. Regardless of the type of containers used in this expt., healthy seeds placed in containers with top or in plastic bags deteriorated only slightly during storage. In sealed containers, seeds should have a MC below 14 percent since they can not lose moisture to the air as seeds do in punctured sacks. Vegetable oil was a useful preservative because it did not affect germination percentages adversely; however, it decreased the incidence of storage fungi. Furthermore, vegetable oil was 100 percent effective in controlling the emergence of adult Acanthoscelides obtectus weevils. The oil is nontoxic, easy to handle, and inexpensive. It is a practical weevil control and could be safely introduced to dry bean growers of rural areas; however, the final acceptance of this technology depends on what the farmer actually do. Approval and final adoption of any new system can only be measured when the farmers themselves take over the new practice and incur in all risks, costs, and benefits. Until this final step is taken, all other evaluations remain only as suggestions of the technology's potential. (AS)

0217

29914 HULSE, J.H.; RACHIE, K.O.; BILLINGSLEY, L.W. 1977. Mechanical device (penetrometer) for measuring the degree of hardness in beans. In_____. Nutritional standards and methods of evaluation for food legume breeders. Ottawa, Canada, International Development Research Centre, IDRC-TS 7e. pp.40-41. En., Il.

Phaseolus vulgaris. Seeds. Temperature. Storage. Seed characters. Water content. Cooking. Mechanization. Canada.

A penetrometer that measures the degree of hardness of bean seeds is described; its calibration and use in research are discussed. Black beans were stored at temp. of 4, 25, and 32 degrees Celsius. MC of samples at each temp. was 8, 11, and 17 percent. Hardness of beans stored under these conditions was measured after 2, 4, and 6 mo. Beans were soaked in water at room temp. for 18 h and then tested on the penetrometer. Hardness increased from 2.53 to 3.28 as storage temp. and MC of samples increased; also, small seeds were harder than large seeds. With increased hardness of seeds during storage, it became necessary to cook them from 15 to 65 min to attain the same degree of softness as that of beans that had been stored in a freezer at low MC. The instrument can be useful in quality control testing because adequate coooking time can be determined to obtain the desired consistency even in hard raw seeds. (CIAT)

0218

29918 KOMATSU, Y.H. 1985. Tratamento inseticida e as qualidades fisiológicas de sementes de milho (Zea mays L.) e feijao (Phaseolus vulgaris L.). (Insecticide treatment and physiological quality of maize and bean seeds). Tese Mestrado. Piracicaba-SP, Brasil, Escola Superior de Agricultura Luiz de Queiroz da Universidade de Sao Paulo. 97p. Pt., Sum. Pt., En., 55 Ref.

Phaseolus vulgaris. Seed. Seed treatment. Insecticides. Germination. Seed vigor. Storage. Insect control. Seed characters. Brazil.

An expt. was carried out at the Escola Superior de Agricultura Luiz de Queiroz, (Piracicaba, Brazil) to observe the physiological quality of seeds of maize cv. Piranao VD-2 winter selection and of bean cv. Carioca. Maize and bean seeds were submitted to phosphine fumigation during 2 periods of exposure (36 and 72 h) and 2 dosages (6 and 12 g of product/cubic meter) and deltamethrin at a commercial dose. Maize and bean seeds, placed in cotton bags, were stored in natural environment conditions and evaluated at 3-mo. intervals, for a total of 5 exptl. periods. The evaluation of seed quality was done by the following tests: germination, insect infestation, vigor (1st counting, accelerated aging, emergence from sand, wt. of dry material, and emergence from natural soil). It was concluded that the application of phosphine and deltamethrin, isolated or in association, was effective in the control of storage pests and, even when the seeds were exposed to the greatest dosage and exposure period, such treatments do not affect the physiological qualities of seeds. (AS) See also 0213

MOO USES, INDUSTRIALIZATION AND PROCESSING

0219

29714 AGUILERA, J.M.; STEINSAPIR, A. 1985. Dry processes to retard quality losses of beans (Phaseolus vulgaris) during storage. Canadian Institute of Food Science and Technology Journal 18(1):72-78. En., Sum. En., Fr., 25 Ref., Il. [Dept. of Chemical Engineering, Catholic Univ., P.O. Box 114-D, Santiago, Chile]

Phaseolus vulgaris. Seed hardening. Processing. Storage. Temperature. Irradiation. Analysis. Stored grain pests. Heat treatment. Chile.

Six samples of bean cv. Tortola Diana, including a control and 5 dry-processed samples, were evaluated for hardness development after 2.5-10.0 mo. of storage in sealed polyethylene bags at 22 degrees Celsius. Treatment consisted of irradiation (10, 50, or 100 krad), high temp.-short time roasting (HTST), and medium temp.-long time heating (MTLT). Most heat-processed samples and approx. 1/2 of the irradiated samples were significantly softer than the control (P less than 0.05) after autoclaving for 12 or 15 min. Scanning electron micrographs demonstrated that hard beans had a tougher middle lamella, showed no separation between cells when cooked, and contained ungelatinized starch granules. The processed samples showed no signs of insect infestation whereas insect losses in the control were in excess of 10 percent. (AS)

0220

29653 CRIVELLI, G.; SEMESI, E.; BERTOLO, G. 1986. Aspetti qualitativi di alcune linee e cultivar di fagioli surgelati. (Qualitative aspects of some bean cultivars and lines for freezing). Informatore Agrario 42(1):59-60. It., Sum. It., 2 Ref., Il.

Phaseolus vulgaris. Cultivars. Seed characters. Seed color. Processing. Italy.

Bean cv. Taylor's, Big Borlotto, Giulia, Minia, and Lena and the lines P262, P288, and P282 were evaluated during 1984-85 in several environments of Italy to determine the effect on the homogeneity of bean seed pigmentation. Cv. Giulia performed satisfactorily irrespective of year and enviroment. The characters seed coloration, shape, and texture were necessary for a high quality frozen product. (CIAT)

0221

29748 GONZALEZ, A.R.; SISTRUNK, W.A.; GIESE, J.H. 1986. Snap bean trials, 1985. Field performance and quality evaluation of raw product, frozen and canned snap bean cultivars. Fayetteville, University of Arkansas, Arkansas Agricultural Experiment Station, Division of Agriculture. Research Series 347. 21p. En., 5 Ref.

Phaseolus vulgaris. Snap beans. Cultivars. Spacing. Planting. Yields. Pod characters. Seed characters. Seed color. Chlorophyll. Canned beans. USA.

Results of snap bean trials, conducted at the Arkansas Agricultural Expt. Station in Fayetteville (Arkansas, USA) in the 1985 spring and fall seasons, are reported to provide information to growers, commercial processors, and seed companies about field performance and quality of raw and processed products of newly developed snap bean cv. Cv. evaluated were Gallatin Valley 50, Stride, Blue Jay, Trophy, Shamrock, Flo, Labrador, and Blazer. For each cv. data are provided on days to harvest, plant density, yield, sieve size distribution, pod and plant characteristics, canned product quality (percent seed, percent fiber, resistance to shear, sloughing, Gardner color difference meter values), sensory quality (color intensity and uniformity, pod smoothness, texture, taste), and quality of frozen pods (color, smoothness, appearance, Gardner color difference meter values, and chlorophyll). The cv. proved to have attributes adapted to the needs of the processing industry and to modern farming practices. (CIAT)

0222

29707 KALDY, M.S. 1985. An improved shaking apparatus to measure matting in canned beans. Laboratory Practice 34(6):90. En., Sum. En., 2 Ref., Il. [Agriculture Canada Research Station, Lethbridge, Alberta T1J 4B1, Canada]

Phaseolus vulgaris. Canned beans. Technology. Canada.

A shaking apparatus was modified to measure the extent of matting (clumping) in canned beans processed in heavy sauce. The operational procedure is simple and relatively quick. Wt. of beans remaining on a stainless steel screen after shaking indicates the extent of matting. Beans with the lowest matting index are preferred. The device can be used by both plant breeders and processors to assess the matting quality of beans. (AS)

0223

29633 MUFTUGIL, N. 1986. Effect of different types of blanching on the color and the ascorbic acid and chlorophyll contents of green beans. Journal of Food Processing and Preservation 10(1):69-76. En., Sum. En., 22 Ref. [Dr. Faruk Ayanoglu Apt., No. 7, D.23, Feneryolu, Istanbul, Turkey]

Phaseolus vulgaris. Snap beans. Cooking. Nutritive value. Turkey.

Green beans were blanched by 4 methods: water blanching, steam blanching, microwave blanching, and convection oven blanching. Min. adequate blanch time for complete peroxidase enzyme inactivation was less in the microwave oven. Wt. loss was significant in the samples blanched in the convection oven due to moisture vaporization. Ascorbic acid was found to be significantly (P less than 0.05) higher in the microwave-blanched sample. The ascorbic acid contents of water-blanched green beans were higher than those of steam-blanched ones. Convection oven-blanched green beans were found to be lowest in ascorbic acid and chlorophyll contents, and microwave-treated samples were found to be highest. For equivalent peroxidase inactivation, more losses of chlorophyll were detected in steam-blanched samples than in water-blanched samples. The results of color measurements with a Hunterlab colormeter indicated that blanching with water and steam resulted in a more intense greenness of the samples. (AS)

0224

29716 TILSEKWA, B. 1985. Laboratory studies on production of canned mboga ya maharage. 2. Heat processing and product quality. Mededelingen van de Faculteit Landbouwwetenschappen Rijksuniversiteit Gent 50(4):1393-1399. En., Sum. En., Nl., 8 Ref. [Laboratory of Food Chemistry & Microbiology, Faculty of Agricultural Sciences, State Univ. of Ghent, Coupure Links, 653 B-9000, Ghent, Belgium]

Phaseolus vulgaris. Canned beans. Temperature. Timing. Organoleptic properties. Protein content. Nutritive value. Tanzania. Belgium.

Heat processing factors and their effect on the quality of canned mboga ya maharage a food eaten with rice, [illegible], cassava, or banana meal, were studied. A bean:sauce ratio of 45, [illegible].5 (wt./wt.) was found satisfactory for filling cans. Retorting canned mboga at 121 degrees Celsius for 36 min gave a product of acceptable organoleptic quality and promising storage properties. Characteristic composition of the finished canned mboga are: total solids, 29.4 percent; pH 5.6; CP, 8.7 percent; and ether extract, 3.7 percent. Further investigation is required to determine the stability of the product in different storage conditions, as well as the feasibility of using larger cans to contain more product in order to favor both the producer and the consumer. (AS)

0225

29627 VAN BUREN, J.P. 1986. Snap bean texture softening and pectin solubilization caused by the presence of salt during cooking. Journal of Food Science 51(1):131-134. En., Sum. En., 13 Ref., Il. [Dept. of Food Science & Technology, Cornell Univ., Geneva, NY 14456, USA]

Phaseolus vulgaris. Snap beans. Canned beans. Cooking. Temperature. Timing. Biochemistry. USA.

Special procedures were used to separate the effects on snap bean softening and pectin solubilization of the presence of salt during cooking from the effects of salt apart from cooking. The effects of the presence of salt during cooking, calculated with respect to corresponding distilled water cooked beans, were greater with processing conditions of lower blanch temp. and shorter cook times, consequently they were greater with higher canned bean firmness and lower liquor pectin. Neither softening nor pectin solubilization had a significant relation to the reduction in pH induced by NaCl. The softening due to salts was seen with NaCl, KCl, and, to a lesser extent, with $CaCl_2$ and it may be the result of accelerated degradation of pectins. (AS)

C226

29709 VAN BUREN, J.P. 1987. Softening of cooked snap beans and other vegetables in relation to pectins and salts. American Chemical Society Symposium Series 310:190-199. En., Sum. En., 36 Ref., Il. [Dept. of Food Science & Technology, Cornell Univ., Geneva, NY 14456, USA]

Phaseolus vulgaris. Snap beans. Cooking. Seed hardening. Temperature. USA.

The use of monovalent salt solutions as cooking media caused a greater softening than when vegetables were cooked in distilled water. Removal of endogenous salts by leaching before cooking reduced softening. The additional softening with salt was the result of 2 separate actions. One action, associated with the solubilization of part of the tissue Ca(++), took place when the salt was used either before or after cooking. The other action, requiring the presence of salt during cooking, was associated with the appearance of higher liquor pectin solids. A blanch temp. of 71 degrees Celsius resulted in snap beans that softened more slowly when cooked in distilled water and had a slower rate of salt-induced softening than was the case with snap beans blanched at 98 degrees Celsius. (AS)

C227

28967 VON ELBE, J.H.; EVANS, J.F.; ATKIN, R.L.; MANN, W.R. 1986. Pigment composition and color of conventional and Veri-Green canned beans. Journal of Agriculture and Food Chemistry 34(1):52-54. En., Sum. En., 26 Ref., Il. [Dept. of Food Science, Univ. of Wisconsin-Madison, Madison, WI 53706, USA]

Phaseolus vulgaris. Snap beans. Canned beans. Processing. USA.

Qualitative pigment differences between conventional and Veri-Green (a processing technology to preserve the green color of vegetables) processed canned green beans were determined. Pigments in conventional processed beans were pheophytins and pyropheophytins, typical of the pigments found in heat-processed green vegetables. The green color of Veri-Green processed beans was attributed to the formation of Zn complexes, such as Zn-pheophytin a and Zn-pyropheophytin a. Large differences in Hunter color value a (greenness) were observed between conventional and Veri-Green processed beans. The greatest a value was observed in Veri-Green processed beans subjected to long storage periods (1 yr or longer), attributing the greener color to the greater amount of Zn complex formation over time. Hunter color values of Very-Green processed beans approached the color values of fresh beans. (AS) See also 0010 0047 0059 0196 0197 0213

ABBREVIATIONS AND ACRONYMS

A	Angstrom(s)
ABA	Abscisic acid
ac	Acre(s)
Af.	Afrikaans
a.i.	Active ingredient
alt.	Altitude
AMV	Alfalfa mosaic virus
approx.	Approximate(ly)
Ar.	Arab
atm.	Atmosphere
ATP	Adenosine 5'-triphosphate
av.	Average
BAP	6-Benzylaminopurine
BBMV	Broad bean mosaic virus
BCMV	Bean common mosaic virus
Bg.	Bulgarian
BGMV	Bean golden mosaic virus
BGYMV	Bean golden yellow mosaic virus
BOD	Biochemical oxigen demand
BPMV	Bean pod mottle virus
BRMV	Bean rugose mosaic virus
BSMV	Bean southern mosaic virus
BV	Biological value
BYMV	Bean yellow mosaic virus
ca.	About (circa)
CAMD	Cassava African mosaic disease
CMV	Cassava African mosaic virus
CBB	Cassava bacterial blight
CBSD	Cassava brown streak disease
CEC	Cation exchange capacity
CER	CO_2 exchange rate
CF	Cassava flour
CGR	Crop growth rate
Ch.	Chinese
CLM	Cassava leaf meal
CLV	Cassava latent virus
CM	Cassava meal
cm	Centimeter(s)
COD	Chemical oxigen demand
concn.	Concentration
CP	Crude protein
Cs.	Czech
CSL	Calcium stearyl lactylate
CSW	Cassava starch wastes
C.V.	Coefficient of variation
cv.	Cultivar(s)
2,4-D	2,4-dichlorophenoxyacetic acid
Da.	Danish
DM	Dry matter
DNA	Deoxyribonucleic acid
EC	Emulsifiable concentrate
EDTA	Ethylenediaminetetraacetic acid
EEC	European Economic Community
e.g.	For example
ELISA	Enzyme-linked immunosorbent assays
EMS	Ethyl methane sulfonate
En.	English
EP	Preliminary Trials, CIAT
Es.	Spanish
expt.	Experiment(s)
exptl.	Experimental
Fr.	French
ft-ca	Foot candles (10.76 lux)
FYM	Farmyard manure
g	Gram(s)
G	Giga (109)
GA	Gibberellic acid
gal	Gallon(s)
GE	Gross energy
GERs	Glucose entry rates
GLC	Gas-liquid chromatography
Gr.	Greek
h	Hour(s)
ha	Hectare(s)
HCN	Hydrocyanic acid
HDP	Hydroxypropyl distarch phosphate (modified cassava starch)
He.	Hebrew
Hi.	Hindi
HI	Harvest index
hp	Horsepower
Hu.	Hungarian
IAA	Indoleacetic acid
IBA	Indolebutyric acid
IBYAN	International Bean Yield and Adaptation Nursery, CIAT
Il.	Illustrations
in.	Inches
In.	Indonesian
It.	Italian
IU	International unit
J	Joule
Ja.	Japanese
kat	Katal(amount of enzymatic activity that converts 1 mole of substrate/s)
kcal	Kilocalorie(s)
kg	Kilogram(s)

De.	German
km	Kilometer(s)
KNap	Potassium naphthenate
Ko.	Korean
kR	Kiloroentgen(s)
La.	Latin
LAD	Leaf area duration
LAI	Leaf area index
lat.	Latitude
lb	Pound(s)
LD50	Mean letnal dose
LER	Land efficiency ratio
LPC	Leaf protein concentrate
lx	Lux
M	Mega
m	Meter(s)
Mal.	Malay
max.	Maximum
MC	Moisture content
ME	Metabolizable energy
meq	Milliequivalent(s)
met.	Methionine
mg	Milligram(s)
mho	Reciprocal ohm
min.	Minimum
min	Minute(s)
ml	Milliliter(s)
mm	Millimeter(s)
mo.	Month
mol. wt.	Molecular weight
m.p.	Melting point
NAA	Alpha-naphthalene acetic acid
NAD	Nicotinamide adenine dinucleotide
NADH	Nicotinamide adenine dinucleotide, reduced form
NAR	Net assimilation rate
NCE	Net CO_2 exchange
NE	Northeast
NER	Net energy ratio
Nl.	Dutch
nm	Nanometer(s) (10-9 m)
n.	Number(s)
No.	Norwegian
NPFs	Negative production factors
NPR	Net protein ratio
NPU	Net protein utilization
NW	Northwest
OM	Organic matter
oz	Ounce(s)
p.	Page
P	Probability
Pa	Pascal(s)
PAN	Peroxyacetic nitrate
PCNB	Pentachloronitrobenzene
PDA	Potato dextrose agar
PER	Protein efficiency ratio
pH	Hydrogen ion concentration
Pl.	Polish
kJ	Kilojoule
pp.	Pages
pphm	Parts per hundred million
PPI	Preplanting incorporation
ppm	Parts per million
PSA	Potato sucrose agar
Pt.	Portuguese
pv.	Pathovar
Ref.	Reference
resp.	Respective(ly)
Rf	Retardation factor-chromatography
RGR	Relative growth rate
RH	Relative humidity
RNA	Ribonucleic acid
Ro.	Romanian
rpm	Revolutions per minute
Ru.	Russian
s	Second
SBM	Soybean meal
SCN	Thiocyanate
SCP	Single cell protein
SDS	Sodium dodecyl sulfate
Sk.	Slovak
Sn.	Slovene
sp.	Species
spp.	Species
SSL	Sodium stearyl-2-lactylate
Sum.	Summary
Sv.	Sweddish
t	Ton(s)
TDN	Total digestible nutrients
temp.	Temperature
TIA	Trypsin inhibitor activity
TIBA	2,3,5-Triiodobenzoic acid compound with N-methylmethanamine
TLC	Thin-layer chromatography
TMV	Tobacco mosaic virus
Tr.	Turkish
TSH	Thyroid-stimulating hormone
UDPG	Uridine diphosphate glucose
Uk.	Ukrainian
UMS	Unmodified cassava starch
Ur.	Urdu
UV	Ultraviolet
var.	Variety(ies), varietal
VEF	Bean Team Nursery, CIAT
VFA	Volatile fatty acids
vol.	Volume
VPD	Vapor pressure deficit
vpm	Volume per million
vs.	Versus
W	West, watt
wk.	Week
WP	Wettable powder
wt.	Weight
yr	Year(s)
/	Per

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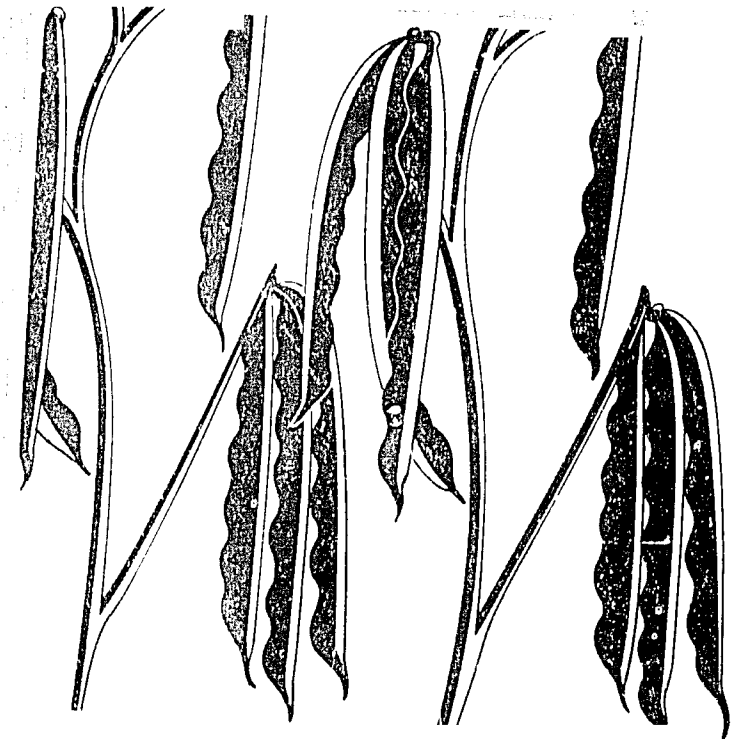
Abstracts on Field Beans

(*Phaseolus vulgaris* L.)



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Abstracts on Field Beans

(*Phaseolus vulgaris* L.)

Vol. XIII No. 2 August, 1988

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INTRODUCTION

This journal of analytical abstracts is designed to provide a specialized guide to the world's literature on field beans (*Phaseolus vulgaris* L.), disseminating research results and ongoing activities related to the crop.

The abstracts present condensed information from journal articles, booklets, reports, theses, manuals, and other conventional and nonconventional material, categorized into broad disciplinary fields. These are complemented with author and subject indexes to enable more comprehensive consultation.

When information is required on a specific topic, CIAT's Bean Information Center can carry out bibliographic searches of its entire document collection. As part of this service, users receive a set of abstracts of the articles related to the topic of their interest. The full text of these articles is available through the Photocopy Service of the Communication and Information Support Unit.

The Specialized Information Centers on cassava (*Manihot esculenta* Crantz) and on tropical pastures also publish abstract journals in their respective areas.

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COMPONENTS OF AN ABSTRACT

Accession number (for photocpy requests)

Authors

Year of publication

Sequential number in the journal (for use of indices)

[19421 ABATE, T.; NEGASI, A. 1981. 0118 Chemical control of American bollworm (Heliothis armigera) (Hübner) with ultra-low-volume sprays. Ethiopian Journal of Agricultural Science 3(1):49-55. Engl., Sum. Engl., 11 Refs. [Inst. of Agricultural Research, P.O. Box 2003, Addis Ababa, Ethiopia]

Original title

Additional notes

Author address

Source

Pages

Language of paper

Language of summary

Phaseolus vulgaris. Injurious insects. Lepidoptera. Heliothis armigera. Insect control. Chemical control. Ethiopia.

Descriptors

Expt. consisting of ultralow vol. formulations of endosulfan (500 and 750 g a.i./ha), cypermethrin (150 g a.i./ha), fenitrothion (960 g a.i./ha), profenofos (750 g a.i./ha), and an untreated check were conducted for 2 consecutive yr against Heliothis armigera on haricot beans at the Awassa and Nazareth Expt. Stations of the Institute of Agricultural Research (IAR), Ethiopia. The treatments were replicated 5 times in a randomized complete block design on 20 x 20 m plots. Of the insecticides used, single application of cypermethrin gave a more consistent and significant control than the check in both seasons at both stations. A new product, cypermethrin/profenofos 166^{R}, substituted for fenitrothion at Nazareth in the 1980 season, gave promising results to warrant further testing. Endosulfan, a recommended insecticide against the American bollworm in the past, was not as satisfactory as cypermethrin in its control of H. armigera on haricot beans. [AS]

Abstract

Abstractor and/or translator

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HOW TO USE THE INDEXES

The numbers listed under each entry in the author and subject indexes correspond to the abstract's sequential number, found above each abstract within the journal.

The last issue of the year contains cumulative author and subject indexes for the year.

Author Index

The Author Index can be used to find abstracts when the personal or corporate authors are known. The Author Index, which is alphabetically arranged, lists *all* author and co-author names cited in the publication.

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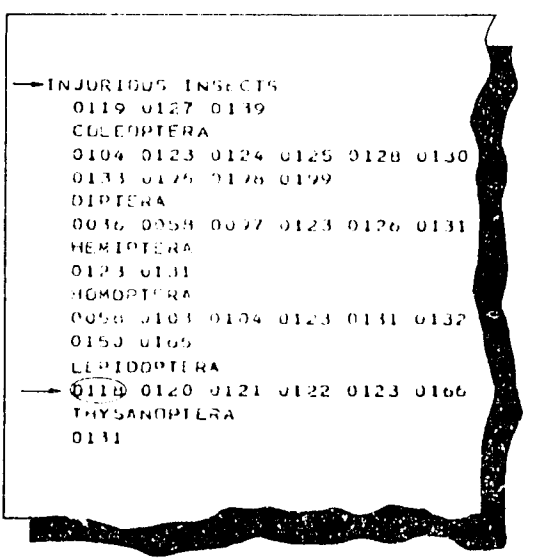
The Subject Index presents an alphabetical list of descriptors used in beans research, many of which are combined with other descriptors, allowing the identification of more specific topics.



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6. UNESCO coupons, available at UNESCO offices all over the world

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0228

30656 ARIAS V., J.E. 1980. Caracterización de cultivares de frijol negro (Phaseolus vulgaris L) y preparación de un archivo de selección para la especie. (Characterization of black bean cultivars and preparation of a selection file for the species). San José, Universidad de Costa Rica. 50p. Es., Sum. Es., 38 Ref., Il.

Phaseolus vulgaris. Cultivars. Agronomic characters. Plant habit. Yields. Costa Rica.

A total of 404 black bean cv. were botanically and agronomically evaluated at the Fabio Baudrit Moreno agricultural expt. station (Costa Rica). A punched-card file was created to store the information recorded on these cv. (CIAT)

0229

29961 PALIYATH, G.; THOMPSON, J.E. 1987. Calcium- and calmodulin-regulated breakdown of phospholipid by microsomal membranes from bean cotyledons. Plant Physiology 83(1):63-68. En., Sum. En., 28 Ref., Il. [Dept. of Biology, Univ. of Waterloo, Waterloo, Ontario, Canada N2L 3G1]

Phaseolus vulgaris. Enzymes. Fatty acids. Ca. Metabolism. Cell structure. Canada.

Evidence for the involvement of Ca(2+) and calmodulin in the regulation of phospholipid breakdown by microsomal membranes from bean cotyledons has been obtained by following the formation of radiolabeled degradation products from (U-(14)C) phosphatidylcholine. Three membrane-associated enzymes were found to mediate the breakdown of (U-(14)C) phosphatidylcholine, namely, phospholipase D, phosphatidic acid phosphatase, and lipolytic acyl hydrolase. Phospholipase D and phosphatidic acid phosphatase were both stimulated by physiological levels of free Ca(2+), whereas lipolytic acyl hydrolase proved to be insensitive to Ca(2+). Phospholipase D was unaffected by calmodulin, but the activity of phosphatidic acid phosphatase was additionally stimulated by nanomolar levels of calmodulin in the presence of 15 micromolar free Ca(2+). Calmidazolium, a calmodulin antagonist, inhibited phosphatidic acid phosphatase activity at IC50 values ranging from 10 to 15 micromolar. Thus, the Ca(2+)-induced stimulation of phosphatidic acid phosphatase appears to be mediated through calmodulin, whereas the effect of Ca(2+) on phospholipase D is independent of calmodulin. The role of Ca(2+) as a 2nd messenger in the initiation of membrane lipid degradation is discussed. (AS)

0230

31035 YEUNG, E.C.; BLACKMAN, S.J. 1987. Histochemical localization of alcohol dehydrogenase in developing bean seeds. American Journal of Botany 74(10):1461-1465. En., Sum. En., 19 Ref., Il. [Dept. of Biological Sciences, Univ. of Calgary, Calgary, Alberta T2N 1N4, Canada]

Phaseolus vulgaris. Seed. Embryo. Enzymes. Inhibitors. Canada.

Alcohol dehydrogenase activity can be readily localized within bean seeds using the tetrazolium method. In the seed coat, prior to the cotyledon stage of embryo development, staining was seen throughout, especially in the branched parenchyma cells and the integumentary tapetum. As the embryo entered the maturation stage, a gradual decrease in the staining intensity was observed throughout the seed coat. Embryos stained well at all stages

of development. A high activity of nothing dehydrogenase (phenomenon of formazan formation in the absence of substrate) was observed. Since its activity could be inhibited by methylpyrazole, an alcohol dehydrogenase inhibitor, it is concluded that the nothing dehydrogenase activity is caused by alcohol dehydrogenase. (AS) See also 0270 0283

B00 PLANT ANATOMY, MORPHOLOGY AND CYTOLOGY

0231

30696 BADOT, P.M.; MELIN, P. 1984. Métabolisme énergétique et mouvement revolutif chez le haricot (Phaseolus vulgaris L.). (Energy metabolism and turbulent movement in beans). Annales Scientifiques de l'Université de Besancon. Biologie Vegetale 4(5):7-12. Fr., Sum. En., Fr., 12 Ref., Il. [Laboratoire de Botanique, Univ. de France-Comté, Place Leclerc 25030, Besancon Cedex, France]

Phaseolus vulgaris. Shoots. Metabolism. O. ATP. France.

Energy metabolism studies in twining shoots of Phaseolus vulgaris showed that O2 consumption, ATP and adenosine diphosphate levels, and invertase activity decrease from the apex to the basis of the upper part of the shoot; however, the max. for the reducing sugars level was in the bending zone. It is assumed that there is a relationship between this high sugar content and the variation of the osmotic potential in this part of the shoot. (AS)

0232

30738 MARTIN, G.B.; ADAMS, M.W. 1987. Landraces of Phaseolus vulgaris (Fabaceae) in northern Malawi. 1. Regional variation. Economic Botany 41(2):190-203. En., Sum. En., 21 Ref., Il. [U.S. Dept. of Energy Plant Research Laboratory, Michigan State Univ., East Lansing, MI 48824, USA]

Phaseolus vulgaris. Cultivars. Outcrossing. Agronomic characters. Phenology. Plant anatomy. Malawi.

The extent and underlying patterns of variability in Phaseolus vulgaris when maintained as diverse landraces under traditional cropping systems in Malawi were investigated. The various seed types comprising these heterogeneous mixtures are known by an array of local names, reflecting farmer perceptions of seed color and pattern, eating quality, plant structure, origin, and other characteristics. A principal components analysis of morphological, phenological, and agronomic metrical traits for 375 lines randomly selected from 14 landraces revealed a clinal pattern, with the northern and southern areas forming the extremes. Genetic distances, based on the 1st 6 principal components, indicated greater between-area variability than within-area variability. Bean landrace diversity in Malawi is likely the result of a complex interplay among forces that generate variability such as outcrossing and human and environmental selection. (AS)

0233

30740 MARTIN, G.B.; ADAMS, M.W. 1987. Landraces of Phaseolus vulgaris (Fabaceae) in Northern Malawi. 2. Generation and maintenance of variability. Economic Botany 41(2):204-219. En., Sum. En., 23 Ref., Il.

Phaseolus vulgaris. Cultivars. Varietal mixtures. Outcrossing. Malawi.

Observations are presented of several seed-handling practices that result in the initial mixing of diverse seed types, in an attempt to understand

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factors affecting diversity in the Malawian bean gene pool. Seed handling practices during harvest, storage, and marketing at the village, local market, and national levels were found to result in physical and usually nonselective mixing of many seed types. Expt. determined that outcrossing does occur at a low level among beans in Malawi and can result in the generation of many new seed phenotypes. A scenario was developed integrating seed-handling practices and outcrossing that lays a foundation for understanding the generation and maintenance of variability in these bean landraces. The process whereby landrace heterogeneity arises and the ways it is maintained, if understood, should assist plant breeders in the development of improved germplasm for subsistence farmers. (AS)

0234

30711 WEAVER, M.L.; TIMM, H. 1987. In vitro and in-flower studies of pollen viability in beans (Phaseolus vulgaris L.). Naturwissenschaften 74(2):89-91. En., 12 Ref. [Western Regional Research Center, ARS, U.S. Dept. of Agriculture, Albany, CA 94710, USA]

Phaseolus vulgaris. Pollen. Flowering. Temperature. Relative humidity. Laboratory experiments. Flowers. USA.

The influence or environmental and cultural stresses on pollen viability was studied in vivo and in vitro. Bean plants were grown under greenhouse conditions and 2 wk. after the start of flowering they were moved to a controlled environment chamber at 25 degrees Celsius. Newly opened, stem-attached and excised flowers were exposed to the ambient environment, and to humidified and nonhumidified environments. In-flower pollen viability was evaluated after 3-, 6-, and 18-h exposures to each environment. For in vitro studies of pollen viability, the pollen was freed from previously removed anthers and deposited on the surface of a germination medium in an uncovered Petri dish which was placed in a covered plastic box maintained at a RH of 98 percent at 25 degrees Celsius. Extreme differences in percentage of flowers with pollen germination, and percentage of pollen grains that germinated, and the rate at which germination occurred in plant-attached and excised flowers from the same plant and in the same humidified environment, suggests that factors other than RH (i.e. ethylene) are involved. While about 75 percent of the pollen germinated within excised flowers in a humidified environment, only about 15 percent of the pollen attached to anthers separated from the flower, and none of the pollen freed from anthers germinated when held in a similar humidified environment. This suggests that moisture needed for hydration of bean pollen is primarily obtained from maternal tissue and not from the atmosphere. (CIAT) See also 0351 0385

C00 PLANT PHYSIOLOGY

0235

28033 AKOYUNOGLOU, A.; AKOYUNOGLOU, G. 1984. Reorganization of thylakoid components in developing chloroplasts of Phaseolus vulgaris leaves after transfer to darkness: changes in PS I and PS II units and in cytochromes. In Sybesma, C., ed. Advances in photosynthesis research. The Hague, Netherlands, Martinus Nijhoff; W. Junk Publishers. v.4,pp.673-676. En., 7 Ref., Il. [Biology Dept., Nuclear Research Center Demokritos, Athens, Greece]

Phaseolus vulgaris. Photosynthesis. Light. Leaves. Netherlands.

A study was carried out to determine whether a reorganization or formation of other thylakoid components occurred in developing chloroplasts after

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transfer to darkness. Six-day-old etiolated bean leaves were 1st exposed to continuous light and then to darkness. Photosystem II and I (PSII and PSI) activities, as well as P700 content of chloroplasts, were measured. Results showed that in leaves transferred to darkness after a short preexposure to continuous light (14 h, 24 h), the PSII and PSI activities increased. Since this occurred with no net chlorophyll synthesis/leaf, results indicated that some of the chlorophyll a in the dark transferred leaves was organized into new PSII and PSI units, which seem to be smaller than those present in leaves prior to transfer to darkness. The P700 content of the leaves also changed following the change in the PSI activity, therefore indicating the formation of new PSI units during the dark incubation. It is concluded that in leaves transferred to darkness, a reorganization of the PSII and PSI units takes place only in developing thylakoids, and this reorganization is accompanied by an increase in the amount of cytochrome f and cytochrome b, which establish the electron flow between the newly synthethized PSII and PSI units. (CIAT)

0236

31037 BERTRAND, M.; DUJARDIN, E.; BEREZA, B. 1987. Photoreduction of NADP(+) in French bean etioplasts. Preliminary experiments. Photosynthetica 21(2):117-123. En., Sum. En., 12 Ref., Il. [Photobiology Laboratory, Liege Univ. B-22, Sart-Tilman, B-4000 Liege, Belgium]

Phaseolus vulgaris. Snap beans. Irradiation. Leaves. Belgium.

NADP(+) photoreduction was assayed spectrophotometrically (340 nm) at the beginning of irradiation of whole etioplasts of Phaseolus vulgaris. Steady state was observed in this plant species, although an increase in NADP(+) photoreduction was found with spinach chloroplasts. Irradiation of etioplast membranes for 1 min induced a decrease of the absorption around 340 nm. When NADPH was added after the 1st irradiation, a fast decrease of absorption at 340 nm occurred in the dark while compounds absorbing at 375, 408, 425, 442, and 482 nm disappeared. (AS)

0237

30715 BOTHA, F.C.; SMALL, J.G.C. 1987. Comparison of the activities and some properties of pyrophosphate and ATP dependent fructose-6-phosphate 1-phosphotransferases of Phaseolus vulgaris seeds. Plant Physiology 83(4):772-777. En., Sum. En., 37 Ref., Il. [Dept. of Botany, Univ. of the Orange Free State, Bloemfontein 9300, Republic of South Africa]

Phaseolus vulgaris. Seeds. Enzymes. Cotyledons. ATP. South Africa.

The distribution of pyrophosphate: fructose 6-phosphate phosphotransferase (PFP) and ATP: fructose-6-phosphate 1-phosphotransferase (PFK) was studied in germinating bean cv. Top Crop seeds. In the cotyledons the PFP activity was comparable with that of PFK; however, in the plumule and radicle plus hypocotyl, PFP activity exceeds that of PFK. Approx. 70-90 percent, depending on the stage of germination, of the total PFP and PFK activities were present in the cotyledons. Highest specific activity of both enzymes, however, occurred in the radicle plus hypocotyl (64-90 nanomoles/min/mg protein). Fractionation studies indicate that 40 percent of the total PFK activity was associated with the plastids while PFP is apparently confined to the cytoplasm. The cytosolic isozyme of PFK exhibits hyperbolic kinetics with respect to fructose 6-P and ATP with Km values of 320 and 40 micromolar, resp. PFP also exhibits hyperbolic kinetics both in the presence and absence of the activator fructose-2,6-P2. The activation is caused by lowering the Km for fructose 6-P from 18.0 to 1.1 millimolar and that for pyrophosphate (PPi) from 40 to 25 micromolar, resp. Levels of fructose 2,6-P2 and PPi in the seeds are sufficient to activate PFP and thereby enable a glycolytic role for PFP during germination; however, the

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fructose 6-P content appears to be well below the Km of PFP for this compound and would therefore preferentially bind to the catalytic site of PFK, which has a lower Km for fructose 6-P. The ATP content appears to be at saturating levels for PFK. (AS)

0238

30741 CHATFIELD, J.M.; ARMSTRONG, D.J. 1987. Cytokinin oxidase from Phaseolus vulgaris callus tissues enhanced in vitro activity of the enzyme in the presence of copper-imidazole complexes. Plant Physiology 84(3):726-731. En., Sum. En., 22 Ref., Il. [USDA/ARS, Dept. of Agronomy, Univ. of Illinois, Urbana, IL 61801, USA]

Phaseolus vulgaris. Enzymes. Cu. USA.

The effects of metal ions on cytokinin oxidase activity extracted from callus tissues of Phaseolus vulgaris cv. Great Northern were examined using an assay based on the oxidation of N(6)-(delta(2)-isopentenyl)-adenine-2,8-(3)H(i(6)Ade) to adenine (Ade). The addition of cupric ions to reaction mixtures containing imidazole buffer markedly enhanced cytokinin oxidase activity. In the presence of optimal concen. of Cu and imidazole, cytokinin oxidase activity was stimulated more than 20-fold. The effect was enzyme dependent, specific for Cu, and observed only in the presence of imidazole. The substrate specificity of the Cu imidazole enhanced reaction, as judged by substrate competition tests, was the same as that observed in the absence of Cu and imidazole. Similarly, in tests involving DEAE-cellulose chromatography, elution profiles of cytokinin oxidase activity determined using a Cu-imidazole enhanced assay were identical to those obtained using an assay without Cu and imidazole. On the basis of these results, the addition of Cu and imidazole to reaction mixtures used to assay for cytokinin oxidase activity is judged to provide a reliable and specific assay of greatly enhanced sensitivity for the enzyme. The mechanism by which Cu and imidazole enhance cytokinin oxidase activity is not certain, but the reaction catalyzed by the enzyme was not inhibited by anaerobic conditions when these reagents were present. (AS (extract))

0239

30706 CHRISPEELS, M.J.; GREENWOOD, J.S. 1987. Heat stress enhances phytohemagglutinin synthesis but inhibits its transport out of the endoplasmic reticulum. Plant Physiology 83(4):778-784. En., Sum. En., 25 Ref., Il. [Department of Biology C-016, University of California, San Diego, La Jolla, CA 92093, USA]

Phaseolus vulgaris. Seeds. Temperature. Cotyledons. Proteins. Phytohemagglutinins. USA.

The effect of heat stress (up to 6 h at 43 degrees Celsius) on the biosynthesis and transport of phytohemagglutinin (PHA) in cotyledons was studied in developing seeds of common bean. Heat stress resulted in a decrease of total protein synthesis and an enhancement of the synthesis of heat shock proteins and PHA. Pulse-chase expt. showed that a considerable proportion of the newly synthesized PHA was present in the endoplasmic reticulum/Golgi fraction and did not readily chase-out. Analysis with endoglycosidase H showed that the oligosaccharide sidechains of PHA were almost entirely in the high mannose configuration, indicating that most of the newly synthesized PHA was in the endoplasmic reticulum; however, some of the PHA became fucosylated at 43 degrees Celsius, indicating fucosyltransferase activity. That the biosynthesis and secretion of fucosyl-containing cell wall polymers proceeded normally at 43 degrees Celsius provided evidence that certain Golgi functions (i.e. transport to the cell wall) remained unaffected by heat stress. The endoplasmic reticulum obtained from these heat-stress cotyledons had a greater density

(1.16 g/cubic centimeter at 43 degrees Celsius instead of 1.14 g/cubic centimeter at 22 degrees Celsius in sucrose gradients. Ultrastructural observations showed that the width of the lumen of the endoplasmic reticulum cisternae had increased from 20 nanometers at 22 degrees Celsius to 60-80 nanometers at 43 degrees Celsius; the lumen was filled with electron-dense material presumed to be protein. The expt. are interpreted as evidence that heat stress imposes a block in the transport of PHA out of the endoplasmic reticulum. Whether heat stress affects the endoplasmic reticulum itself or alters the conformation of PHA, thereby preventing its transport, is not clear. (AS)

0240

30769 DUJARDIN, E.; BERTRAND, M.; RADUNZ, A.; SCHMID, G.H. 1987. Immunological evidence for the presence of proteins of the photosynthetic membrane in etiolated leaves of Phaseolus vulgaris. Journal of Plant Physiology 128(1-2):95-107. En., Sum. En., 27 Ref., Il. [Photobiology Laboratory, Liege Univ., 4000 Sart-Tilman, Belgium]

Phaseolus vulgaris. Leaves. Analysis. Proteins. Chlorophyll. Enzymes. Belgium.

Immunological techniques were utilized to detect the occurrence of different proteins of the electron transport chain in different fractions of etiolated leaves of Phaseolus vulgaris var. Commodore: plastocyanin, cytochrome f, ferredoxin, ferredoxin-NADP(+)-reductase. Furthermore, the coupling factor of photophosphorylation and RuBP carboxylase/oxygenase were also shown to be present in the etiolated material. Different fractions (leaf homogenates, etioplasts, etioplast membranes, and the protochlorophyllide protein complex) were photoactive and were characterized by their low-temp. absorption and fluorescence spectra. The double diffusion test and the tandem-crossed immunoelectrophoresis demonstrated that all the investigated proteins were immunochemically identical in etiolated and in green leaves. In the rocket immunoelectrophoresis test the relative amounts of the enzymes on a total protein basis were investigated in homogenates from etiolated, greening, and green leaves. All the electron carrier proteins as well as the RuBP carboxylase/oxygenase and the coupling factor were more abundant in green leaves than in etiolated leaves. During a 60 min illumination of etiolated leaves, the relative amount of these proteins did not markedly increase. (AS)

0241

29969 DUPON, M.; VAN ONCKELEN, H.A.; DE GREEF, J.A. 1987. Characterization of cyclic nucleotide phosphodiesterase activity in Phaseolus vulgaris. Physiologia Plantarum 69(2):361-365. En., Sum. En., 16 Ref., Il. [Dept. of Biology, Univ. of Antwerpen, Universiteitsplein 1, B-2610 Wilrijk, Belgium]

Phaseolus vulgaris. Cotyledons. Enzymes. Analysis.

Cyclic nucleotide phosphodiesterase (3',5'-cyclic nucleotide nucleotidohydrolase) activity isolated from Phaseolus vulgaris cv. Limburg seedlings was partially purified and characterized by fractional $(NH_4)_2SO_4$ precipitation, DEAE-cellulose chromatography, chromatography on cyclic adenosine 3', 5'-monophosphate-agarose, gel permeation chromatography, and chromatofocusing. A crude enzyme preparation, a 30-65 percent $(NH_4)_2SO_4$ pellet, showed an acidic pH optimum. The enzyme activity was stimulated by imidazole and divalent cations such as $Ca(2+)$, $Mg(2+)$, and $Mn(2+)$, whereas NaF, inorganic pyrophosphate, and $Fe(3+)$ were inhibitory. Isobutylmethylxanthine had no significant effect on the plant enzyme. An Mr of 42,000 was estimated by gel permeation high performance liquid chromatography. By chromatography on cyclic adenosine 3', 5'-

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monophosphate-agarose a phosphodiesterase was resolved that produced adenosine 5'-monophosphate as sole reaction product. (AS)

0242

29172 IRVING, D.E.; SILSBURY, J.H. 1987. A comparison of the rate of maintenance respiration in some crop legumes and tobacco determined by three methods. Annals of Botany 59(3):257-264. En., Sum. En., 24 Ref., Il. [Levin Horticultural Research Centre, Ministry of Agriculture and Fisheries, Private Bag Levin, New Zealand]

Phaseolus vulgaris. Plant respiration. CO_2. Growth. Protein content. Roots. Stems. Leaves. Australia.

Carbon exchange was measured on whole plants of broad bean, lucerne, chick pea, kidney bean, pea, and tobacco. The maintenance respiration rate was measured in 3 ways: (1) by allowing the CO_2 efflux to decay in prolonged darkness to an asymptotic value which was then taken to be the maintenance value (the dark decay method); (2) by plotting the dark CO_2 efflux as a function of the net CO_2 uptake over a range of irradiances and taking maintenance as the dark CO_2 efflux when the net CO_2 uptake was zero (the dynamic method); and (3) by plotting the total CO_2 uptake as a function of the growth rate and taking maintenance respiration as the CO_2 efflux when the growth rate was zero (the zero growth rate method). The range of values for the maintenance coefficient over all species was 1.6-2.1 percent of the dry wt./day, 1.8-2.1 percent, and 2.7-2.9 percent as determined by these 3 methods, resp. There was a linear relationship, common to all species, between the maintenance respiration rate (dark decay method) and dry wt., total N, and organic N content. It was concluded that the dark decay method provided the best estimate of the minimal maintenance requirements in the plants studied. (AS)

0242

28027 KALOSAKAS, K.; AKOYUNOGLOU, G.; GHAD, I. 1984. Relationship between the ultrastructure of freeze fractured thylakoids and the composition of the thylakoid membrane during development of Phaseolus vulgaris. In Sybesma, C., ed. Advances in photosynthesis research. The Hague, Netherlands, Martinus Nijhoff; W. Junk Publishers. v.4,pp.645-648. En., 8 Ref., Il. [Biology Dept., Nuclear Research Center Demokritos, Athens, Greece]

Phaseolus vulgaris. Leaves. Light. Photosynthesis. Netherlands.

A study was carried out to determine the changes of the distribution and particle size in thylakoids of plants with different sizes of photosystem II (PSII) and photosystem I (PSI) units and different PSII/PSI ratios. Six-day-old etiolated bean leaves were exposed to continuous light or to 86 light-dark cycles and then transferred to continuous light. Tylakoids obtained from plastids were freeze-fractured and the particle sizes were measured from micrographs. The sizes of both exoplasmic fracture (EF) particles and protoplasmic fracture (PF) particles were slightly larger than those found for intermittent light plants, showing an increase in the PS unit size. After transfer of the plants to continuous light, the av. particle size increased and the av. EF particle size in green thylakoids was found much larger than that in thylakoids of plants exposed to 86 light-dark cycles and then transferred to continuous light for 48 h. Results indicate a correlation between the increase in EF particle size and the relative increase in light harvested protein complexes and PSII unit size, and a correlation between the increase in the PF particle size and the increase of the PSI unit. (CIAT)

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0244

31046 MIKULSKA, M.; SIEDLECKA, M.; POSKUTA, J.W.; MALESZEWSKI, S. 1987. Effect of long-term action of high oxygen concentration on photosynthetic apparatus in French bean leaves. 1. Changes in net photosynthetic rate and in chlorophylls and carotenoids contents. Photosynthetica 21(2):175-178. En., Sum. En., 20 Ref. [Dept. of Photosynthesis & Dept. of Plant Physiology II, Faculty of Biology, Warsaw Univ., Warzsawa, Krakowskie Przedmiéscie 26/28, Poland]

Phaseolus vulgaris. Leaves. Light. Photosynthesis. Chlorophyll.

Leaves of 16-day-old bean plants were exposed for 1 or 10 h in light to an atmosphere containing either 21 or 100 percent O2. Immediately after the exposure or after further 20 h in natural atm., net photosynthetic rate and chlorophyll and carotenoid contents in leaves were determined. After 1 h exposure of the leaves to O, net photosynthetic rate was unaffected but carotenoid content decreased, indicating that a protective mechanism had effectively prevented damage to the photosynthetic apparatus. The 10-h exposure to pure O declined net photosynthetic rate more than chlorophyll content but less than beta-carotene, violaxanthin, and zeaxanthin contents. After transfer to normal air, the resynthesis of carotenoids was more evident that the restoration of net photosynthetic rate. (AS)

0245

30709 SAINIS, J.K.; BHAGWAT, A.S. 1986. Activity of ribulose 1,5 bisphosphate carboxylase (RuBPCase) in pods and leaves of the red kidney beans Phaseolus vulgaris (L). Indian Journal of Experimental Biology 24(12):783-785. En., Sum. En., 18 Ref. [Molecular Biology & Agricultural Division, Bhabha Atomic Research Centre, Bombay 400 085, India]

Phaseolus vulgaris. Enzymes. Leaves. Pods. India.

In vitro specific activity of ribulose 1,5 biphosphate carboxylase from 9-day-old bean leaves and pods at different stages after anthesis was measured. RuBPCase from pods showed 6-7 times higher specific activity/mg of enzyme protein than corresponding axillary leaves at early stages of pod development. The specific activity of RuBPCase from young pods was 2.55 micromol/mg enzyme protein/min whereas young 9-day-old leaves showed specific activity around 1.64 micromol/mg enzyme protein/min. Specific activity of RuBPCase was low in leaves after anthesis (around 0.27-0.39 micromol/mg enzyme protein/min), but pods retained high specific activity almost until maturity. (AS)

0246

31040 SPAETH, S.C. 1987. Pressure-driven extrusion of intracellular substances from bean and pea cotyledons during imbibition. Plant Physiology 85(1):217-223. En., Sum. En., 25 Ref., Il. [Grain Legume Genetics & Physiology Research Unit, United States Dept. of Agriculture, Agricultural Research Service, 215 Johnson Hall, Washington State Univ., Pullman, WA 99164, USA]

Phaseolus vulgaris. Electron microscopy. Cotyledons. Imbibition. Proteins. USA.

Light and scanning electron microscopy were used to examine bean and pea cotyledons and the material released from them into imbibition water. A large fraction of the visible materials released from excised bean and pea cotyledons during the 1st 30 min. of imbibition consisted of convoluted or helical streams of material which rapidly emerged from the cotyledons surfaces. Large streams of material from bean cotyledons contained starch grains and protein bodies, and smaller streams from bean and pea cotyledons

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probably contained protein bodies. The forms of streams were characteristic of a viscous fluid which had been forced by pressure through irregular orifices. The sites of extrusion from bean cotyledons were multicellular blisters which formed on the surfaces of imbibing cotyledons. In 6 h, pea and bean cotyledons leaked from 1-11 micrograms protein/mg of seed dry wt. The quantities of protein leaked primarily depended on cv. (AS)

0247

30694 WILCOX, E.R.; WHITAKER, J.R. 1984. Some aspects of the mechanism of complexation of red kidney bean alpha-amylase inhibitor and alpha-amylase. Biochemistry 23(8):1783-1791. En., Sum. En., 28 Ref., Il. [Dept. of Neurosciences, School of Medicine, University of California, San Diego, La Jolla, CA 92093, USA]

Phaseolus vulgaris. Enzymes. Inhibitors. Analysis. USA.

Bovine pancreatic alpha-amylase binds 1 mol of acarbose (a carbohydrate alpha-amylase inhibitor)/mol at the active site and also binds acarbose nonspecifically. The red kidney bean alpha-amylase inhibitor-bovine pancreatic alpha-amylase complex retained nonspecific binding for acarbose only. Binding of p-nitrophenyl alpha-D-maltoside to the final complex of red kidney bean alpha-amylase inhibitor and bovine pancreatic alpha-amylase has a beta Ks (Ks') value that is 3.4-fold greater than the Ks (16 millimolar) of alpha-amylase for p-nitrophenyl alpha-D-maltoside alone. The initial complex of alpha-amylase and inhibitor apparently hydrolyzes this substrate as rapidly as alpha-amylase alone. The complex retains affinity for substrates and competitive inhibitors, which, when present in high concn., cause dissociation of the complex. Maltose (0.5 molar), a competitive inhibitor of alpha-amylase, caused dissociation of the red kidney bean alpha-amylase inhibitor--alpha-amylase complex. Interaction between red kidney bean alpha-amylase inhibitor and porcine pancreatic alpha-amylase proceeds through 2 steps. The 1st step has a Keq of 3.1 x 10(-5) molar. The 2nd step (unimolecular; 1st order) has a forward rate constant of 3.05/min at pH 6.9 and 30 degrees Celsius. Alpha-amylase inhibitor combines with alpha-amylase, in the presence of p-nitrophenyl alpha-D-maltoside, noncompetitively. On the basis of the data presented, it is likely that alpha-amylase is inactivated by the alpha-amylase inhibitor through a conformational change. A kinetic model, in the presence and absence of substrate, is described for noncompetitive, slow, tight-binding inhibitors that proceed through 2 steps. (AS) See also 0283

C01 Plant Nutrition

0248

31059 ASCENCIO, J. 1987. Potassium and calcium distribution patterns along the leaf insertion gradient of bean plants grown in nutrient solutions. Journal of Plant Nutrition 10(4):455-484. En., Sum. En., 17 Ref., Il. [Depto. de Botánica, Fac. de Agronomía, Univ. Central de Venezuela, Maracay, Venezuela 2102]

Phaseolus vulgaris. Nutrient solution. Plant nutrition. K. Ca. Nutrient transport. Flowering. Mineral content. Canopy. Venezuela.

K and Ca distribution patterns along the leaf insertion gradient were analyzed in plants of bean cv. Tacarigua grown in different K and Ca concn. in the nutrient solution. The plants were sampled at the early flowering stage and the leaves analyzed following the helix or genetic spiral which follows leaves in the order of their origin at the shoot tip.

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Different canopy profiles for K and Ca showed that critical concn. limits could be established for K but not for Ca, due perhaps to the nonphloem mobile nature of this element. Besides sampling procedures based on a representative leaf (or leaves) were compared with those based on the sampling of the whole canopy in order to obtain reference nutrient concn. values. (AS)

0249

31015 BARCELO, J.; CABOT, C.; POSCHENRIEDER, C. 1986. Cadmium-induced decrease of water stress resistance in bush bean plants (Phaseolus vulgaris L. cv. Contender). 2. Effects of Cd on endogenous abscisic acid levels. Journal of Plant Physiology 125(1-2):27-34. En., Sum. En., 24 Ref., Il. [Depto. de Fisiología Vegetal, Facultad de Ciencias, Universidad Autónoma de Barcelona, 08071 Bellaterra, Barcelona, Spain]

Phaseolus vulgaris. Roots. Stems. Leaves. Nutrient solution. Cd. Mineral content. Resistance. Water stress. Spain.

The Ca content and the endogenous ABA levels of roots, stems, primary, and trifoliate leaves of plants of bush bean cv. Contender, grown with different Cd concn. in the medium, were analyzed. The samples were taken at different plant growth stages: primary leaf growth stage, 1st trifoliate leaf growth stage, flowering, and fruit development. No correlation between Cd and ABA contents could be established. In roots, Cd toxicity increased ABA levels. In leaves only the lowest Cd concn. increased the ABA content, while in plants treated with higher Cd concn. no increase in ABA content in response to wilting was observed. Cd at high concn. is suggested to decrease water stress resistance by inhibition of the hydroactive stomatal response. (AS)

0250

31058 HODDINOTT, J.; RICHTER, C. 1987. The influence of aluminum on photosynthesis and translocation in French bean. Journal of Plant Nutrition 10(4):443-454. En., Sum. En., 18 Ref., Il. [Dept. of Botany, Univ. of Alberta, Edmonton, Alberta, Canada, T6G 2E9]

Phaseolus vulgaris. Snap beans. Nutrient solution. Al. Growth. Mineral content. Leaves. Stems. Photosynthesis. Translocation. Toxicity. Plant nutrition. Canada.

Hydroponically grown French bean cv. Black Valentine plants showed reduced growth with increasing concn. of Al in their culture solutions. Leaves and stems of plants grown in Al contained Al, but also control levels of Ca as a result of the culture method used. Plants grown in Al had higher photosynthesis rates than control plants in distilled water, but reduced translocation rates. Xylem injection of Al in the transpiration stream of plants grown continuously in Hoagland's solution caused a rapid decline in rates of photosynthesis and translocation. (AS)

0251

31013 MINNICH, M.M.; McBRIDE, M.B.; CHANEY, R.L. 1987. Copper activity in soil solution. 2. Relation to copper accumulation in young snapbeans. Soil Science Society of America Journal 51(3):573-578. En., Sum. En., 26 Ref., Il. [Dept. of Soil & Water Science, Univ. of Arizona, Tucson, AZ 85721, USA]

Phaseolus vulgaris. Snap beans. Nutrient uptake. Cu. Mineral content. Roots. Shoots. Translocation. USA.

Soil solution Cu(2+) activity measured in soil saturation extracts was compared with Cu accumulation in young snap beans. Copper was supplied

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through sewage sludge mixtures of varied Cu concn. and through Cu-salt additions to the soil. Treatments were a factorial combination of 4 levels of Cu additions (75, 150, 225, and 300 mg/kg) and 4 levels of total sludge additions (0, 40, 80, and 120 g/kg). Soil and sludge pH values were limited to pH 5.0-5.5. Plant yield differences were minor. Data are reported showing the relationships of root, shoot, and total plant Cu contents with Cu(2+) activity, with DTPA-extractable Cu, with soluble Cu, and with sludge Cu concn. The Cu source (sludge vs. salt) produced distinctly different curves in most every case. Sludge treatments demonstrated nonlinear relationships of Cu activity vs. Cu accumulation; these were fit with exponential functions. Higher shoot Cu concn. occurred with the Cu salt treatments. Higher root Cu levels occurred at lower Cu(2+) activity values with sludge as the Cu source, probably reflecting the superior ability of the sludge to replenish or maintain the Cu supply in soil solution. Total soluble Cu was not related to plant Cu. The proportion of Cu in the sludge was closely linked with shoot Cu (r2 = 0.94); root Cu levels also reflected the proportion of Cu in the sludge, but higher sludge rates resulted in increased root Cu. Increased labile, soluble, Cu-organic complexes with increased sludge rates would explain both the observed differences between salt and sludge treatments and the positive correlation of root Cu and sludge rate. Physiological control of Cu translocation within the plant is implicit in this reasoning. Continual monitoring of soil solution ion activity or a buffering index is needed to improve predictions of plant ion uptake. (AS)

0252

31002 NEILSEN, D.; HOYT, P.B.; MacKENZIE, A.F. 1987. Measurement of plant-available zinc in British Columbia orchard soils. Communications in Soil Science and Plant Analysis 18(2):161-186. En., Sum. En., 29 Ref., Il. [Agriculture Canada, Research Station Summerland, British Columbia VOH 1ZO, Canada]

Phaseolus vulgaris. Nutrient uptake. Zn. Nutrient solution. Mineral content. Canada.

Zn availability in 20 southern British Columbia orchard soils (Canada) was examined in the greenhouse. Zn concn. uptake and yield in navy beans were measured and compared with soil Zn extracted by $MgCl_2$ at 3 concn. (1.00, 0.50, and 0.25 molar), DTPA, 0.10 molar HCl, and 0.05 molar HCl + 0.0125 molar H_2SO_4 (Mehlich No. 1). Adding Zn at the rate of 10 mg/kg did not increase yields. Available Zn varied greatly as measured by the soil tests and by plant Zn concn. and uptake. These availability indices, except for plant Zn concn., varied directly with Bray-P1 extractable P and OM content. Plant Zn uptake and concn. and $MgCl_2$-extractable Zn also varied inversely with pH. Zn extractable by $MgCl_2$ was more closely related to plant Zn concn. and uptake than Zn extracted by the other 3 extractants. Furthermore, extraction of Zn with 0.25 molar $MgCl_2$ instead of with 1.0 molar $MgCl_2$ decreased analytical difficulties with atomic absorption spectrophotometry and also resulted in improved relationships with plant Zn concn. (increased r = 0.69 to r = 0.89). Comparisons between Zn and Mn extracted by $MgCl_2$ solutions ranging from 1.0 to 0.01 molar in strength and at different soil: extractant ratios indicated that 0.25 molar $MgCl_2$ (1:2 soil:extractant ratio) extracted less specifically adsorbed Zn than 1.0 molar $MgCl_2$ which resulted in the improved relationship with plant Zn. (AS)

0253

30771 PRIMAVESI, O.; MELLO, F.A.F. DE; MURAOKA, T. 1986. Efeitos da porosidade de aeracao na nutricao mineral do feijoeiro (Phaseolus vulgaris L.). (Effects of aeration porosity on bean mineral nutrition). Anais da Escola Superior de Agricultura Luiz de Queiroz 43(2):691-711. Pt., Sum. Pt., En., 10 Ref. [Centro de Tecnologia Copersucar, Piracicaba-SP, Brasil]

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Phaseolus vulgaris. Soils. Fertilizers. P. Yields. Mineral content. Nutrient uptake. N. K. Ca. Mg. Zn. Cu. Fe. Mn. Canopy. Brazil.

The influence of varying aeration porosity on the nutritional parameters of bean cv. Aroana 80 was studied in greenhouse expt. carried out at the Escola Superior de Agricultura Luiz de Queiroz/U. de Sao Paulo in Piracicaba, Brazil. Soil samples of horizons A and B2 of Oxisol and Alfisol soils, with and without fertilization, were used. CEC saturation was 80 percent and the Ca:Mg:K ratio, 16:4:1; available P was 15 ppm. The water content of 2.5-liter pots was maintained between 100 and 70 percent field capacity. The decrease of aeration porosity affected the absolute and relative levels of P and the N:P ratio. The nutritional efficiency of N in the B2 horizon of both soils, that of Cu in both horizons of the Oxisol, and that of Mn in both horizons of the Alfisol were altered. Behavior was found to be specific to soil type and horizon. (AS)

0254

31045 RUANO, A.; BARCELO, J.; POSCHENRIEDER, C. 1987. Zinc toxicity-induced variation of mineral element composition in hydroponically grown bush bean plants. Journal of Plant Nutrition 10(4):373-384. En., Sum. En., 16 Ref. [Depto. Fisiología Vegetal, Facultad de Farmacia, Univ. Complutense, Madrid, Spain]

Phaseolus vulgaris. Nutrient solution. Zn. Yields. Toxicity. Roots. Stems. Mineral content. P. Ca. Mg. Fe. Mn. Cu. Leaves. Spain.

Plants of bush bean cv. Contender were grown for 20 days in nutrient solution (pH = 5), containing 0.13, 0.30, 0.50, or 0.75 mg Zn/liter. Plant yield decreased linearly with the increase of the Zn concn. supplied. The phytotoxic threshold content (for 10 percent growth reduction) was about 486, 242, 95, and 134 micrograms Zn/g for roots, stems, mature primary and trifoliate leaves, and developing leaves, resp. High inverse correlation coefficients with the Zn concn. supplied were found for the Mn content of all organs, for the P content of roots, and for the Cu and Ca contents of developing leaves. Significant positive relations were found for the Fe, Zn, and Cu contents in roots and for the Zn contents in stems and fully expanded leaves. The ratios of the mineral contents between organs suggest inhibition of uptake of Mn and P, and inhibition of translocation of Fe, Cu, and Ca. The relation between dry wt. decrease and Zn-induced nutrient content disorders was discussed. (AS)

0255

30647 VAN ASSCHE, F.; CLIJSTERS, H. 1986. Inhibition of photosynthesis in Phaseolus vulgaris by treatment with toxic concentration of zinc: effect on ribulose-1,5-bisphosphate carboxylase/oxygenase. Journal of Plant Physiology 125(3-4):355-360. En., Sum. En., 22 Ref., Il. [Dept. SBM, Limburgs Universitair Centrum, B-3610 Diepenbeek, Belgium]

Phaseolus vulgaris. Photosynthesis. Enzymes. Nutrient solution. Zn. Nutrient uptake. Mg. Mineral content. Leaves. Belgium.

Plants of dwarf bean cv. Limburgse Vroege were cultivated on a medium containing a toxic nonlethal Zn(2+) concn. The ribulose-1,5-bisphosphate carboxylase/oxygenase capacity of these Zn(2+) treated plants was compared with the capacity of control plants, grown under standard nutrient conditions. The carboxylase capacity, measured on crude leaf extracts, was significantly inhibited by Zn(2+) treatment. As the oxygenase capacity was not affected, the carboxylase:oxygenase capacity ratio decreased significantly. This lower ratio was restored up to the control value by in vitro inactivation of the enzyme, followed by reactivation in the presence of Mg(2+). This suggests a partial substitution in vivo of Zn(2+) for

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Mg(2+) in the ternary enzyme-CO2-metal(2+) complex. Further evidence for this substitution was provided by the extremely low Mg/Zn concn. ratio found in the chloroplast, as well as by the higher KM(CO2) of the enzyme. (AS)

0256

30719 VYAS, B.N.; MISTRY, K.B. 1981. Uptake of 241 Am from major Indian soils and its distribution in plants. Environmental and Experimental Botany 21(1):75-81. En., Sum. En., 20 Ref.

Phaseolus vulgaris. Nutrient uptake. Am. Soils. Mineral content. Leaves. Pods. Stems. India.

Studies on the uptake of (241)Am from 3 major Indian soils indicated that higher amounts of (241)Am were absorbed by plants on an acidic laterite soil having low pH, predominantly kaolinite clay, and low CEC than by plants on an alkaline medium black soil containing predominantly montmorillonite clay and high CEC, and a neutral alluvial soil. Am concn. ratios for beans and maize ranged from 1.0 x 10(-4) to 7.5 x 10(-4) for shoots and from 4.7 x 10(-4) to 12.5 x 10(-4) for roots in plants grown using a split-root technique. In plants grown under the Neubauer technique, higher concn. ratio values, ranging from 0.2 x 10(-3) to 2.9 x 10(-3), were obtained for maize shoots. Split-root studies also indicated that (241)Am once absorbed by roots from soil was not subsequently released into the nutrient solution. The distribution pattern of (241)Am in aerial tissues of bean plants grown to maturity in a labelled nutrient solution showed the max. concn. of the radionuclide in the oldest tissue (primary leaves) and a marked acropetal gradient. Chemical characterization of (241)Am in freshly harvested edible tissues (pods) of bean plants is indicated. (AS (extract))
See also 0285 0294 0295 0296 0394

CO2 Plant Development

0257

30613 ABDALLA, O.A. 1984. Effects of flurprimidol, abscisic acid and benzyladenine on growth and water relations of two bean (Phaseolus vulgaris L.) lines. Ph.D. Thesis. Manhattan, Kansas State University. 101p. En., Sum. En., 103 Ref., Il.

Phaseolus vulgaris. Cultivars. Plant introductions. Irrigation. Plant growth substances. Stomata. Transpiration. Photosynthesis. Growth. USA.

Seedlings of 2 bean introduction lines, one drought-resistant and the other drought-susceptible, were grown in plastic containers in growth chambers. When the plants were 8 days old, they were sprayed with ABA, benzyladenine (BA), d-(1-methylethyl)-d-4-trithioromethoxy) phenyl-5-pyrimidine methanol (EL-500), or distilled water. The plants were either irrigated daily or allowed to dry. The stomatal resistance, transpiration rate, shoot elongation, water potentials, dry wt., photosynthesis, and endogenous ABA concn. were determined. Plants sprayed with ABA displayed the highest stomatal resistance, the lowest transpiration rate, and the highest water potential among treatments. ABA treatment also decreased total dry wt., shoot and root dry wt., and increased the root:shoot ratio. Together with EL-500, ABA gave the shortest plants and the smallest total leaf areas. The BA treatment caused the highest transpiration rate, the lowest stomatal resistance, and accumulated high levels of endogenous ABA in the 1st 3 days of the expt. It also reduced water potential, root dry wt., total leaf areas and root:shoot ratio. The EL-500 sprays reduced the amount of endogenous ABA in unirrigated plants, increased water potential, reduced

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osmotic potential, and increased the resistance of plants to water stress. It also reduced total dry wt., shoot dry wt., and increased root dry wt. and root:shoot ratio in the drought-susceptible introduction line. The drought-resistant introduction line had higher stomatal resistance and lower transpiration than the susceptible line. (AS)

0258

31012 BALAKRISMNAN, K.; NATARAJARATNAM, N.; SUNDARUM, K.M. 1985. A rapid method for the estimation of leaf area in field bean. Madras Agricultural Journal 72(11):633-635. En., Sum. En., 15 Ref.

Phaseolus vulgaris. Leaf area. Leaves. Mathematical model. India.

An attempt was made to establish a relationship between leaf length, leaf width, and leaf area in bean cv. Co. 1. The regression equation fitted against leaf area and the product between terminal leaf length and width was y = 3.09 + 1.63 (x) (r = 0.9647**), where y = leaf area of a trifoliate leaf; x = length x width of the terminal leaflet of the trifoliate leaf (L x W). The leaf area was also predicted by using the formula A = 1.685 (L x W). A significant correlation (r = 0.9630**) was also found between actual W). A significant correlation (r = 0.9630**) was also found between actual and predicted leaf area by using the above constants. Predicted leaf area by regression equation was more accurate than by the 2nd method. (AS)

0259

30641 BERRY, J.A.; LORIMER, G.H.; PIERCE, J.; SEEMANN, J.R.; MEEK, J.; FREAS, S. 1987. Isolation, identification, and synthesis of 2-carboxyarabinitol 1-phosphate, a diurnal regulator of ribulose-bisphosphate carboxylase activity. Proceedings of the National Academy of Sciences of the United States of America 84(3):734-738. En., Sum. En., 19 Ref., Il. [Dept. of Plant Biology, Carnegie Institution of Washington, Stanford, CA 94305, USA]

Phaseolus vulgaris. Enzymes. Leaves. Analysis. Inhibitors. Photosynthesis. USA.

The diurnal change in activity of ribulose 1,5-bisphosphate (Rbu-1,5-P2) carboxylase (3-phospho-D-glycerate carboxy-lyase (dimerizing)) of leaves of Phaseolus vulgaris is regulated (in part) by machanisms that control the level of an endogenous inhibitor that binds tightly to the activated (carbamoylated) form of Rbu-1,5-P2 carboxylase. This inhibitor was extracted from leaves and copurified with the Rbu-1,5-P2 carboxylase of the leaves. Further purification by ion-exchange chromatography, adsorption to purified Rbu-1,5-P2 carboxylase, barium precipitation, and high performance liquid chromatography separation yielded a phosphorylated compound that was a strong inhibitor of Rbu-1,5-P2 carboxylase. The compound was analyzed by gas chromatography/mass spectrometry, (13)C nuclear magnetic resonance, and (1)H nuclear magnetic resonance and shown to be 2-carboxyarabinitol 1-phosphate ((2-C-phosphohydroxymethyl)-D-ribonic acid]. Verification of structure was obtained by comparison of the inhibitory activity of the isolated compound with that of 2-carboxy-D-arabinitol 1-phosphate synthesized in vitro. This compound (but not 2-carboxy-D-arabinitol 5-phosphate) inhibited Rbu-1,5-P2 carboxylase in a way that was kinetically identical to that of the isolated, naturally occurring compound. The structure of the isolated compound differs from the Rbu-1,5-P2 carboxylase transition-state analogue 2-carboxyarabinitol 1,5-bisphosphate only by the lack of the C-5 phosphate group. This difference results in a higher binding constant for the monophosphate (Kd = 32 nanomolar) compared with the bisphosphate (Kd less than 10 picomolar). The less tightly bound compound acts in a light-dependent, reversible regulation of Rbu-1,5-P2 carboxylase activity in vivo. (AS)

135

0260

30781 LAGUETTE R., H.D. 1985. Impacto de los oxidantes ambientales en el cultivo de frijol, en Montecillos, Estado de México. (Impact of environmental oxidants on bean crops in Montecillos, state of Mexico). Tesis Mag.Sc. Chapingo, México, Universidad Autónoma de Chapingo. Colegio de Postgraduados. 109p. Es., Sum. Es., 61 Ref., Il.

Phaseolus vulgaris. Phaseolus acutifolius. Phaseolus lunatus. Phaseolus dumosus. Ozone. Yields. Growth. Mexico.

Twenty-one Phaseolus vulgaris, P. acutifolius, P. lunatus, and P. dumosus materials were planted in May and June 1983 to evaluate their differences in sensitivity to environmental oxidants through visual estimations of leaf damage. Because of the climatic conditions that prevailed until early July (high temp. and scarce rainfall), together with the clay-type soil of the exptl. site, leaf symptom expression attributable to oxidant gases, particularly O3, was delayed until early Aug.; 4 visual estimations of symptoms developed on each material were made starting this month until early Oct. Based on leaf damage evaluations, P. vulgaris var. Tempo and Pinto III can be considered as highly susceptible to the environmental oxidants present in the Montecillos area, and var. Amarillo 153, Amarillo 154, Negro Puebla, and Canario 107 as of intermediate susceptibility. P. vulgaris var. Bayo 107, Ojo de Cabra 400, Jamapa, Negro Mecentral, and Sataya 425, P. coccineus, and P. domosus showed low susceptibility. P. vulgaris var. Bayomex, Michoacán 12-A-3, Negro 150, Cacahuate 72, Flor de Mayo X-16441, and Cacahuate Bola, and the species P. lunatus and P. acutifolius developed no symptoms. From June to Sept. 1984, an exptl. plot was established with alternate furrows of bean var. Canario 107 and Pinto III to measure the effect of environmental oxidants on the growth and yield of these var. Treatments included (1) open field chamber with a filter for oxidant gases and particles; (2) open field chamber with no filter; (3) foliar spray with ethylenediurea at rates of 500 micrograms/ml; and (4) control. Results with the ethylenediurea treatment, compared with the control treatment in both var., showed yield reductions in plants due to the contaminating O3 present in the lower atmospheric strata. O3 reduced the yields of Canario 107 by approx. 4.5 percent, while the reduction for Pinto III averaged 40.7 percent. Results obtained in open field chambers with and without filters were unconclusive since the polyvinyl chloride plastic panels used became opaque and air flow deficiencies also occurred; this restricted correct evaluations of plant growth and yields in an atmosphere partly lacking air pollutants. (AS (extract)-CIAT)

0261

30793 LUCAS, N.M.C.; VALIO, I.F.M. 1987. Inhibition of rooting in bean leaf cuttings by the pulvinus. Journal of Plant Physiology 127(1-2):41-54. En., Sum. En., 36 Ref., Il. [Depto. de Fisiología Vegetal, Inst. de Biología, Univ. Estadual de Campinas, 13.081 Campinas-SP, Brasil]

Phaseolus vulgaris. Leaves. Auxins. Rooting. Indoleacetic acid. Brazil.

Auxins were the only growth regulators capable of inducing root formation in bean leaf cuttings with a basal pulvinus. These roots were usually formed in the petiole above the pulvinus. Although NAA and IAA stimulated root initiation, IBA showed the most marked promotive effect. Application of ABA did not affect rooting and was found in higher levels in the lower part of the petiole than in the pulvinus. The transport of labelled material (IAA and ABA) did not help the understanding of the inhibitory effect of the pulvinus. The presence of substances with similar chromatographic pattern of standard oestrogens in the basic fraction of extracts of the pulvinus suggests the possibility of its involvement in the inhibitory effect of the pulvinus on the rooting process. (AS)

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0262

31051 PUNJABI, B.; BASU, R.N. 1987. Regeneration of French bean (Phaseolus vulgaris L.) cuttings as influenced by morphactin pretreatment of stock plants. Indian Journal of Plant Physiology 30(1):96-103. En., Sum. En., 23 Ref., Il. [Univ. College of Agriculture, Calcutta Univ., 35 Ballygunge Circular Road, Calcutta 700 019, India]

Phaseolus vulgaris. Snap beans. Inhibitors. Rooting. Auxins. India.

French bean cv. Shravani Shevada cuttings, obtained from stock plants 8-10 days after pretreatment of 10-day-old seedlings with a morphactin formulation, EMF 7301 (10 ppm effective concn., spray application), showed a significant inhibition of adventitious root formation. Rooting was, however, greatly promoted by the preplanting application of the auxins IAA, IBA, and NAA to the base of cuttings, resulting in a synergistic effect on regeneration of adventitious roots. When cuttings were made soon after morphactin pretreatment of stock plants, auxin-induced rooting of cuttings was inhibited; a time-gap of over a wk. between spraying and preparation of cuttings was necessary for the synergistic effect. The beneficial effect of morphactin pretreatment on rooting of cuttings in the presence of auxins cannot be interpreted in terms of differential uptake and distribution of the labelled auxins, IAA-1-(14)C and IAA-2-(14)C, or the activity of the IAA-oxidizing enzymes. Growth suppression because of morphactin pretreatment resulted in an accumulation of carbohydrates and nitrogenous reserves in shoots. This, coupled with increased synthesis of rooting factors in the pretreated plants, may account for the observed positive interaction between morphactin pretreatment and auxin application. (AS)

0263

30779 SAAM, M.M.; HOMFIELD, G.I.; SAUNDERS, J.W. 1987. In vitro propagation of dry bean from seedling shoot tips. Journal of the American Society for Horticultural Science 112(5):852-855. En., Sum. En., 9 Ref., Il . [Dept. of Crop & Soil Sciences, Michigan State Univ., East Lansing, MI 48824, USA]

Phaseolus vulgaris. Apical meristems. Shoots. Propagation. Culture media. Auxins. Cytokinins. USA.

A protocol for in vitro propagation was developed with 2 dry bean cv. Shoot cultures were initiated by placing seedling shoot tips (1.0-1.5 cm) on Murashige and Skoog (MS) medium in which the effects of kinetin and BA (N-(phenylmethyl)-1H-purin-6-amine) alone or in combination with IAA or NAA were examined with regard to shoot multiplication and root or basal callus formation. The combination of BA (3.0 mg/liter) and NAA (0.1 mg/liter) was most effective in shoot multiplication. At high concn. of BA or kinetin (over 10 mg/liter), shoot production and internode elongation decreased markedly and rosette-like cultures with multiple buds developed. Shoots were rooted on basal MS medium. Ramets grew to maturity in the greenhouse or field and produced fertile flowers, pods, and seeds. (AS)

0264

30777 SCULLY, B.; WAINES, J.G. 1987. Germination and emergence response of common and tepary beans to controlled temperature. Agronomy Journal 79(2):287-291. En., Sum. En., 16 Ref., Il. [Dept. of Botany & Plant Sciences, Univ. of California, Riverside, CA 92521, USA]

Phaseolus vulgaris. Phaseolus acutifolius. Temperature. Germination. Resistance. Emergence. USA.

Accessions of Phaseolus vulgaris and P. acutifolius that could potentially germinate and emerge under cool soil conditions were identified, and an optimum germination temp. for P. acutifolius was determined. Germination

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of 129 P. vulgaris and 18 P. acutifolius accessions was initially evaluated at 10 degrees Celsius. The 10 earliest P. vulgaris and the 5 earliest P. acutifolius accessions to germinate were entered into an emergence test at 3 temp. (12, 14, and 16 degrees Celsius). P. vulgaris emerged 1 day earlier than P. acutifolius at 12 and 14 degrees Celsius, while P. acutifolius emerged 1 day earlier at 16 degrees Celsius. The most cold-tolerant P. vulgaris accession at emergence was PI 165-426, while accessions G40034 and PI 319-443 displayed the highest cold tolerance among those of P. acutifolius. Subsequently, P. acutifolius accessions were compared with P. vulgaris ones for germination response over 6 temp. from 10 to 35 degrees Celsius. In general, accessions of both species took approx. the same time to germinate except at 35 degrees Celsius where P. acutifolius germinated faster. The optimum temp. range for P. acutifolius is 25-35 degrees Celsius, whereas it is lower, 20-30 degrees Celsius, for P. vulgaris. (AS (extract))

0265

31106 SPILDE, L.A. 1987. Navy bean seed vigor and field performance in relation to microwave radiation. Agronomy Journal 79(5):827-830. En., Sum. En., 20 Ref. [Agronomy Dept., North Dakota State Univ., Fargo, ND 58105, USA]

Phaseolus vulgaris. Seed. Radiation. Germination. Seed vigor. Yields. Temperature. Water content. USA.

Seed lots of navy bean cv. Fleetwood were exposed to 2450-MHz electric fields of 3 intensities for various time periods and tested for germination, vigor, and seed yield in lab. and field studies for 2 yr. Seed exposed to temp. ranging from 38 to 49 degrees Celsius had significantly increased germination percentage. Seed vigor tests were less conclusive. Exposure of seed to a high power level (500 W) or to seed temp. above 62 degrees Celsius reduced germination and vigor. The effect of radiation at high seed MC (180 g/kg) was similar to the low MC level (90 g/kg). (AS)

0266

30736 VAZQUEZ, M.D.; POSCHENRIEDER, C.; BARCELO, J. 1987. Chromium VI induced structural and ultrastructural changes in bush bean plants (Phaseolus vulgaris L.). Annals of Botany 59:427-438. En., Sum. En., 41 Ref., Il. [Depto. Fisiología Vegetal, Facultad Ciencias, Univ. Autónoma de Barcelona, 08193 Bellaterra, Spain]

Phaseolus vulgaris. Cr. Electron microscopy. Toxicity. Nutrient solution. Nutrient uptake. Chlorophyll. Mineral content. Growth. Spain.

The effect of a growth reducing Cr VI concn. (9.6 x 10(-5) molar Cr) on the structure and ultrastructure of different organs of bush bean plants grown on perlite was studied using light, transmission electron, and scanning electron microscopy. The structural and ultrastructural alterations observed were quite different in the various organs analyzed and did not always stay in direct relation to the av. Cr content of the whole organ. The primary toxicity effect seemed to be membrane damage, due to the high oxidation power of Cr VI. It is suggested that Cr is retained in vacuoles and cell walls of roots, and that the Cr reaching the leaves may be principally Cr III and present in cell walls. The alterations observed in the upper plant parts seemed principally due to indirect Cr effects on the content of essential mineral nutrients. (AS)

0267

30735 VIEIRA, R.F.; FONSECA, J.R. 1986. Diferenca varietal na perda de germinacao de sementes de feijao (Phaseolus vulgaris L.). (Varietal differences in germination loss of bean seeds). Revista Ceres

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33(190):567-570. Pt., Sum. En., 4 Ref. [Empresa de Pesquisa Agropecuária de Minas Gerais, C.P. 216, 36.570 Vicosa-MG, Brasil]

Phaseolus vulgaris. Cultivars. Seed. Germination. Storage. Timing. Seed characters. Brazil.

Seeds of 19 bean cv. were harvested at the same time, dried to 12 percent moisture, treated with malathion, and stored in normal room conditions in paper bags. Germination tests were carried out when seeds were 3, 23, 30, 36, 42, 46, and 53 mo. old. It was found that germination of large and white seeds declines more quickly than germination of small and nonwhite seeds. Up to the age of 30 mo., most of the cv. exhibited more than 75 percent seed germination. Only 3 cv. (Rico 23, Mulatinho Vagem Roxa, and Beatao) were able to present 20 percent seed germination when 53 mo. old. (AS)

0268

31025 ZAHARAH, H.; SCARISBRICK, D.H. 1986. Pod development trend in Phaseolus vulgaris L., MARDI Research Bulletin 14(2):102-107. En., Sum. En., Mal., 6 Ref., Il. [Miscellaneous Crops Research Division MARDI, Serdang, Selangor, Malaysia]

Phaseolus vulgaris. Snap beans. Podding. Pod characters. United Kingdom.

French bean var. Processor was planted under glasshouse and field conditions (Kent, England). Measurement of pod development and pod count were done to determine the rate of pod growth, total no. of pods initiated, and percentage aborted. Results indicated that development of earlier pods affected that of the later ones. Removal of earlier pods as vegetable increased total no. of developed pods and delayed crop senescence. (AS)
See also 0284 0287 0292 0300 0371 0389 0394

C03 Chemical Composition, Methodology and Analyses

0269

30612 BOYLAN, M. 1983. Endoproteolytic cleavage of cotyledon storage protein during the growth of Phaseolus vulgaris seedlings. Ph.D. Thesis. New Haven, Connecticut, Yale University. 138p. En., Sum. En., 135 Ref., Il.

Phaseolus vulgaris. Phaseollin. Cotyledons. Enzymes. USA.

Phaseolin from Phaseolus vulgaris seeds is rapidly degraded following seed germination. The cotyledons of 4-day-old seedlings contain an endopeptidase which cleaves the polypeptides of (3)H phaseolin (Mr's = 51,000, 48,000, 46,000, and 43,000) into 3 discrete clusters of proteolytic fragments (Mr's = 27,000, 25,000, and 23,000). This enzyme was purified from crude extracts by ammonium sulfate precipitation, organomercurial agarose chromatography, gel filtration, and ion exchange chromatography. The endopeptidase is a cysteine-containing enzyme with a single polypeptide chain (Mr = 30,000). Analytical isoelectric focusing reveals only 1 major pI form. The enzyme is stable at 4 degrees Celsius but is irreversibly inactivated by freezing or incubation at 55 degrees Celsius. Optimum hydrolysis of (3)H phaseolin occurs at pH 5; the enzyme is irreversibly inactivated above pH 8. The endopeptidase attacks only a limited no. of peptide bonds in (3)H phaseolin, without causing any significant change in the native mol. wt. of the storage protein. The size distribution of the proteolytic fragments suggests that each of the polypeptides is cleaved at single sites, near the middle of the polypeptide chain. Endopeptidase activity is not detected in the cotyledons until the protein content of

these organs starts to decline after the 1st day of seedling growth. Max. activity occurs in the cotyledons of 5-day-old seedlings, during the period of rapid protein mobilization. By day 9, cotyledon protein content and endopeptidase activity have both decreased to low levels which are maintained activity have both decreased to low levels which are maintained until the storage organs abscise at day 13. The loss of phaseolin is accompanied by the transient accumulation of polypeptides in the same Mr range as found when (3)H phaseolin is incubated with the purified endopeptidase. (AS)

0270

30603 GEPTS, P.L. 1984. Nutritional and evolutionary implications of phaseolin seed protein variability in common bean (Phaseolus vulgaris L.). Ph.D. Thesis. Madison,, University of Wisconsin. 222p. En., Sum. En., 180 Ref., Il.

Phaseolus vulgaris. Genotypes. Phaseollin. Methionine. Crossbreeding. Analysis. Wild beans. Seed characters. Center of origin. Colombia. Ecuador. Peru. Bolivia. Argentina. Mexico. Guatemala. Honduras. Venezuela.

The relationship between available met. concn. and quantitative phaseolin variation was studied in the progenies of crosses involving several genotypes with different levels of phaseolin and/or available met., among which were a Phaseolus coccineus subsp. coccineus line (Mexican Red Runner) without detectable phaseolin and a Mexican wild bean accession (PI325690-3) with reduced phaseolin levels. In all the progenies studied, with the exception of those in population 6, higher phaseolin levels led to increased available met. concn., indicating that phaseolin is a major source of available met. in common bean seeds. In population 6 (Sanilac x 15R148), no association was observed between phaseolin and available met. concn. Qualitative phaseolin variation among wild and cultivated common beans was analyzed using 1-dimensional SDS-polyacrylamide gel electrophoresis (SDS/PAGE) and 2-dimensional isoelectric focusing SDS/PAGE. Wild beans exhibited a wide var. of phaseolin patterns: B, CH, M, S, and T. Landrace cv. showed the C, S, and T types described previously, as well as 3 new patterns: A, B, and H. Cv. with B and S phaseolin types generally had smaller seeds than A, C, H, and T phaseolin cv. The geographic distribution patterns of the different phaseolin types indicated domestications of the common bean in Middle America (small-seeded, S phaseolin cv.), in Colombia (small-seeded, B phaseolin cv.), and in the southern Andes (large-seeded, T phaseolin cv.). Hybrid F1 weakness occurred always in crosses between small-seeded, S phaseolin cv. on one hand, and large-seeded, T or C phaseolin cv. on the other, reflecting the geographical isolation between Middle American and Andean cv. and indicating the possible existence of separate gene pools, with different gene frequencies, environmental adaptations, and coevolutionary relationships with pathogens and symbionts. This complexity of the phaseolin pattern allowed a hypothesis to be made that common bean domestication in Middle America occurred in a limited region in westcentral Mexico. (AS)

0271

30707 GERSCHENSON, L.N.; BARTHOLOMAI, G.B. 1986. Effect of thermal treatment on the rheological pattern and composition of dry bean flour soluble extracts. Journal of Food Science 51(4):1085-1086. En., Sum. En., 13 Ref., Il. [Depto. de Industrias, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires, Ciudad Universitaria, 1428 Buenos Aires, Argentina]

Phaseolus vulgaris. Bean flour. Composition.

HH

Dry bean flour samples with 14 percent (dry basis) MC were exposed to thermal treatment, in sealed cans, at 50, 70, 80, and 90 degrees Celsius, for various periods. The rheological pattern and composition of their soluble extracts, obtained at pH 10, were determined. Soluble extracts decreased in viscosity with time of treatment, up to a time dependent on temp., where viscosity became constant. Soluble protein decreased with time of treatment. During the 1st step of dry bean flour heat treatment, soluble solids other than protein were constant, then began to increase, promoting viscosity constance in spite of soluble protein decrease. (AS)

0272

30622 GOMES, J.C. 1980. Isolation and characterization of navy bean trypsin inhibitor. Ph.D. Thesis. East Lansing, Michigan State University. 122p. En., Sum. En., 91 Ref., Il.

Phaseolus vulgaris. Analysis. Triptophane. Trypsin. Proteins. Inhibitors.

A trypsin-inhibitor fraction was isolated from navy bean cv. Sanilac by affinity chromatography on agarose-bound trypsin and characterized (ultracentrifugal properties and mol wt.). Mol. wt. values calculated by the Svedberg equation and sedimentation equilibrium were 17,000 and 20,900, resp. This inhibitor preparation was heterogeneous when examined by discontinuous polycrylamide gel electrophoresis. Important aspects of its amino acid composition were the high content of half-cystine, low content of met., and absence of tryptophan. There was no available thiol group detected. The trypsin inhibitor is present in the albumin fraction of the navy bean proteins. Rabbit antibodies against the affinity-isolated inhibitor indicated that the inhibitor was localized in the protein bodies of the navy beans. A fraction obtained from the water-soluble proteins of navy bean by gel filtration on Sephadex G-75 was closely related in mobility (disc-polyacrylamide gel electrophoresis) to the affinity-isolated inhibitor. A mol. wt. of 16,000 was estimated from its eluting position. Further separation by disc-polyacrylamide gel electrophoresis indicated that the TIA is limited to 2 protein zones. The affinity-isolated inhibitor is highly heat resistant. The decimal reduction time at 120 degrees Celsius was 145 min with a Z value of 22.3 degrees Celsius. An Arrhenius plot yielded an activation energy of 30.9 kcal/mol. Heat treatment of intact beans indicated that the indigenous inhibitor is easily inactivated by heat. (AS)

0273

31413 HALBROOK, W.U.; KURTZMAN JUNIOR, R.H. 1975. Water uptake of bean and other starches at high temperatures and pressures. Cereal Chemistry 52(2):156-161. En., Sum. En., 15 Ref., Il.

Phaseolus vulgaris. Bean starch. Temperature. Water absorption. USA.

The water uptake of 6 bean starches at temp. between 80-148 degrees Celsius was measured. Water uptake differences between starches were small over this temp. range. All of the bean starches appeared to have a water uptake max. at approx. 121 degrees Celsius. Also, there seems to be a secondary max. water uptake at a higher temp. The water uptake of starches from potato and white waxy corn was also determined. (AS)

0274

30640 HOHLBERG, A.I.; STANLEY, D.W. 1987. Kinetics of bean protein thermal denaturation. Journal of Food Processing and Preservation 11(1):31-42. En., Sum. En., 29 Ref., Il. [Depto. de Ingeniería Quimica, Univ. Catolica de Chile, Casilla 6177, Santiago, Chile]

Phaseolus vulgaris. Proteins. Analysis. Canada.

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A kinetic model for the thermal denaturation of the 7S protein of common black beans was developed. Thermal analysis was performed on hydrated (9:1) solutions of the proteins with a differential scanning calorimeter. Kinetic parameters were obtained by analyzing peaks in the differential scanning calorimeter thermogram using the Borchardt and Daniels method. Denaturation temp. for 10 percent solutions increased from 382 to 387 degrees Kelvin when increasing the heating rate from 5 to 30 degrees Celsius/min, while the enthalpy was steady at about 0.4 joule/g solution. The reaction order for phaseolin denaturation was found to be close to 2.5, with an activation energy of 932 kilojoule/mol and a preexponential factor of 127/min. A critical evaluation of the peak temp. vs. heating rate method revealed that the former method was less appropriate and accurate for determining the activation energy of protein denaturation. (AS)

0275

29793 HUSSAIN, A.; RAMIREZ, H.; ROCA, W.M. 1986. Manual práctico para la detección electroforética de isoenzimas y otras proteínas. (Practical handbook for electrophoretic detection of isoenzymes and other proteins). Cali, Colombia, Centro Internacional de Agricultura Tropical. Documento de trabajo 68p. no.19. Es., 73 Ref., Il. [Dept. of Plant Science, Univ. of Manitoba, Canada]

Phaseolus vulgaris. Enzymes. Analysis. Proteins. Colombia.

Procedures for the electrophoretic detection of isoenzymes and other proteins contained in cassava, beans, and legumes are described. Diagrams illustrating the construction and assembly of equipment required to conduct starch gel and polyacrylamide gel electrophoresis and protein electrophoresis are included. A detailed description is given on the preparation of the starch and polyacrylamide gels, buffer solutions, and sample solutions is described in detail. Procedures for sample cutting, voltage application time and values, and staining of the main enzymes under study (acid phosphatase, catalase, esterase, fumarase, and peroxidase) are specified. Protein electrophoresis is a much simpler procedure, since protein bands are not influenced by the equipment used in extraction procedures or by the physiological state of the plant material. Total proteins, water-soluble proteins (albumins), salt-soluble proteins (globulins), alcohol-soluble proteins (gliadins), acetic acid-soluble proteins (glutenins), and insoluble or residual proteins can be extracted by these methods. The general procedure for protein extraction consists in mixing 0.4 N sodium chloride and centrifuging until the desired protein is obtained; electrophoresis using basic and acid polyacrylamide gels is described. An analysis is presented of electrophoretic patterns, which can be made by using samples of known identity or through visual intensity measurements. (CIAT)

0276

30703 JACOB, R.T.; PATTABIRAMAN, T.N. 1986. Natural plant enzyme inhibitors: isolation and properties of a trypsin/chymotrypsin inhibitor rom kidney bean (Phaseolus vulgaris). Indian Journal of Biochemistry and Biophysics 23(2):105-109. En., Sum. En., 18 Ref., Il. [Dept. of Biochemistry, Kasturba Medical College, Manipal 576119, India]

Phaseolus vulgaris. Enzymes. Trypsin. Inhibitors. Proteins.

A trypsin/chymotrypsin, double-headed inhibitor was isolated from kidney bean by extraction in neutral medium and chromatographies on DEAE-cellulose and trypsin-Affigel-10. The protein with an Mr of 13 K inhibited bovine trypsin noncompetitively (Ki = 0.000000064 molar) and bovine alpha-chymotrypsin uncompetitively (Ki = 0.000000135 molar). Formation of trypsin-inhibitor-chymotrypsin trimer complex was demonstrated by

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chromatography on Sephadex G-100. The antichymotryptic activity of the factor was more stable to heat and to inactivation by trinitrobenzene sulphonate than the antitryptic activity. The inhibitor was resistant to pepsin action. (AS)

0277

30646 KOJIMA, S.; JAY, M. 1986. Application of lectins to tumor imaging radiopharmaceuticals. European Journal of Nuclear Medicine 12(8):385-389. En., Sum. En., 23 Ref., Il. [Depto. of Radiopharmacy, School of Pharmaceutical Sciences, Teikyo Univ., Suarashi 1091-1, Sagamiko-machi, Tukui-gun, Kanagawa 199-01, Japan]

Phaseolus vulgaris. Lectins. Analysis. Radiation. USA.

The in vitro binding of (125)I-lectins to Ehrlich ascites tumor (EAT) cells and in vivo uptake of (125)I-lectins in Ehrlich solid tumor (EST) bearing mice were studied. In in vitro binding assays, Phaseolus vulgaris agglutinin (PHA), Pisum sativum agglutinin (PSA), and Concanavalia agglutinin (Con A) showed a high affinity for EAT cells. The in vivo biodistribution of (125)I-lectins showed (125)I-PSA to be significantly taken up into EST tissues 24 h postinjection. After intravenous injection of (125)I-PSA, uptake of the radioactivity into the tumor tissues reached a max. at 6 h, and thereafter decreased. Rapid clearance of the radioactivity from blood and its excretion into kidney soon after injection of (125)I-PSA were observed. When compared with the biodistribution of (67)Ga-citrate in EST-bearing mice 24 h postinjection, tumor to liver (T/B), tumor to muscle (T/M), and tumor to blood (T/B) ratios were superior for (125)I-PSA. At 6 h postinjection, the T/B ratio of (125)I-PSA was 2.5, and this value may be sufficient to enable discernible diagnostic images. Results suggest that PSA might be a useful tumor imaging radiopharmaceutical. (AS)

0278

30795 LEE, E.H.; FOY, C.D. 1986. Aluminum tolerances of two snapbean cultivars related to organic acid content evaluated by high-performance liquid chromatography. Journal of Plant Nutrition 9(12):1481-1498. En., Sum. En., 11 Ref., Il. [Plant Stress Laboratory, Beltsville Agriculture Research Center, U.S. Dept. of Agriculture, Beltsville, MD 20705, USA]

Phaseolus vulgaris. Snap beans. Cultivars. Resistance. Al. Analysis. pH. Nutrient solution. Roots. Stems. Mineral content. USA.

High-performance liquid chromatography (HPLC) was used to determine Al-induced changes in organic acid concn. of Al-tolerant Dade and Al-sensitive Romano snap bean cv. Two-wk.-old Dade and Romano snap beans were grown in 1/5-strength Steinberg nutrient solution for 10 days and then subjected to 0, 2, 4, 6, and 8 mg/liter Al treatments at pH 4.5 for an additional 3-15 days. Current studies confirmed earlier findings that cv. Dade was significantly more tolerant to Al than cv. Romano. Organic acid analyses were performed on root and leaf extracts and on stem exudates. The organic acids were separated on an ion exclusion column using a mobile phase of 0.01 N H_3PO_4. Individual organic acids were quantified with a variable wavelength detector operating at 210 nm. Al stress tended to reduce the concn. of citric, malonic, malic, glycolic, fumaric, and acetic acids in the roots and increased the organic acid concn. in stem exudates. In the presence or absence of Al stress, cv. Dade contained higher organic acid concn. than did cv. Romano. Al stress reduced total organic acid levels in root extracts from cv. Romano plants to a greater extent than in those from cv. Dade. Malic and citric acid concn. were decreased more than those of the other organic acids examined. Results indicate that the Al-tolerant cv. Dade has a higher potential for Al chelation and

detoxification than does the Al-sensitive cv. Romano. Hence, an Al-chelation mechanism may be involved in differential Al tolerance within this species. (AS)

0279

30794 LEE, T.S.G. 1985. Protein pattern changes in the developing seeds of beans (Phaseolus vulgaris L.). Turrialba 35(4):377-381. En., Sum. Es., En., 19 Ref., Il.

Phaseolus vulgaris. Seeds. Proteins. Analysis. Protein content. Brazil.

The formation of reserve protein during Phaseolus seed development was studied using gel electrophoresis. The protein content of the seed increased gradually during development, with a rapid period of deposition of storage protein beginning about 18 days after flowering. At 30 days after flowering, the vicilin-like protein became predominant and continued so throughout maturation. Legumin-like protein was synthesized at a later stage of seed development since it was not observed in the seed at day 30 but appeared in seeds at day 50, day 60, and full maturation. (AS)

0280

31411 NAIVIKUL, O.; D'APPOLONIA, B.L. 1978. Comparison of legume and wheat flour carbohydrates. 1. Sugar analysis. Cereal Chemistry 55(6):913-918. En., Sum. En., 19 Ref., Il.

Phaseolus vulgaris. Bean flour. Starch content. Protein content. Fat content. Ash content. Fiber content. Water content. Sugar content. Sucrose. Glucose. Maltose. Fructose.

Flour was obtained by dry milling of 5 legumes: navy bean, pinto bean, faba bean, lentil, and mung bean. Comparison of the chemical composition of the legume flours with that reported for hard red spring wheat flour showed that legume flours have less starch, starch damage, and pentosan content but more protein, fat, ash, and acid detergent fiber. The various legume flours have similar starch and moisture contents. Faba bean, lentil, and mung bean flours contain approx. the same amount of damaged starch, which is more than that in the navy and pinto bean flours. Faba bean flour has the highest protein content and pinto bean has the lowest. Fat content is highest in navy bean flour; ash and acid detergent fiber content is highest in mung bean flour. The total sugar content is higher in all legume flours than in wheat flour. The legume flours contain high levels of sucrose, stachyose, and verbascose, but navy and pinto bean flours contain small amounts of verbascose. All legume flours also contain raffinose and glucose, but faba bean and lentil flour have certain different unidentified sugars. Wheat flour has no stachyose or verbascose but does have small amounts of maltose and fructose. (AS)

0281

31412 PAREDES L., O.; MAZA C., E.C.; GONZALEZ C., J.; MONTES R., R. 1988. Physico-chemical and functional properties of common bean (Phaseolus vulgaris) starches. Starch/Starke 40(1):11-15. En., Sum. En., De., 21 Ref., Il. [Unidad Irapuato, CIEA, Inst. Politécnico Nacional, Apdo. Postal 629, 36.500 Irapuato, Gto, México]

Phaseolus vulgaris. Bean starch. Cultivars. Water absorption. Composition. Temperature. pH. Mexico.

Starch was isolated by a simple procedure from 2 Phaseolus vulgaris var. with outstanding agronomic performance. These var. were Negro Queretaro and Bayocel, with black and light brown colored seeds, resp. Starch yields were 31.5 percent for Negro Queretaro and 28.5 percent for Bayocel.

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Commercial maize starch was used as reference. The granule size followed the order: Negro Queretaro more than Bayocel more than maize. Compared with maize starch, the legume starches had at least a similar water absorption capacity, formed a stable gel at lower concn., and showed a Hunter total color closer to the employed white standard. The swelling and solubility were both temp. and pH dependent. Effects of pH on the pasting properties were also examined with the Brabender Viscograph. The viscosity of legume starches was increased after holding the paste at 90 degrees Celsius for 5 min. The retrogradation tendency of maize starch was much higher than that of legume samples. The physicochemical and functional properties of common bean starches might suit some food industrial applications. (AS)

0282

30609 RUTHERFORD, W. M. 1983. Physiology of starch synthesis and the location of the genes for the enzymes of starch synthesis in Phaseolus vulgaris. Ph.D. Thesis. Normal, Illinois State University. 160p. En., Sum. En., 190 Ref., Il.

Phaseolus vulgaris. Starch content. Enzymes. Chlorophyll. Protein content. Analysis. Leaves. Chloroplasts. RNA. USA.

The physiology of destarching and restarching was studied in Phaseolus vulgaris. During the 120-h destarching period in total darkness, chlorophyll and soluble protein contents decreased by nearly 50 percent. The total RNA content was unaffected. The activities of ADPglucose pyrophosphorylase, ADPglucose glucosyltransferase, and starch phosphorylase decreased dramatically during the destarching period. After destarching, excised leaf discs were floated on a sucrose solution to allow starch synthesis in the dark. Chlorophyll and soluble protein contents continued to decline. RNA content remained constant until 12 h into the restarching period when a large increase was observed This increase in RNA was accompanied by the appearance of at least 6 new peaks of chloroplast RNA on electrophoretic gels. Over the 24-h restarching period, the activity of the aforementioned enzymes returned to light control levels. In vivo labeling of the leaf proteins during restarching suggested that at least part of this increase in activity of ADPglucose pyrophosphorylase and ADPglucose glucosyltransferase was due to new enzyme synthesis. No increase in the amount of ((3)H) leucine incorporated into starch phosphorylase could be detected during restarching. In vivo labeling of chloroplast proteins in the presence of cycloheximide and chloramphenicol confirmed the differential specificity of these antibiotics in inhibition of protein synthesis. In vitro translation of chloroplast RNA in an Escherichia coli cell-free system indicated that chloroplast RNA from destarched and restarched leaf tissue had different translational efficiencies. A 6-fold stimulation of the system was observed with chloroplast RNA from restarched leaf tissue, while RNA from destarched tissue was capable of stimulating the system only 1.2-fold. Characterization of the system showed that the bean leaf chloroplasts were similar to those isolated from other leaf tissue. (AS (extract)) See also 0248 0250 0253 0256 0294 0295 0296 0302 0305 0309 0327 0394 0400 0401 0407

D00 AGRONOMY

0283

29786 MENEZES, J.E.; CASTRO, M.E.B. DE; SILVA, J.B.T. DA; BATISTA, W.M.; LIRA, C.L. 1982. Feijao: resumos informativos. (Beans: informative abstracts). Brasilia, Brasil, Empresa Brasileira de Pesquisa Agropecuaria. Centro Nacional de Pesquisa de Arroz e Feijao. Feijao: resumos informativos V.1,371p. no.19. Pt., 680 Ref.

Phaseolus vulgaris. Cultivation. Plant anatomy. Climatic requirements. Economics. Plant nutrition. Diseases and pathogens. Plant breeding. Genetics. Irrigation. Seed. Uses. Brazil.

A total of 680 document abstracts (most of them of nonconventional documentation) on beans, under Brazilian conditions, were presented regarding the following areas: general crop aspects, botany, climate, economics, statistics, plant physiology and nutrition, phytochemistry, plant sanitation, genetics and breeding, irrigation drainage, seeds, soils, technology, and uses. Subject, author, and geographical indexes are included. (CIAT)

DC1 Soil, Water, Climate and Fertilization

0284

30725 ASADY, G.H. 1986. Modeling spatial and temporal responses of Phaseolus vulgaris L. roots and shoots to soil mechanical impedance and aeration. Ph.D. Thesis. East Lansing, Michigan State University. 224p. En., Sum. En., 159 Ref., Il.

Phaseolus vulgaris. Soil compaction. Growth. Rooting. Yields. Transpiration. Photosynthesis. Shoots. Mathematical model. USA.

The effects of mechanical impedance and associated stresses on the growth and development of dry edible bean root system were evaluated. A soil core seedling test was developed which could be used as a fast and inexpensive method of studying root responses to multiple levels of mechanical impedance and aeration under a constant soil water potential. Root penetration ratios were measured 14 days after planting without destroying seedling viability. Root penetration ratios and root lengths declined linearly with decreasing air-filled porosity. The max. DM accumulations and yields occurred at root penetration ratio values of approx. 0.65. The xylem flow rates of plants grown in high bulk density soils were also reduced to values as low as 5 nanoliters/s. Transpiration and photosynthetic rates were inversely and diffusive resistance was directly correlated to mechanical impedance, resp. Severe mechanical impedance reduced total root lenth by approx. 80 and 74 percent after 20 and 30 days of growth, resp. The av. root length density was reduced to less than 1 cm/cubic centimeter in high density soils. Extension of the roots into deeper layers was greatly reduced by severe mechanical impedance. Approx. 90 percent of the roots grown in severely compacted treatment remained in the surface 2.5 cm compared with 15 percent in the control, at 20 days after planting. Greater pathway resistances of the soil pores appeared to influence the reduced oxygen and increased carbon dioxide conen. of the soil more than the reduced aeration treatments of this study. A model of shoot growth is proposed which includes the dynamic RGR and biological growth capacity of the environment. (AS (extract))

0285

31016 BARCELO, J.; POSCHENRIEDER, C.; ANDREU, I.; GUNSE, B. 1986. Cadmium-induced decrease of water stress resistance in bush bean plants (Phaseolus vulgaris L. cv. Contender). 1. Effects of Cd on water potential, relative water content, and cell wall elasticity. Journal of Plant Physiology 125(1-2):17-25. En., Sum. En., 20 Ref., Il. [Depto. de Fisiología Vegetal, Facultad de Ciencias, Universidad Autónoma de Barcelona, 08071 Bellaterra, Barcelona, Spain]

Phaseolus vulgaris. Cd. Nutrient solution. Toxicity. Water stress. Cell walls. Spain.

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The leaf water potential and the relative water content of primary and 1st trifoliate leaves of plants of bean cv. Contender, grown with different Cd concn. in the medium, were analyzed under both normal water supply and water stress conditions. With these data, Richter plots were drawn, from which the max. turgor pressure, the turgor loss point, the bulk elastic modulus, and the structure coefficient were derived. Cd generally decreased the water stress tolerance of plants, causing turgor loss at higher relative water content and leaf water potential than in nontreated control plants. Cd increased the bulk elastic modulus and therefore decreased the cell wall elasticity. Low cell wall elasticity seems to be an important cause of the low water stress tolerance in Cd-toxic plants. (AS)

0286

31006 CIPOLLINI, M.L.; PICKERING, J.L. 1986. Determination of the phytotoxicity of barium in leach-field disposal of gas well brines. Plant and Soil 92(2):159-169. En., Sum. En., 24 Ref., Il. [Dept. of Biology. Indiana Univ. of Pennsylvania, Indiana, PA 15705, USA]

Phaseolus vulgaris. Ba. Toxicity. Na. K. USA.

A study was conducted to determine the effect of Ba on yield and elemental composition of plants growing near natural gas wells where potentially phytotoxic concn. of Ba are periodically released into leach fields. Data on plant yield, soil and plant Ba, Ca, Mg, Na, and K concn., and soil pH were collected from high-Ba well sites with crops of maize and Elymus sp., and from greenhouse pot expt. with Phaseolus vulgaris and barley using simulated brines. Ba had no detectable effect upon plant yield, and contributed only to variations in its own concn. in the plants studied. Ba also exhibited biodiminution, in contrast to all other elements studied. Na was implicated as the major cause of phytotoxicity at gas well leach fields. Due to interference of K uptake by Na, the soil Na/K ratio was closely correlated with plant yield fluctuations. (AS)

0287

30797 DIAZ, F. 1986. Efectos de diferentes dosis y frecuencia de fertilización foliar en frijol (Phaseolus vulgaris). (Effects of different leaf fertilization rates and frequencies in beans). Turrialba 36(4):415-425. En., Sum. En., Es., 17 Ref., Il. [Depto. de Biología, Univ. del Valle, Cali, Colombia]

Phaseolus vulgaris. Fertilizers. Leaves. N. P. K. S. Yield components. Growth. Yields. Colombia.

The effect of supplementary application of leaf fertilizer to plants of bean var. Porrillo Sintético, which had been provided with adequate soil fertilizer, was studied. Different quantities of leaf fertilizer were applied, the total amount depending on the no. of application dates (1-5). No significant differences were found among treatments regarding yield components. For growth analysis 2 treatments were applied: (1) a control that received only soil fertilizer and (2) in addition to soil fertilizer, a leaf fertilizer supplement of 80:12:33:5 kg N:P:K:S was applied per ha on 5 successive dates. Weeky samples were taken, the 1st 7 days before flowering and the last at physiological maturity. During the growth period and harvest, the application of leaf fertilizer did not significantly affect any of the variables studied or samples dates. (AS (extract))

0288

30705 DYNIA, J.F.; CUNHA, N.G. DA 1986. Limitacoes nutricionais do feijoeiro em solo Brunizem Avermelhado na regiao de Corumba. (Nutritional limitations for beans on red prairie soils in Corumba). Pesquisa Agropecuaria Brasileira 21(11):1219-1221. Pt., Sum. En., Pt., 7 Ref.

[EMBRAPA, Centro Nacional de Pesquisa de Arroz e Feijao, Caixa Postal 179, 74.000 Goiania-GO, Brasil]

Phaseolus vulgaris. Soil fertility. Mineral deficiencies. N. S. P. K. Brazil.

Soil of the red prairie group, originated from limestone rocks bordering the Pantanal Matogrossense, was collected in savanna and in secondary forest areas near Corumbá, (Mato Grosso do Sul, Brazil). Glasshouse fertility tests (using the missing element technique) evidenced marked deficiencies of N, S, and P, and slight K deficiency for beans on both soil samples. (AS)

0289

30607 KOALA, S. 1985. Effects of N and P fertilizers on the growth, nodulation and N2-fixation of fababean (Vicia faba L.), green pea (Pisum sativum L.) and dry bean (Phaseolus vulgaris L.). Ph.D. Thesis. Bozeman, Montana State University. 209p. En., Sum. En., 145 Ref., Il.

Phaseolus vulgaris. Fertilizers. N. P. Growth. Nodulation. Nitrogen fixation. Yields. USA.

The relative effectiveness of different sources of P fertilizers, levels, and methods of application on dry beans and fababean was evaluated as well as and also the effects of N and P fertilizers and their interaction on nodulation, N2-fixation, and growth of fababean, dry bean, and green pea grown in the field. Main plots were 0 and 100 kg N/ha. Subplots were: control, no P and 2 P sources (orthophosphoric acid as liquid P fertilizer and triple superphosphate). In 1981, the orthophosphoric acid was replaced by monoammonium phosphate. In 1982, 1983, and 1984, factorials in randomized complete block designs with 4 replications were used with varying levels of N and P fertilizers. There were differential responses of fababean and dry bean grain yields to P sources and methods of application. In dry bean, nodulation and N2-fixation reached a max. during pod set and declined rapidly during the final weeks of growth. Application of 100 kg N/ha reduced nitrogenase activity by 75, 72, 82, and 75 percent in dry bean at the 4 harvests but only 47, 60, 62, and 57 percent in fababean. Excellent positive linear correlations between acetylene reduction rates and nodule no. and mass were found with both fababean and dry bean in 1980. Increasing P supply increased nodule no. and nodule dry wt. but these increases paralleled increases in shoot and root dry wt. and suggested that increasing P supply increases nodulation and N2-fixation in the 3 different species of host plants. A model is proposed to explain the inhibitory effects of ammonia on nitrogenase activity. It suggests that ammonia acts as an uncoupler or ion ionophore and dissipates the electrochemical proton gradient created by the bacteriod respiratory chain. More importantly, the destruction of the membrane potential suppresses the low potential electrons that might be necessary in reduction reactions within the bacteroids. (AS)

0290

29996 MASAYA, P.N. 1978. Genetic and environmental control of flowering in Phaseolus vulgaris L., Ph.D. Thesis. Ithaca, New York, Cornell University. 171p. En., Sum. En., 66 Ref., Il.

Phaseolus vulgaris. Photoperiod. Temperature. Genotypes. Cultivars. Flowering. Adaptation. Yields. Branching. CIAT-1. USA.

The effects of daylength and mean daily temp. were studied in 26 Phaseolus vulgaris genotypes adapted to tropical conditions and that had been previously selected for day-neutral (DN) character at CIAT under field

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conditions and artificial lengthening of daylength to 18 h. Long days and high temp. hastened flowering for the 26 genotypes indicating that the screening in field conditions was effective. When the 26 cv. were observed under an 11 degrees Celsius night-day temp. differential and compared with a 7 degrees Celsius night-day temp. differential, 6 cv. (P-729-A, P-561-A, P-320-C, P-013-C, P-185-A, and P-012-A) were delayed in flowering indicating that they were sensitive to a wide night-day temp. differential. P-013-C and P-729-A, together with Redkloud, Redkote, Linea-17, P-737-A, and P-302-A, were grown under a 21/26 degrees Celsius central regime and under a 5 degrees Celsius cooler night regime and a 5 degrees Celsius warmer day regime. All 3 regimes were given under an 18-h daylength. The no. of days to flowering, production of nodes and of pods, total wt., and seed wt. were recorded. Lowering the night temp. by 5 degrees Celsius increased the no. of nodes in branches in Redkloud, Redkote, Linea-17, P-729-A, and P-013-C. P-013-C was the most responsive with a 39 percent increase. The 5 degrees Celsius cooler night also increased the production of pods in Linea-17, P-302-A, P-729-A, and P-013-C. P-729-A was the most responsive with a 60 percent increase. The 5 degrees Celsius cooler night also increased total wt. in Linea-17 and in P-013-C. Increasing the day temp. by 5 degrees Celsius delayed flowering of short-day cv., increased the development of nodes on branches, but reduced the no. of pods/plant for all cv., except Redkloud. Seed yield was substantially reduced in all cv. It was concluded that daylength and temp. variations can have similar and independent effects on the development of flowers, pods, and branches. (AS (extract))

0291

30732 OHU, J.O.; RAGHAVAN, G.S.V.; MCKYES, E.; STEWART, K.A.; FANDUS, M.A. 1985. The effects of soil compaction and organic matter on the growth of bush beans. Transactions of the American Society of Agricultural Engineers 28(4):1056-1061. En., Sum. En., 19 Ref., Il.

Phaseolus vulgaris. Soil compaction. Soils. Yields. Dry matter. Roots. Leaf area. Canada.

In Canada, bush beans were planted in 3 soil textures (Ste. Rosalie clay, Chicot sandy loam, and Chateauguay clay loam) having varying OM contents that were subjected to 3 levels of compaction energy. Measurements were made of some plant and yield parameters in a controlled environment. Soil compaction decreased fresh yields of the crop, plant height, and root DM, and increased the plant diameter. On the other hand, OM incorporation, which tends to reduce compaction, increased fresh and dry yields of the crop, plant height, LAI, and root DM. Results indicate that there is a great potential for using OM to alleviate the problems of soil compaction in crop production. (AS)

0292

30614 PETERSEN JUNIOR, A.C. 1985. Effects of water stress on Phaseolus vulgaris L. and P. acutifolius A. Gray var. latifolius Freeman. Ph.D. Thesis. Minneapolis, University of Minnesota. 231p. En., Sum. En., 527 Ref., Il.

Phaseolus vulgaris. Phaseolus acutifolius. Water stress. Growth. Leaf area. Stomata. Transpiration. Irrigation. Yield components. USA.

Field and greenhouse expt. were conducted to investigate (1) the growth response of Phaseolus vulgaris and drought-resistant P. acutifolius to water stress, and (2) some of the morphological and physiological mechanisms that reduce drought injury. Generally, vegetative growth of water-stressed plants was less than that of well-watered controls; however, P. vulgaris was more affected. In both species, water stress reduced the

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total leaf area, shoot dry wt., mean area/leaf, no. of leaves/plant, RGR, relative leaf area expansion rate (Ra), relative leaf growth rate (RL), relative stem growth rate (Rs), and NAR, but had little effect on leaf area ratio (LAR). Water-stressed P. acutifolius maintained a higher rate of DM production, and its greater productivity was reflected in its greater NAR. In both field and greenhouse, leaf water potential of both species decreased as soil moisture decreased, but values were lower in P. vulgaris. More importantly, the nonirrigated P. acutifolius maintained a higher leaf water potential, and recovered more rapidly in the early evening, with values increasing from -11.0 bars at 1200 h to -7.0 bars at 1900 h CDT; on the other hand, the change in P. vulgaris approximated 1 bar. At -12.0 to -13.0 bars, wilting occurred in P. acutifolius. This species may avoid drought by maintaining a relatively high leaf water potential through partial stomatal closure and/or reduction in transpiration rate. Water stress reduced seed yield of field-grown P. vulgaris 24 and 47 percent in 1979 and 1982, resp. Corresponding seed yields of nonirrigated P. acutifolius were an increase of 50 percent and a decrease of 20 percent. Water stress generally had little influence on HI in P. vulgaris. The yield component most affected in nonirrigated P. vulgaris was pod no./plant, followed by mean seed wt. Least affected was seeds/pod. Seed yield of greenhouse-grown P. vulgaris was particularly sensitive to water stress, especially during anthesis, while P. acutifolius was less sensitive. (AS (extract)-CIAT)

0293

30758 PINTO, J.M.; FERREIRA, P.A.; BERNARDO, S.; CAIXETA, T.J.; CONDE, A.R.; MONTEIRO, M.A.R. 1986. Efeito de diferentes regimes hídricos no solo sobre a producao e componentes da producao do feijoeiro (Phaseolus vulgaris L.). (Effect of different soil moisture regimes on the yield and yield components of bean). Revista Ceres 33(189):380-394. Pt., Sum. Pt., En., 9 Ref., Il. [CPATSA, Caixa Postal 23, 56.300 Petrolina-PE, Brasil]

Phaseolus vulgaris. Irrigation. Water requirements. Yields. Yield components. Brazil.

A set of columns was used to determine the consumptive use of water and to measure the yield and yield components of Phaseolus vulgaris, under protected conditions using a transparent plastic cover. The columns were filled with mineral soil from the Brazilian lowlands and water tables were kept at depths of 25, 40, 55, and 80 cm in relation to the soil surface during the entire crop cycle. Surface irrigation was applied when the soil MC reached 50 percent of the water available to 1/3 of the depth of the water table. Greater water consumption was observed in the treatments with surface irrigation and in subsurface irrigated treatments when the water table was maintained closer to the soil surface. The different treatments influenced the depth and distribution of the root system. The use of subsurface irrigation, with a stable water table as the only source of water for the root zone, resulted in low seed production compared with other treatments using surface irrigation. (AS)

0294

31026 PRIMAVESI, O.; MELLO, F.A.F. DE; MURAOKA, T. 1985. Concentracao e acúmulo de alumínio e micronutrientes por feijoeiro (Phaseolus vulgaris L.), em dois solos submetidos a compactacao. (Concentration and accumulation of aluminum and micronutrients by common bean in two soils subjected to compaction). Anais da Escola Superior de Agricultura Luiz de Queiroz 42(2):303-325. Pt., Sum. Pt., En., 12 Ref., Il.

Phaseolus vulgaris. Soil compaction. Nutrient uptake. Al. Fertilizers. P. Ca. Mg. K. Mineral content. Roots. Shoots. Zn. B. Cu. Fe. Mn. Canopy. Brazil.

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The influence of soil compaction on the concn. and accumulation of Al and micronutrients was studied in 2 bean cv. grown on an Oxisol and an Alfisol, with and without fertilization, in 3.8-liter pots. At the end of the growth cycle, Al concn. and accumulation decreased in fertilized pots and increased in nonfertilized pots. Decreased root Al accumulation occurred in both fertilized and nonfertilized soils. With increasing compaction, Cu tended to increase in the shoots and Zn, B, Fe, and Mn showed a specific behavior depending on soil type, level of fertility, and cv. At the end of the growth cycle, Fe and B accumulation in the aerial parts tended to increase and that of Zn decreased in the Oxisol whereas Mn, Zn, and B accumulation tended to decrease in the Alfisol. In the roots the accumulation of all micronutrients decreased. (AS)

0295

31028 PRIMAVESI, O.; MELLO, F.A.F. DE; MURAOKA, T. 1985. Eficiencia nutricional de feijoeiro (Phaseolus vulgaris L.) em Oxisol e Alfisol, em funcao dos niveis de compactacao dos solos. (Nutritional efficiency of common bean on an Oxisol and an Alfisol as related to soil compaction). Anais da Escola Superior de Agricultura Luiz de Queiroz 42(1):289-301. Pt., Sum. Pt., En., 7 Ref.

Phaseolus vulgaris. Cultivars. Soil compaction. Fertilizers. Canopy. Nutrient uptake. Mineral content. K. N. P. Mg. Ca. Cu. Fe. Zn. B. Mn. Brazil.

Two common bean cv. (Rico Pardo 896 and Aroana 80) were grown in 3.8-liter pots with Oxisol and Alfisol soils, fertilized and nonfertilized, and subjected to 3 compaction levels. Data showed that with increasing soil compaction the nutritional efficiency of K increased at the end of the growth cycle in aerial parts and that of N, P, Mg, Ca, Cu, and Fe decreased. Soil type, level of fertility, and bean cv. affected Zn, B, and Mn the most. (AS)

0296

31027 PRIMAVESI, O.; MELLO, F.A.F. DE; MURAOKA, T. 1985. Producao de matéria seca, concentracao e acúmulo de macronutrientes por feijoeiro (Phaseolus vulgaris L.), em dois solos sujeitos a compactacao. (Dry matter production and macronutrients concentration and accumulation by common bean grown in two soils subjected to compaction). Anais da Escola Superior de Agricultura Luiz de Queiroz 42(2):327-362. Pt., Sum. Pt., En., 32 Ref., Il.

Phaseolus vulgaris. Cultivars. Soil compaction. Fertilizers. Dry matter. Nutrient uptake. Mineral content. Canopy. Mg. Ca. N. K. Roots. Brazil.

Two bean cv. were grown in pots (3.8 liters) with fertilized and nonfertilized soil samples of the A horizon from an Oxisol and an Alfisol under greenhouse conditions. Soil samples were subjected to compaction and maintained with a soil water tension between 100-300 mbars. Beans were harvested at flowering and at 67 days after emergence (maturity). A differential variation in DM production due to the genotype, growth stage, level of fertility, and soil compaction levels was verified. In general, at the end of the growth stage accumulation was related to soil macroporosity. There seems to be an ideal zone for max. accumulation, below and above of which there is a tendency to decrease. The greatest influence of compaction occurred in the fertilized pots. Mg concn. tended to increase (up to 26.3 percent) in aerial parts as well as Ca and N, whereas K decreased. In the roots Mg and K concn. tended to increase, and N concn. decreased. At the end of the growth cycle, in the Oxisol the accumulation of Mg tended to increase and that of K and N to decrease in aerial parts; in the roots, Ca,

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P, and N decreased. In the Alfisol accumulation of Mg and N and that of K decreased in the aerial parts; Ca and K decreased in the roots. (AS)

0297

31044 RAMALHO, M.A.P.; SANTOS, J.B. DOS; REIS, W.P. 1986. Comportamento de cultivares de feijao (Phaseolus vulgaris L.) em dois níveis de saturacao de aluminio em solo de cerrado. (Performance of bean cultivars at two levels of aluminum saturation in Cerrado soil). Ciencia e Prática 10(1):41-50. Pt. , Sum. Pt., En., 19 Ref., Il. [Escola Superior de Agricultura de Lavras, Depto. de Biologia, Lavras-MG, Brasil]

Phaseolus vulgaris. Cultivars. Al. Resistance. Yields. Rainfall. Brazil.

Thirteen bean cv. were evaluated in a Cerrado soil in Sete Lagoas (Minas Gerais, Brazil) during 3 yr (1982-84). Two randomized complete block expt. differing in Al(+++) saturation levels (25.2 and 9.8 percent) were used every year. Cv. Carioca 1030, Mulatinho 46, and IPA 7419 were the most tolerant to Al(+++) saturation, and ESAL 66 and Rico 23 the most sensitive. The effect of Al(+++) saturation levels was smaller in years with regular rainfall distribution. It was not possible to discriminate cv. in relation to stability and adaptability of grain yield in the environments studied. (AS)

0298

30773 SILVEIRA, A.P.D. DA; CARDOSO, E.J.B.N. 1987. Efeito do fósforo e da micorriza vesículo-arbuscular na simbiose Rhizobium-feijoeiro. (Effect of phosphorus and vesicular-arbuscular mycorrhizae on Phaseolus vulgaris-Rhizobium symbiosis). Revista Brasileira de Ciencia do Solo 11(1):31-36. Pt., Sum. Pt., En., 41 Ref., Il. [Depto. de Solos, Geologia e Fertilizantes, ESALQ, Caixa Postal 9, 13.400 Piracicaba-SP, Brasil]

Phaseolus vulgaris. Fertilizers. P. Rhizobium phaseoli. Mycorrhizae. Dry matter. Seed production. Shoots. Mineral content. N. P. Nodulation. Symbiosis. Brazil.

A greenhouse expt. was conducted to determine the effects of soil and mycorrhizas on the Rhizobium-Phaseolus vulgaris symbiosis. Sterilized sandy quartz soil and 3 P levels (0, 11, and 22 ppm) were used. Bean cv. Carioca was inoculated with Rhizobium phaseoli and cultivated in the presence or absence of Glomus macrocarpum. Plants were harvested at 30, 50, and 70 days after sowing. The bean-Rhizobium symbiosis benefitted from the inoculation of G. macrocarpum at all P levels, showing increases in DM wt. and seed production, shoot N and P concn., and nodulation. Mycotrophic response was greater in the treatments without added P. (AS)

0299

30750 SILVEIRA, A.P.D. DA; CARDOSO, E.J.B.N. 1987. Influencia do tipo de solo e do fungo micorrízico vesículo-arbuscular no desenvolvimento de tres cultivares de feijao. (Influence of soil type and vesicular-arbuscular mycorrhizal fungi on the development of three bean cultivars). Revista Brasileira de Ciencia do Solo 11(1):37-43. Pt., Sum. Pt., En., 33 Ref. [Dept. de Solos, Geologia e Fertilizantes, ESALQ, Caixa Postal 9, 13.400 Piracicaba-SP, Brasil]

Phaseolus vulgaris. Mycorrhizae. Cultivars. Soils. Rhizobium phaseoli. Inoculation. Dry matter. Yields. Mineral content. P. K. Canopy. Symbiosis. Brazil.

A greenhouse expt. was conducted to evaluate the efficiency of 4 different vesicular-arbuscular mycorrhizal fungi (Glomus macrocarpum and G. leptotichum, Gigaspora margarita and G. heterogama) inoculated in 3 bean

cv. (Carioca, Goiano-Precoce, and Negro Argel) grown on 3 sterilized soils (sandy quartz, Terra Roxa Estruturada, and dark red Latosol). A control treatment without vesicular-arbuscular mycorrhizal fungi was included. Plants were inoculated with Rhizobium phaseoli. G. leptotichum was the most efficient endophyte on the 3 soil types, generally promoting higher plant DM wt. and grain yields, as well as higher total P and K contents in the aerial parts. G. leptotichum also enhanced Rhizobium-bean symbiosis, resulting in higher nodule dry wt. and higher plant N contents. G. macrocarpum and G. margarita had an intermediate efficiency, with G. heterogama being the least efficient. (AS)

0300

31014 WOUTERS, J.F.R.; WAKANA, M.; OPDECAMP, L. 1986. Sensibilité du haricot Phaseolus vulgaris a la concentration en aluminium des sols de la région des Grands Lacs. (Sensitivity of bean to soil aluminum concentrations in the Great Lakes region). Tropicultura 4(1):20-26. Fr., Sum. Fr., En., 6 Ref., Il. [Dept. de Fertilisation et Phytotechnie, Faculté des Sciences Agronomiques, Université du Burundi, B.P. 2940 Bujumbura, Burundi]

Phaseolus vulgaris. Al. Nutrient solution. Biomass production. Nodulation. Rhizobium. Toxicity. Growth. Burundi. Zaire. Rwanda.

The response of bean cv. Diacol Calima, a widely grown cv. in Burundi, to soil Al concn. was studied in pot trials using (1) superficial soil samples of humiferous high alt. kaolisols with m index of Kamprath between 4-92; (2) culture medium consisting of an inert substrate complemented with a nutritive solution to which a series of soluble Al concn. (0-12 meq Al(3+)/liter) were added. With treatment 1, biomass production after 25 days of growth decreased as of an m value of 33. The no. of Rhizobium nodules also decreased drastically with Al toxicity, becoming negligible at an m value of 33. With treatment 2, increasing Al concn. affected growth adversely, although root growth inhibition was less pronounced than with treatment 1. (AS) See also 0249 0256 0264 0301 0307 0310 0320 0392 0407 0408 0413

D02 Cultivation Practices: Planting, Weed Control and Harvesting

0301

31008 ABIYO, F. 1987. Effect of vegetative cover, tillage and planting system on run-off, soil erosion and other soil physical properties. Agricultural Mechanization in Asia, Africa and Latin America 18(2):23-28. En., Sum. En., 38 Ref., Il. [Inst. of Agric. Research, Addis Ababa, Ethiopia]

Phaseolus vulgaris. Cover crops. Tillage. Planting. Soil conservation. Soil moisture. Drainage. Ethiopia.

The effects of vegetative cover, tillage, and planting systems on run-off, soil erosion and moisture conservation, bulk density, OM content, and moisture infiltration rates were assessed in an expt. conducted on a sandy soil with a uniform 10-11 percent slope in Melkassa, a semiarid region in Ethiopia, during 1981-82. Treatments were natural grass cover, bare fallow, and haricot bean (Phaseolus vulgaris) broadcasted or ridge planted across the slope. The quantity of run-off from each test plot was collected by a cylindrical tank with 5 slot divisors attached to it. Among all treatments, the grass cover was most effective in controlling soil erosion when about 85 percent of the plots had been covered with the grass.

57

Ridge planting of beans helped conserve soil water on steep slope; broadcasting is not recommended on this slope, regardless of soil type. (AS)

0302

30710 APPAIAH, K.M.; SREENIVASA, M.A.; KAPUR, O.P. 1985. Colorimetric determination of propoxur residues in vegetables and water. Bulletin of Environmental Contamination and Toxicology 35(3):296-300. En., 17 Ref. [Analytical Quality Control Laboratory, Central Food Technological Research Inst., Mysore-570 013, India]

Phaseolus vulgaris. Herbicides. Analysis. Composition. India.

A colorimetric method for detecting propoxur (a nonsystemic insecticide) residues in vegetables (among them beans) and water is described. Recoveries ranged from 95.1 to 98.0 percent for water samples, and from 96.7 to 97.8 percent for bean samples. The proposed method is lightly superior to the 4,4-diaminodiphenyl sulphone method, as the percent recovery is higher than the latter method (89.5-95.0 percent for beans). The advantages of the method described over other colorimetric methods are mentioned. (CIAT)

0303

30624 BLANCO R.F.A. 1981. Evaluación de ocho mezclas de herbicidas en el control de malezas y el rendimiento de cuatro cultivares de frijol (Phaseolus vulgaris L.). (Evaluation of eight herbicide mixtures regarding weed control and yield of four bean cultivars). Tesis Ing.Agr. San José, Universidad de Costa Rica. 63p. Es., Sum. Es., 52 Ref.

Phaseolus vulgaris. Herbicides. Cultivars. Weeding. Costa Rica.

At the Fabio Baudrit Agricultural Expt. Station of the U. of Costa Rica, an expt. was carried out in a sandy loam soil between mid-dry season and the beginning of the rainy season of 1980. The efficiency of 8 preemergent herbicide mixtures in 4 bean var. (Mex-80-R, Rojo de Seda, Talamanca, and ICA-Pijao) was evaluated. The best control of broad-leaved weeds and grasses was found with dinoseb + pendimethalin applied at 2.00 + 1.00 kg/ha. (AS (extract)-CIAT)

0304

29975 CALIL, A.C.P.; CHANDLER, L.; NOGUEIRA, S.B.; CASALI, V.W.D.; GALVAO, J.D. 1986. Tabela de vida das culturas para o feijoeiro (Phaseolus vulgaris L.), com enfase nas pragas e seus danos, em tres plantios no periodo da seca. (The crop life table for beans, with emphasis on pests and their damage, during three dry season plantings). Revista Ceres 33(187):249-273. Pt., Sum. Pt., En., 26 Ref., Il. [Depto. de Fitotecnia da Univ. Federal de Vicosa, 36.570 Vicosa-MG, Brasil]

Phaseolus vulgaris. Planting. Conotrachelus phaseoli. Coccotrypes. Spodoptera frugiperda. Lagria villosa. Megalotomus parvus. Acanthoscelides obtectus. Crop losses. Yields. Brazil.

Three dry season plantings of beans were made at approx. 3-wk. intervals (Feb. 6 and 28; March 20, 1981) in Vicosa (Minas Gerais, Brazil) to observe insect pest occurrence and evaluate their importance. Plant mortality for the 3 plantings was 82.9, 41.0, and 16.3 percent, resp., with the resp. insect-caused mortality being 47.2, 19.9, and 7.9 percent. The highest single pest-caused mortality (36.4 percent) occurred in the Feb. 6 planting, which suffered a heavy attack by Conotrachelus phaseoli. Each of the 3 plantings sustained rather uniform losses caused by adults of Coccotrypes sp., larvae of Spodoptera frugiperda and of Lagria villosa, and

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use of seed damaged by feeding by Megalotomus parvus. In-pod seed losses were especially high in the Feb. 28 and March 20 plantings (40.8 and 37.8 percent, resp.). These were caused by larvae of Theclo jebus, Chalcodermus angulicollis, and fungi associated with these attacks. In both Feb. plantings Acanthoscelides obtectus infested 2 and 3 percent of the seeds, resp. Pest-caused stand losses and in-pod seed losses, combined with cold, dry weather conditions unfavorable for bean growth and development, resulted in extremely low yields of 8, 154, and 52 kg/ha for the 3 plantings, resp. These yields are not, however, atypical for low technology-min. input systems. (AS)

0305

30701 EL-SHARKAWY, A.M.; EL-SHAL, M.A.; ABDEL-RAZEK, A. 1981. Effect of plant population on growth, yield and quality of some bean cultivars (Phaseolus vulgaris L.). 2. Fruit quality. Alexandria Journal of Agricultural Research 29(2):697-707. En., Sum. En., Ar., 6 Ref.

Phaseolus vulgaris. Spacing. Planting. Cultivars. Pods. Pod characters. Protein content. Dry matter. Carbohydrate content. Vitamin content. Egypt.

The effects of spacing between plants (7.5, 15.0, 22.5, and 30.0 cm) and no. of plants/hill (1 or 2 plants/hill) on pod quality of 2 bean cv. (Contender and Giza 3) were studied at the Alexandria U. Farm (Egypt) in the summer and fall seasons of 1976 and 1977. Results indicated that the pods of cv. Contender were heavier and longer than those of Giza 3. Neither pod wt. nor pod length seemed to be affected, in general, by the spacing or the no. of plants/hill. The 2 cv. did not differ in DM or protein contents. Cv. Giza 3 contained higher total soluble solids and ascorbic acid content in the green pods. Neither DM content nor total soluble solids seemed to be constantly affected by the spacing or the no. of plants/hill. This holds true for the protein and ascorbic acid contents. (AS)

0306

30622 MATAMOROS S., G. 1980. Combate de malezas en dos cultivares de frijol (Phaseolus vulgaris L.) en dos suelos de Costa Rica. (Weed control in two bean cultivars on two Costa Rican soils). Tesis Ing.Agr. San José, Universidad de Costa Rica. 78p. Es., Sum. Es., 36 Ref., Il.

Phaseolus vulgaris. Herbicides. Weeding. Toxicity. Cultivars. Yields. Costa Rica.

Three herbicide trials with beans were conducted at the Fabio Baudrit Exptl. Station, U. of Costa Rica. In a preliminary trial, the red-seeded cv. Mex. 80-R was used with 20 herbicide treatments, used alone or in mixtures, compared with an unweeded control. Parameters measured were weed control, toxicity, bean plant wt., and yield. The best herbicides were alachlor, pendimethalin, methabenzthiazuron, dinitramine, acifluorfen, and the mixture of dinoseb + chloramben. The 2nd trial was conducted on a loam soil of the Baudrit series; red-seeded cv. Mex. 80-R and black-seeded cv. Pavamor were used with 10 treatments (8 herbicide mixtures, an unweeded control, and a hand-weeded control). The 3rd trial was a replicate of the 2nd, carried out on a clay soil of the Saenz series. Similar weed control was observed on both soil types, all treatments being superior to the unweeded control up to 40 days. Good yields were obtained in the 2nd trial with statistically significant differences between treatments. The best treatment was that in which the crop was hand-weeded during the entire season, with no significant differences with the other treatments. All 3 herbicide treatments were also statistically similar regarding the control of grasses and broad-leaved weeds. The best yield in the 3rd trial was obtained with dinitramine + alachlor (1.5 + 1.0 kg/ha), with no significant difference with the other treatments. Outstanding treatments were

dinitramine + alachlor for grasses and dinoseb + chloramben for broad-leaved weeds. Cv. x herbicide interactions were observed in the 2nd and 3rd trials, indicating that herbicides performed differently for some variables depending on the bean cv. These interactions had no effect on yields. (AS (extract)-CIAT)

0307

31023 MILLER, D.E. 1987. Effect of subsoiling and irrigation regime on dry bean production in the Pacific Northwest. Soil Science Society of America Journal 51(3):784-787. En., Sum. En., 13 Ref., Il. [USDA-ARS, Prosser, WA 99350, USA]

Phaseolus vulgaris. Soils. Tillage. Irrigation. Rooting. Foliage. Water stress. Yields. USA.

A study was conducted on 2 soils to determine the effect of subsoiling on soil strength, bean root development, and plant reaction to different irrigation regimes. On a rigid uncemented matrix sandy soil, subsoiling reduced soil strength from over 3 to less than 1 MPa, promoted deep rooting, and increased foliage. Without subsoiling, plants frequently suffered water stress between irrigations applied at 4-day intervals. This resulted in bloossom drop and delayed maturity by about 2 wk. The deeper rooting associated with subsoiling reduced water stress and bean plants grew and matured normally. On a loam soil subsoiling also reduced strength to about 1 MPa or less and increased rooting depth and foliage density compared with normal tillage. With the dense foliage, 65-80 percent of the bean plants were infected with Sclerotinia white mold and dry bean yields were low. Because of the Sclerotinia injury, results were inconcluaive. (AS)

0308

30789 PEREZ M., J.A. 1981. Efecto de tres distancias de siembra y tres niveles de fósforo sobre la producción y el contenido nutritivo del frijol (Phaseolus vulgaris L.) de guía para vainicas. (Effect of three planting distances and three levels of phosphorus on climbi snap bean production and nutrient content). Tesis Ing.Agr. San José, Universidad de Costa Rica. 76p. Es., Sum. Es., 41 Ref., Il.

Phaseolus vulgaris. Snap beans. Spacing. Fertilizers. P. Planting. Costs. Income. Yields. Pods. Ash content. Protein content. Fiber content. Fat content. Dry matter. Costa Rica.

The effect of 3 planting distances (10, 20, and 30 cm between plants) and 3 P levels (70, 140, and 210 kg/ha) on yield and composition of the climbing snap bean cv. Blue Lake FMK was evaluated at the Fabio Baudrit Moreno exptl. station (Alajuela, Costa Rica). The cost:benefit ratio of this cv. was also compared to that of bush cv. Extender. The variables studied were pod yield, length, diameter, and chemical composition. A quadratic response to the P rates evaluated was observed for pod yield, length, and diameter. The highest response was observed for a P rate of 210 kg/ha. Planting distance had no significant effect on pod yield. Pod length and diameter showed a positive linear response to increments in planting distances. Neither the planting distance nor the P rate affected the chemical composition of pods. The climbing cv. showed higher net incomes than the bush-type cv. due to its increased pod production, but because of lower production costs and good yields, the bush-type cv. showed higher returns on capital. (AS-CIAT)

0309

30658 RAMIREZ E., Z. 1981. Efecto de tres distancias entre plantas sobre la producción y el contenido nutritivo de tres cultivares de vainica de guía

160

(Phaseolus vulgaris L.). (Effect of three planting distances on yield and nutritional content of three climbing string bean cultivars). Tesis Ing.Agr. San José, Universidad de Costa Rica. 72p. Es., Sum. Es., 37 Ref., Il.

Phaseolus vulgaris. Snap beans. Cultivars. Planting. Spacing. Yields. Yield components. Protein content. Fat content. Fiber content. Ash content. Dry matter. Income. Costs. Costa Rica.

At the Fabio Baudrit Moreno agricultural exptl. station of the U. of Costa Rica, 3 climbing string bean cv. (Blue Lake FMIK, Kentucky Wonder, and Chileno) were evaluated at 3 planting distances (0.05, 0.10, and 0.15 m) to determine their effect on yield and its components (diameter and length), as well as on the nutritional content (protein, fat, crude fiber, N-free extract, ash, and DM). Furthermore, a cost-benefit study was conducted and the borders were used for cultivating the dry grain (as a dual-purpose crop). The use of cv. Blue Lake FMIK, yielding 20,347 kg string beans/ha, is recommended. Cv. Kentucky Wonder and Chileno yielded 15,902 and 10,861 kg/ha, resp., and therefore are not discarded as crops. Max. yield for the 3 cv. was obtained at a distance of 0.15 m between plants. Planting distances had significative effects (P = 0.01) on yield, diameter, and length of the string beans, as well as on protein and N-free extract contents in all treatments. The cv. differed among themselves (P = 0.01) for all the variables studied. Cv. Blue Lake FMIK, Kentucky Wonder, and Chileno yielded, resp., 1629, 1458, and 1004 kg grain/ha. They also showed a great agroecological adaptation. The economic study showed that the production costs/ha for indeterminate cv. were high, yet net incomes were satisfactory due to their high commercial yields. (AS (extract)-CIAT)

0310

30648 SHAH, R.M.; PATHAK, A.R. 1985. New cultivation practices for rabi pulses in Gujarat. Indian Farming 35(2):16-17. En. [Pulses Research Project, Gujarat Agricultural Univ., Sardar Krishinagar, Gujarat, India]

Phaseolus vulgaris. Seed. Seed treatment. Fungicides. Rhizobium. Yields. Cultivation. India.

On the basis of field expt. a package of practices has been evolved for improving the productivity of chickpea and beans in Gujarat State, India. Seed treatment with fungicides and Rhizobium resulted in 27 and 12 percent higher yields, resp. It is recommended to grow beans at a distance of 45-60 cm between rows, using a seed rate of 50-60 kg/ha. A scheme for irrigation and for pest control is presented. (CIAT)

0311

30610 TURCHIN, P.B. 1985. The effect of host-plant dispersion on movement of Mexican bean beetles (Epilachna varivestis). Ph.D. Thesis. Durham, North Carolina, Duke University. 72p. En., Sum. En., 43 Ref., Il.

Phaseolus vulgaris. Planting. Spacing. Epilachna varivestis. USA.

The effect of host plant dispersion on the no. of Mexican bean beetles was determined by examining the beetle's movement behavior. Two aspects of plant dispersion were highlighted: patch area and plant density. The movement of beetles was studied by releasing marked individuals in bean patches varying in area and host plant density. Patches were observed every 2 h following the release. Beetles left small patches at a faster rate than large patches, but the difference was not statistically significant. A stochastic model which translated individual patterns of Mexican bean beetle movement into population patterns of beetle distribution within a patch was developed; the changes of distribution with time were predicted.

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These were very similar to the observed distributions; the predicted proportion of insects remaining in a patch at each census time differed from the observed by less than 10 percent on the av. The model predicts that Mexican bean beetle emigration rate should decrease with patch size, confirming the observed trend. By creating patches varying in density of host plants and monitoring them daily, it was found that denser patches acquired higher no. of Mexican bean beetles/plant than sparse patches and single plants. The distribution of beetles among plants in denser patches was highly clumped, while in sparser patches it was statistically indistinguishable from random. Mexican bean beetles tend to move towards conspecific aggregations, but reducing host plant density (i.e., spacing bean plants farther apart) decreases intrapatch movement. A hypothesis which explains the effect of host plant density on herbivore loads was advanced: in dense patches intrapatch movement provides ample opportunity for Mexican bean beetle aggregations to build up, while in sparse patches, where intrapatch movement is virtually absent, such aggregations are not likely to arise. (AS)

0312

30755 WILSON, H.P.; HINES, T.E. 1987. Snap bean (Phaseolus vulgaris) and common lambsquarters (Chenopodium album) response to acifluorfen. Weed Technology 1(1):18-21. En., Sum. En., 9 Ref.

Phaseolus vulgaris. Snap beans. Herbicides. Weeding. Plant injuries. Yields. USA.

Field studies were conducted near Painter (Virginia, USA) for 3 yr to determine the foliar activity of acifluorfen to control Chenopodium album in snap bean cv. Provider in 1983 and 1985 and cv. Green Crop in 1984. Control of 1- to 7-cm tall C. album varied between 75-100 percent with 0.28 kg a.i. acifluorfen/ha and frequently increased linearly with increases in acifluorfen rates to 0.84 kg/ha. Snap bean injury occurred each year and in 1985 was influenced by acifluorfen rate, stage of snap bean growth, and surfactant. Snap bean yields in 1983 were reduced linearly with increases in acifluorfen rates and in 1985 were reduced more from applications at the 1- to 2-trifoliolate leaf stage than at the 4- to 8-trifoliolate leaf stage. In the greenhouse, reductions in snap bean height from acifluorfen were related to application timing, surfactant, and cv. Fresh wt. reduction of snap beans was highest with the cv. Green Crop but was increased in both cv. by early application and addition of surfactant to the spray mix. (AS) See also 0315 0316 0317 0319 0320 0325

D03 Cultivation Systems: Intercropping, Rotational Crops

0313

30763 ARAUJO, G.A. DE A.; FONTES, L.A.N.; LOPES, M.F.; GALVAO, J.D. 1986. Producao e componentes da producao em sistemas de cultivos associados e exclusivos de milho e feijao. (Yield and yield components of maize and beans in associated and sole cropping systems). Revista Ceres 33(190):469-478. Pt., Sum. Pt., En., 18 Ref. [Empresa de Pesquisa Agropecuária de Minas Gerais, Caixa Postal 216, 36.570 Vicosa-MG, Brasil]

Phaseolus vulgaris. Intercropping. Zea mays. Yields. Yield components. Relay crops. Brazil.

In a field expt. conducted in a Red-Yellow Podzol, terrace phase, in Vicosa (Minas Gerais, Brazil), different maize and bean cropping systems were tested: sole cropping, row intercropping, strip intercropping, and relay intercropping. Beans were planted in rainy and dry periods. Maize grain

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yields in associated cropping systems were smaller than in sole cropping. In the row intercropping system, a high bean plant population (200,000 plants/ha) reduced maize yield. Similarly, there was a reduction of bean yield in associated cropping systems in both planting periods. The reduced bean yields in the row and relay intercropping systems were due to a smaller no. of pods/plant and seeds/pod, whereas in the strip intercropping system, reduced bean yields in the rainy period were due to the smaller no. of plants/ha and seeds/pod. In the dry period, however, reduced bean yields were due to the smaller no. of plants/ha and lesser grain wt./plant. (AS)

0314

30695 AUSTIN, M.N.; MARAIS, J.N. 1987. Methods of presenting intercropping results and preliminary results with Zea mays and Phaseolus vulgaris. South African Journal of Plant and Soil 4(1):1-6. Sum. En., Af., 15 Ref., Il. [Dept. of Agronomy, University of Fort Hare, Alice, Ciskei, South Africa]

Phaseolus vulgaris. Intercropping. Zea mays. Rainfall. South Africa.

Replacement intercropping trials with maize and dry beans were conducted to provide information which could lead to a cropping strategy that would reduce the risk of rainfed crop production in Ciskei, South Africa. Attention is focused on the problem of analyzing intercropping expt. It was concluded that more than 1 method of analysis was necessary. The gross yields obtained as well as the competition effects in terms of the proportion harvested rather than the proportions sown must be examined. Replacement intercropping of maize and beans does not appear to provide a strategy for reducing the risk of rainfed cropping in Ciskei. (AS)

0315

30753 CARDOSO, M.J.; FONTES, L.A.N.; GALVAO, J.D.; SEDIYAMA, C.S.; LOPES, N.F. 1986. Producao de graos e outras características agronômicas de milho e feijao em dois sistemas de associacao. (Yield and agronomic characteristics of maize and beans in two associated cropping systems). Revista Ceres 33(190):506-515. Pt., Sum. Pt., En., 10 Ref., Il. [EMBRAPA/UEPAE de Teresina, Caixa Postal 1, 64.000 Teresina-PI, Brasil]

Phaseolus vulgaris. Intercropping. Zea mays. Spacing. Yields. Yield components. Brazil.

Yield and other characteristics of 2 maize and bean associated cropping systems were studied in a red-yellow dystrophic cambial Podzol, terrace phase, in Vicosa (Minas Gerais, Brazil). One row of beans was planted between 2 of maize (S1) and maize and beans were planted in the same row (S2). Maize hills were spaced at 0.25, 0.50, and 1.00 m. S2 gave higher yields than S1. Av. maize grain wt./plant, bean pod no./plant, and wt. of 100 bean seeds were the characteristics associated with the high yield. When the spacing was increased from 0.25 (1 plant/hill) to 1.00 m (4 plants/hill), bean production was stable and maize production decreased. An increase was observed in the relative distribution of photoassimilates in the reproductive organs of the bean plant. (AS)

0316

30768 DAVIS, J.H.C.; GARCIA, S. 1987. The effects of plant arrangement and density on intercropped beans (Phaseolus vulgaris) and maize. 1. Traits related to dry matter and seed productivity. Field Crops Research 16(2):105-115. En., Sum. En., 9 Ref., Il. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Phaseolus vulgaris. Intercropping. Zea mays. Cultivars. Planting. Spacing. Yields. CIAT-1. Colombia.

Three expt. were conducted at CIAT to compare planting systems of 8 bean cv. grown with maize. Planting in hills significantly reduced lodging of the maize in 2 out of 3 expt. Higher bean density also tended to reduce maize lodging due to an anchoring effect of the climbing stems. Maize yields were reduced by planting in hills in 2 out of 3 expt., but tended to increase slightly with bean density. Bean yield was also reduced by planting in hills but increased with density up to 9 plants/square meter, associated with a reduction in node no./plant, especially on the branches. Bean HI was increased by planting in hills, but reduced by higher bean density. Bean cv. significantly affected maize yield, which was negatively related to bean plant height and node no. The best yielding bean cv., G2525, had a well-developed climbing main stem; it gave 53 percent greater yield than G4017, which had well-developed branches. There were no significant interactions of bean cv. with spacing or density. Increased bean density, either in hills or in rows, had beneficial effects both on bean and maize yields, the latter mainly due to reduced lodging. Reducing the spacing between hills and increasing bean density has potential for increasing the total productivity of this cropping system. (AS)

0317

30728 DAVIS, J.H.C.; ROMAN, A.; GARCIA, S. 1987. The effects of plant arrangement and density on intercropped beans (Phaseolus vulgaris) and maize. 2. Comparison of relay intercropping and simultaneous planting. Field Crops Research 16(2):117-123. En., Sum. En., 7 Ref., Il. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Phaseolus vulgaris. Spacing. Intercropping. Zea mays. Relay crops. Planting. Colletotrichum lindemuthianum. Uromyces phaseoli. Yields. CIAT-1. Colombia.

To compare response to spacing and density in relay intercropped and simultaneously sown Phaseolus vulgaris and maize, 4 expt. were conducted in Medellin, Colombia. Five P. vulgaris cv. were tested in 7 treatment combinations of maize spacings of 0.30 or 0.92 m and P. vulgaris densities of 4.7, 7.1, 9.5, or 11.8 plants/square meter. A single maize cv. was grown at 2 spacings but at constant density. Relay intercropping allowed a 2-fold increase in yield of P. vulgaris compared with associated intercropping (simultaneous sowing) with maize but took longer to achieve. P. vulgaris equivalent yield/day was slightly higher in associated intercropping. Wide spacing (approx. 1 m between hills) is traditionally used by farmers; narrower spacing significantly improved P. vulgaris yield when combined with an improved disease-resistant cv. but did not affect disease incidence. Maize yield was increased at the narrower spacing in relay intercropping and slightly decreased in associated intercropping. Potential benefits of introducing a semiclimbing, disease-resistant P. vulgaris cv. like G7908, together with closer spacing and higher density, were indicated by increases in yield of 57 percent in relay intercropping and 250 percent in associated intercropping. The greater competition seen in associated intercropping could potentially be alleviated through improved spatial arrangement. (AS)

0318

29991 ECHEVERRI L., M.J. 1983. Efecto de la época de siembra del frijol arbustivo en el rendimiento del sistema maíz (Zea mays L.) x frijol (Phaseolus vulgaris L.). (Effect of bush bean planting date on yield in the maize/bean associated cropping system). Tesis Mag.Sc. Bogotá, Universidad Nacional. Instituto Colombiano Agropecuario. 99p. Es., Sum. Es., En., 45 Ref., Il.

164

Phaseolus vulgaris. Intercropping. Zea mays. Planting. Timing. Growth. Yield components. Income. Yields. Colombia.

The effect of 5 different bean planting dates (10-day intervals) on the yields of bush beans (var. ICA Tundama) intercropped with maize was studied in an expt. planted at the Centro Nacional de Investigaciones Agropecuarias in Tibaitata, Colombia. Yield components and maize ear production were not affected by the planting of bush beans at various intervals. There were no significant differences in maize yields when grown alone or intercropped with beans. Vegetative development of beans and no. of pods/plant were reduced with delayed planting in relation to maize planting. No significant differences were detected in the additional yield of beans as a result of planting, but yield was favored by early planting (323.5 kg dry beans/ha). Income-yield on capital for the maize/bean association was larger than for monocropped maize; however, the percentage of the bean share is reduced due mainly to low and unstable yields. These results show that there is an important food production potential when low bean populations are intercropped in normal maize plantings. (AS (extract))

0319

30791 FUENTES D., C.L. 1985. Efecto de tratamientos de control sobre las poblaciones y gremios de arvenses en cultivos de frijol Phaseolus vulgaris L. y maíz Zea mays L., (Effects of control treatments on weed populations and associations in beans and maize). Tesis Mag.Sc. Chapingo, México, Universidad Autónoma de Chapingo. Colegio de Postgraduados. 210p. Es., Sum. Es., 158 Ref., 11.

Phaseolus vulgaris. Intercropping. Rotational crops. Zea mays. Weeding. Herbicides. Mexico.

Changes in weed populations and associations during 2 consecutive cropping cycles (1982 and 1983) of beans, maize, and beans/maize in rotation, under 3 weed control treatments, were studied in Montecillos, Mexico. Treatments were (1) chemical (linuron + alachlor applied to beans and maize in 1982 and linuron + metolachlor applied to beans and atrazine + metolachlor to maize in 1983); (2) manual (hoeing); and (3) an unweeded check. The most abundant weeds in herbicide-treated plots and check plots were Amaranthus hybridus and Chenopodium album; DM of both species at crop harvest represented more than 80 percent of total weed DM. The weed species Eragrostis mexicana spp. mexicana, Eleusine multiflora, and Galinsoga parviflora were the most abundant in the hoeing treatment and represented approx. 60 percent of total DM. Total weed density in 1983 was significantly lower (P less than 0.05) for chemical control on all evaluation dates. Weed density in the bean crop after the 2nd evaluation date ranged between 30-75 percent less than the unplanted check. The highest bean yields in both years were obtained with manual weeding, with a 60 percent reduction in the chemical control treatment and over 90 percent reduction in the unweeded check. Beans (cv. Canario) had a lower ability to compete against weeds than maize. (AS (extract)-CIAT)

0320

24613 INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1951. Legumineuses: Phaseolus vulgaris. (Legumes: Phaseolus vulgaris). In Institut National pour l'Etude Agronomique du Congo Belge. Rapport Annuel 1951. Zaire, Station de Nioka. pp.15-18,31-35. Fr.

Phaseolus vulgaris. Developmental research. Cultivars. Dwarf beans. Zea mays. Intercropping. Fertilizers. Yields. Planting. Congo. Zaire.

The objectives, methodology, and main results and conclusions of comparative trials among bush bean var. are given, as well as the results

and conclusions of organic and mineral fertilization trials of various crops (beans among them); results of trials on beans intercropped with cassava carried out during 1948-50 are also included. From the comparative trials among bush bean var. carried out at Nioka and Pimbo, the cv. Cuarentino H6, Linhagen H35, and Caraotas H7 were outstanding. In beans/cassava intercropping trials, a marked decrease was noted in the tuber yields compared with cassava in monoculture; on the other hand, its association with beans is particularly interesting as it improves the protein content of cassava. Beans-maize-cassava appears to perform the best and it is recommended to plant maize before or simultaneously with beans. Furthermore, in the association beans-Eleusine sp.-cassava, it is recommended to plant the 2 latter species a month after beans are planted. (CIAT)

0321

29989 MALDONADO M. S. I. 1984. Evaluación agronómica del sistema caña de azúcar (Saccharum officinarum L.) asociado con leguminosas de grano, frijol común (Phaseolus vulgaris L.), caupí (Vigna unguiculata Walp.) y soya (Glycine max L.). (Agronomic evaluation of the cropping system sugarcane associated with grain legumes: common beans, cowpea, and soybean). Tesis Ing.Agr. Guatemala, Universidad de San Carlos. 48p. Es., Sum. Es., 26 Ref., Il.

Phaseolus vulgaris. Intercropping. Saccharum officinarum. Yields. Guatemala.

The competitive effect of annual crops (bean var. Suchitan and Tamazulapa, cowpea, and soybean) on sugarcane yield was evaluated at the Bulbuxya Center for Tropical Agriculture of the U. of San Carlos in Guatemala. No significative difference was found among treatments for the variables sugarcane (t/ha) and sugar (lb/t of cane) yields; however, max. yield was obtained when sugarcane was associated with bean var. Tamazulapa, yielding 7 t/ha more than sole cropped sugarcane. Significative differences in grain yield were found among treatments for the annual crops. Yield of bean var. Suchitan grown in association with sugarcane was 60 kg grain/ha greater than its yield in monoculture. Grain crops associated with sugarcane were more efficient in the use of land than monocrops, with the sugarcane/bean var. Suchitan association showing the highest LER (2.20). (AS (extract)-CIAT)

0322

31004 MUÑOZ, E. 1986. Producción de maíz, frijol y calabaza en un sistema hidráulico de chinampa. (Maize, bean, and squash production in a prehispanic irrigation system (Chinampa)). Turrialba 36(3):369-373. Es., Sum. Es., En., 17 Ref., Il. [Inst. Nacional de Investigaciones sobre Recursos Bióticos, INIREB, Xalapa, Veracruz, México]

Phaseolus vulgaris. Intercropping. Zea mays. Cucurbita pepo. Spacing. Yields. Mexico.

The yields of maize, bean var. Xilotepec, and squash, grown singly and in association, were assessed at the Instituto Nacional de Investigaciones sobre Recursos Bioticos in Veracruz, Mexico. Weed growth in each system was also determined. Treatments were 25,000 (5000 of beans and 10,000 each of maize and squash) and 31,250 plants/ha (6250 of bean and 12,500 each of maize and squash), compared with pure crops of beans (12,500 plants/ha), maize, and squash (both with 25,000 plants/ha). The variables analyzed were crop height, biomass, and yield (dry wt. basis for beans and maize; fresh wt. basis for squash) and weed biomass (dry wt. basis). Results showed that the LER, reduced weed growth (per system), and energy allocation for plant

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reproduction (maize and squash) are favorable in associated cropping systems, although total yield/crop was higher in pure crops. (AS (extract)

0323

29739 NADAR, H.M. 1984. Intercropping and intercrop component interaction on under varying rainfall conditions in eastern Kenya. 1. Maize/bean intercrop. East African Agricultural and Forestry Journal 44(Special Issue):166-175. En., Sum. En., 13 Ref., Il. [USAID/Kenya Agricultural Research Inst., Muguga]

Phaseolus vulgaris. Intercropping. Zea mays. Spacing. Rainfall. Planting. Kenya.

To improve the intercrop production, a study was started in the short rains season of 1978/79 in the Machakos area, Katumani, Kenya, to evaluate the performance of both maize and beans in sole crop and intercrop systems with different populations, spatial arrangements, and fertility levels as influenced by the varying rainfall conditions prevalent in the study area. The rate of intracrop competition was much higher than that of intercrop. Increasing the population by intercropping resulted in competition levels 10 percent lower than that caused by higher maize populations. Intercropping in the same row was superior to intercropping in alternate rows. This might be due to better spatial arrangements or to the closeness of the maize and bean plant roots in the same row arrangement, resulting in the maize plants benefitting from the N fixed by the bean plants. This beneficial effect was found to be positively correlated with the proximity to each other of the roots of the 2 intercrop components. LERs of intercrop expt. under adequate rainfall conditions were always more than unity. On the other hand, under drought conditions LER values were lower than unity, probably because of the competition between the intercrop components for the available moisture. Because of the maize/bean price relationship, the intercrop would be more economical than sole crop maize under drought conditions, while sole crop beans would be more economical than either sole crop maize or a maize/bean intercrop. It was also found that within a certain range of population levels, bean plants do not significantly respond to changes in population and can counteract the change by an opposite change in the no. of pods/plant. These results clearly indicate that under unpredictable rainfall conditions, such as prevail in the Machakos area, maize and bean intercropping would not be the best practice. (AS)

0324

30788 ZEPEDA M., J.A. 1984. Diseño de recomendaciones de producción en los patrones anuales de cultivo maíz-maíz y maíz-frijol-maíz, en la parte baja del Distrito de Temporal III, Tuxpan, Veracruz. (Design of production practices for the annual cropping patterns of maize-maize and maize-beans-maize in the lowlands of District Temporal III, Tuxpan, Veracruz). Tesis Mag.Sc. Chapingo, México, Universidad Autónoma de Chapingo. Colegio de Postgraduados. 206p. Es., Sum. Es., 61 Ref., Il.

Phaseolus vulgaris. Rotational crops. Zea mays. Costs. Income. Statistical analysis. Relay crops. Mexico.

Twenty-four expt. were conducted in the lowlands of District Temporal III of Tuxpan (Veracruz, Mexico) to (1) develop the 1st technological approach for the use of modern inputs (residual effects of N and P rates, plant density, soil preparation, weeding, herbicides, and var.) in the annual cropping patterns of maize-maize and maize-beans-maize; and (2) compare productivity in terms of net income + fixed costs and total production for each cropping pattern. A variance analysis of net income + fixed costs was conducted for the annual cropping pattern of maize-beans-maize using

rainfed maize and relay beans. According to this analysis, the graphic-statistical method was applied to determine production equations for these 2 crops; the 3rd maize crop was analyzed separately. The 1st technological approach for there 2 annual cropping patterns was obtained. (AS (extract)-CIAT)

D04 Seed Production

0325

30778 SIDDIQUE, M.A.; SOMERSET, G.; GOODWIN, P.B. 1987. Time of harvest, prethreshing treatment and quality in snap bean (Phaseolus vulgaris) seed crops. Australian Journal of Experimental Agriculture 27(1):179-187. En., Sum. En., 18 Ref., Il. [Dept. of Horticulture, Bangladesh Agricultural Univ. Mymensingh, Bangladesh]

Phaseolus vulgaris. Snap beans. Harvesting. Timing. Threshing. Water content. Seed characters. USA.

Trials with snap bean cv. Canyon and Gallatin 50 in 1978 and Cascade in 1979 were run in north Queensland (Australia) to examine ways of improving seed quality. The trials concentrated on the maturation period, since this is a critical period for the development of seed quality. Seed quality was poor when the crop was cut at the stage when the leaves had fallen and all the pods were dry, or if the plants were cut at any stage and allowed to dry on the ground in single rows. This poor seed quality was associated with high pod temp. during seed maturation. Cutting the crop before leaf fall, at a seed MC close to 50 percent (20-40 percent of pods dry), and windrowing immediately in 5 or 10 rows to 1 windrow gave low pod temp. during seed maturation and high seed quality. Seed harvested and threshed directly off the crop was of good quality provided the seed MC in the crop had fallen to less than 25 percent. (AS)

D05 Varietal Trials

0326

28215 ADAMS, A.W. 1981. Update: new bean archetype. Michigan Dry Bean Digest 5(2):12-13,20. En., Il.

Phaseolus vulgaris. Cultivars. Adaptation. USA.

The navy bean var. development program at Michigan State U. (USA) has been directed toward the taller, narrow profile, more erect plant type, called archetype. The main reasons for such a decision were the expectation of greater yielding potential when grown in narrower rows than usual, the belief that the erect type would be better adapted to narrow rows, the discovery that many of the parental stock seemed to be more tolerant of air pollution and soil compaction than standard navy bean var., and the potential inherent for direct combine harvesting. As seed of promising expt. archetypes became available, field trials were conducted in 1980 to obtain data needed to enable growers to make an easier transition from older bush navy and black to the new archetypes. Although agronomic data confirmed most of the expectations, more field trials on fertility, row widths, herbicides, compaction, and direct harvest are needed. (CIAT)

0327

30606 HARTANA, A. 1986. Components of variability for seed protein of common bean (Phaseolus vulgaris L.). Ph.D. Thesis. Madison, University of Wisconsin-Madison. 118p. En., Sum. En., 90 Ref., Il.

163

Phaseolus vulgaris. Genotypes. Adaptation. Yields. Protein content. Phaseolin. USA.

The effects of genotype x environment interactions on the expression of seed protein and seed yield of common bean were analyzed. The association between bean genotypes and environments was unique to individual locations and years; however, the genotypic variance components were substantially greater than the genotype x year x location variance components for most traits except seed yield. The superior and stable lines for high yield were 2-4-1 and 23-7, and for high percentage protein were 2-4-1 and 2-29. The general combining ability and specific combining ability of lines 2-1, 2-29, 6-8, and 8-4 were determined by analyzing F3 progeny data. General combining ability was more important than specific combining ability for all traits. Six lines having higher percentage protein than both parents were discovered, and all had 8-4 as the common parent. Parent 6-8 had the highest general combining ability for yield and also relatively good general combining ability for percentage protein. Contrary to expectations, progeny lines having simultaneously, high phaseolin and nonphaseolin fractions from 2-1 or 8-4 and low nonprotein from 2-29 or 6-8, resp., were not found. In the Canilac genetic background, phaseolin types from Tendergreen (T), Contender (C), PI 325670 (M1), PI 318696 (M2), and PI 318700 (M5) had enhanced percentage total seed protein. The increased protein fraction was due to more phaseolin and nonphaseolin for T type, and more phaseolin for C type. In Pinto UI 111 genetic background, lectin types from PI 312041 (S12), Bunsi (B), Canilac (S), Viva (V), and Porrillo 70 (P) had a different composition of total seed protein. Lower lectin was compensated for by higher phaseolin. The increased total protein/seed of progenies compared with the resp. donor parent was due not only to more phaseolin and nonphaseolin nonlectin protein, but also to more lectin. (AS)

0328

31005 MULLINS, C.A. 1986. Performance of snap bean cultivars in Tennessee, 1982-1985. Tennessee Farm and Home Science no.139:17-19. En., Sum. En., 10 Ref.

Phaseolus vulgaris. Snap beans. Cultivars. Selection. USA.

Seventeen snap bean cv. were evaluated in Tennessee (USA) trials from 1982 to 1985. New cv. selected as promising for commercial trials were BBL GV66, Win, Peak, FM 103, Early Riser, Earlybird, NemaSnap, and Javelin. (AS)

0329

31029 TYSON, R.V.; BRYAN, H.H.; ELLAL, G. 1985. Bush snap bean cultivars suitable for winter production in South Florida. Proceedings of the Florida State Horticultural Society 98:301-304. En., Sum. En., 9 Ref. [IFAS, Univ. of Florida Dade Country Extension Service, 18710 SW 288 Street, Homestead, FL 33030, USA]

Phaseolus vulgaris. Snap beans. Dwarf beans. Adaptation. Yields. Storage. Pod characters. USA.

Var. trials were conducted over 3 seasons (1982/83 to 1984/85) to evaluate bush snap bean cv. performance during the winter growing season in Dade County (Florida, USA). Although results varied between trials, pod yields from snap bean cv. Strike, Triumph, and Sprite were the most consistently high. Cv. Saver, Picker, and 76-017 maintained quality marketable pod appearance longer than Triumph or Sprite in a postharvest storage test. Snap bean pod removal force, an important factor for machine harvest, was generally less with cv. Triumph and 76-017 compared with other entries. (AS)

164

0330

30720 VAID, K.; SINGH, R.M.; GUPTA, V.P. 1986. Inter-relationship of yield and its component characters in dry beans (Phaseolus vulgaris L.). Crop Improvement 13(2):164-167. En., Sum. En., 8 Ref. [Dept. of Plant Breeding & Genetics, Inst. of Agricultural Sciences, Banaras Hindu University, Varanasi 221 005, India]

Phaseolus vulgaris. Germplasm. Yields. Yield components. Maturation. India.

The analysis of interrelationships among different characters in 100 genetically diverse germplasm of dry beans over 3 environments (India) showed that yield was significantly and positively correlated with days to flowering, days to maturity, plant height, branch no., pods/cluster, pods/plant, and seeds/pod. Path coefficient analysis revealed that pod no. was the most important yield component. Direct effect of 100-grain wt. was also important at both genotypic and phenotypic levels. The only other direct effects worth consideration were no. of seeds/pod and plant height at genotypic levels. Traits like days to flowering, days to maturity, branch no., pods/cluster, and pod length were found to be secondary yield characters, as all of them had their effect via no. of pods at both genotypic and phenotypic levels. These characters therefore could be used as useful criteria in developing high yielding var. in Rajmash bean. (AS)
See also 0320

E00 PLANT PHYSIOLOGY

Véase 0283

E02 Bactericses

0331

28207 ANDERSEN, A.L. 1977. The bacterial blight seed testing program. Michigan Dry Bean Digest 1(2):2-5. En., Il.

Phaseolus vulgaris. Seed. Xanthomonas campestris pv. phaseoli. Laboratory experiments. Analysis. USA.

Background and achievements of the bean bacterial blight seed testing program, developed at Michigan State U., USA, are given. Such a program was devised to detect internal seed infections by means of direct observation, surface testing, surface sterilization, removal of bacteria in the seed, and testing methods. Each one of the above mentioned procedures is explained. The more outstanding results obtained during the 1st and 2nd yr (1969-70 and 1970-71) are discussed, highlighting the success of the program. Finally, indications on how to grow blight-free seed are included as well as costs/sample submitted to the seed testing program. (CIAT)

0332

31018 CLAFLIN, L.E.; VIDAVER, A.K.; SASSER, M. 1987. MXP, a semi-selective medium for Xanthomonas campestris pv. phaseoli. Phytopathology 77(5):730-734. En., Sum. En., 38 Ref., Il.

Phaseolus vulgaris. Xanthomonas campestris pv. phaseoli. Xanthomonas phaseoli var. fuscans. Isolation. Races. Culture media.

A semiselective medium was developed for isolation of Xanthomonas campestris pv. phaseoli and fuscans strains from common blight-infected dry beans and infested soil. All X. campestris pv. phaseoli strains tested grew on the semiselective medium and most X. campestris pathovars tested grew

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equally well. Other phytobacterial pathogens of bean failed to produce colonies on the semiselective medium. For recovery from seed, incubation for 6 h at 28 degrees Celsius in a diluent of 12.5 millimolar PO4 + 10 millimolar MgSO4 + 0.01 percent Tween 20 resulted in the greatest no. of cells of X. campestris pv. phaseoli recovered. Incubating seeds in distilled water resulted in limited or no recovery of X. campestris pv. phaseoli. The semiselective medium consists of (in g/liter): K2HPO4 (0.8), KH2PO4 (0.6), yeast extract (0.7), soluble potato starch (8.0), potassium bromide (10.0), glucose (1.0), and agar (15.0). After autoclaving, chlorothalonil (15 mg/liter), cephalexin (20 mg/liter), kasugamycin (20 mg/liter), gentamycin (2 mg/liter), methyl violet 2B (30 microliters/liter 1 percent solution in 20 percent ethanol), and methyl green (60 microliters/liter; 1 percent aqueous solution) were added before pouring the plates. (AS)

0333

31102 CONTRERAS DE VELASQUEZ, N.; TRUJILLO, G.E. 1984. Evaluación de Xanthomonas campestris pv. phaseoli (Smith) Dye, en lotes de semilla de caraota (Phaseolus vulgaris L.) mediante la técnica combinada del medio semi-selectivo e inmunodifusión en agar. (Evaluation of Xanthomonas campestris pv. phaseoli in bean seed lots by the combined technique of semiselective medium and agar immunodiffusion). Agronomia Tropical 34(4-6):59-67. Es., Sum. Es., En., 16 Ref., Il.

Phaseolus vulgaris. Seeds. Analysis. Xanthomonas campestris pv. phaseoli. Antisera. Venezuela.

A total of 176 bean seed samples of different classes (genetic, basic, registered, certified, and harvested from farms and exptl. areas) were taken in Anzoategui, Apure, Aragua, Carabobo, Guarico, Lara, Monagas, Portuguesa, Sucre, Trujillo, and Yaracuy (Venezuela). The liquid obtained from samples using a semiselective medium was the antigen against antisera of Xanthomona campestris pv. phaseoli, which was produced at titers of 1:640-1:10240 in rabbits by intravenous injections of formalized bacterial cell. Of all the seed samples tested, 53 percent was internally infected by X. campestris pv. phaseoli and was detected in all of the states cited. In Apure, Monagas, Sucre, and Trujillo the bacteria was reported for the 1st time. The percentages of infected seed samples were 31, 63, and 51 percent for certified seeds, farmers' seed, and seed from exptl. areas, resp. (AS)

0334

31009 FETT, W.F.; OSMAN, S.F.; DUNN, M.F. 1987. Auxin production by plant-pathogenic pseudomonads and xanthomonads. Applied and Environmental Microbiology 53(8):1839-1845. En., Sum. En., 45 Ref. [Eastern Regional Research Center Agricultural Research Service, U.S. Dept. of Agriculture, Wyndmoor, PA 19118, USA]

Phaseolus vulgaris. Pseudomonas syringae pv. syringae. Races. Indoleacetic acid.

Pathogenic strains of Xanthomonas cam[illegible] pv. glycines, which cause hypertrophy of leaf cells of susceptible soybean cultivars, and nonpathogenic strains, which do not cause hypertrophy, were compared for their ability to produce indole compounds, including the plant hormone IAA in liquid media with or without supplementation with L-tryptophan. Several additional strains of plant-pathogenic xanthomonads and pseudomonads were also tested for IAA production to determine whether in vitro production of IAA is related to the ability to induce hypertrophic growth of host tissues. Indoles present in culture filtrates were identified by TLC,

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high-performance liquid chromatography, UV spectroscopy. mass spectroscopy, and gas cromatography-mass spectrometry and were quantitated by high-performance liquid chromatography. All strains examined produced IAA when liquid media were supplemented with L-trytophan. The highest levels of IAA were found in culture filtrates from the common bean pathogen Pseudomonas syringae pv. syringae, and this was the only bacterium tested which produced IAA without addition of tryptophan to the medium. Additional indoles identified in culture filtrates of the various strains included indole-3-lactic acid, indole-3-aldehyde, indole-3-acetamide, and N-acetyltryptophan. Pseudomonads and xanthomonads could be distinguished by the presence of N-acetyltryptophan, which was found only in xanthomonad culture filtrates. (AS)

0335

30749 HIRANO, S.S.; HOUSE, P.I.; UPPER, C.D. 1987. Bacterial ice nucleation as a predictor of bacterial brown spot disease on snap beans. Phytopathology 77(7):1078-1084. En., Sum. En., 19 Ref., Il.

Phaseolus vulgaris. Snap beans. Pseudomonas syringae pv. syringae. USA.

Snap bean plants that harbored different population sizes of Pseudomonas syringae pv. syringae were established in field plots in Arlington (Wisconsin, USA) by several combinations of seed and foliage treatments. The tube nucleation test was used to determine ice nucleation temp. of individual bean leaflets within each of the plots at 3- or 4-day intervals throughout each of 2 growing seasons. The frequency with which bean leaflets harbored large population sizes of ice nucleation active P. syringae pv. syringae was estimated by the frequency with which ice nucleation events occurred between -2.0 and -2.5 degrees Celsius. Incidence of brown spot was assessed every 3-4 days on the same sets of field plots. The proportion of leaflets frozen at -2.0 and -2.5 degrees Celsius was significantly correlated (P less than 0.0001) with the incidence of brown spot assessed 3-8 days later. The frequency with which ice nucleation events occur on individual bean leaflets at relatively high temp. appears to be a sufficiently reliable predictor of large pathogen populations and, therefore, of disease. The tube nucleation test shows potential for use in disease management schemes for foliar blights caused by ice nucleation active pv. of P. syringae. (AS)

0336

29960 JAHN, O.; SAUERSTEIN, J.; REUTER, G. 1987. Characterization of two ornithine carbamoyltransferases from Pseudomonas syringae pv. phaseolicola, the producer of phaseolotoxin. Archives of Microbiology 147(2):174-178. En., Sum. En., 27 Ref., Il. [Forschungszentrum fur Bodenfruchtbarkeit der Adl, Muncheberg, Bereich Jena]

Phaseolus vulgaris. Pseudomonas syringae pv. phaseolicola. Enzymes.

Two ornithine carbamoyltransferases (OCT 1 and OCT 2) were isolated from Pseudomonas syringae pv. phaseolicola and purified by precipitation with ammonium sulfate, heat denaturation, chromatography on DEAE-Sephadex A-50 and Sephadex G-200. Mol. wt. of both enzymes were 110,000; optimal activity at pH 8.5 to 9.5 (OCT 1) and pH 8.4 (OCT 2); apparent Km for ornithine, 0.0007 (both enzymes); apparent Km for carbamoylphosphate, 0.0007 (OCT 1) and 0.0028 (OCT 2). Both enzymes possess only an anabolic function. OCT 1 is highly inhibited by low conen. of phaseolotoxin and Orn-P(O)(NH2)-NH-SO3H. OCT 2 is insensitive to both compounds. The inhibition of OCT 1 is reversible. (AS)

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0337

30786 RODRIGUEZ, E.N. 1984. Identification, incidence, transmission and control of seedborne diseases of some Philippine legumes. M.Sc. Thesis. College, Laguna, University of the Philippines at Los Baños. 133p. En., Sum. En., 82 Ref., Il.

Phaseolus vulgaris. Colletotrichum lindemuthianum. Pseudomonas syringae pv. phaseolicola. Bean common mosaic virus. Macrophomina phaseoli. Seed transmission. Disease transmission. Herbicides. Germination. Disease control. Philippines.

Pathogens associated with 5 leguminous crops (mung bean, cowpea, snap bean, soybean, and Vigna sesquipedalis) grown in the Philippines were determined by incubation methods for fungi and bacteria and culture tests for viruses. Ten fungi were detected (Colletotrichum lindemuthianum, Macrophomina phaseoli, Cercospora cruenta, C. kikuchii, Ascochyta phaseolorum, Phomopsis sojae, Fusarium moniliforme, F. oxysporum, Aspergillus spp., and Penicillium spp.) as well as 2 bacteria (Pseudomonas syringae pv. phaseolicola and Xanthomonas phaseoli var. sojensis) and 5 viruses (mungbean mosaic virus, BCMV in snap beans and in V. sesquipedalis, cowpea mottle virus, and soybean mosaic virus). Samples obtained from seed lots with known incidence of field infection when tested in the lab. showed seed infection in various amounts. Seeds from virus-infected plants exhibited seed transmission in culture tests. Seed pathogens that reduced seed germination were C. lindemuthianum, M. phaseoli, F. moniliforme, C. kikuchii, and X. phaseoli. Seed treatment with 4 fungicides (in particular, captan and benomyl) increased germination percentage and decreased the amount of pathogens. (AS (extract))

0338

31042 TRUJILLO P., G.; TRUJILLO, L.V. 1985. Desarrollo de un sistema selectivo para estudios epidemiológicos de la bacteria Xanthomonas campestris pv. phaseoli, causante de la quemazón bacteriana de la caraota. (Design of a selective means for epidemiological studies of the Xanthomonas campestris pv. phaseoli bacteria, causing common blight in beans). Revista de la Facultad de Agronomía (Venezuela) 14(1-2):201-211. Es., Sum. Es., En., 23 Ref. [Depto. de Botánica Agrícola, Facultad de Agronomía, UCV, Maracay, Venezuela]

Phaseolus vulgaris. Xanthomonas campestris pv. phaseoli. Culture media. Races. Venezuela.

Rifampicin- and rifocin-resistant mutants of Xanthomonas campestris pv. phaseoli were selected for their similarity with wild-type isolates and their usefulness as tools in epidemiological studies of bean common blight bacteria. Several mutants isolated from X. campestris pv. phaseoli were similar to wild types in numerous bacteriological and serological tests, grew at identical rates, and were as virulent as the wild types on bean leaves. The indicators of resistance to the antibiotics rifampicin and rifocin allowed selective isolation of these mutants from inoculated bean leaves in the field. The growth of all microorganisms of plant tops was inhibited in the medium, with 50 micrograms rifampicin or 60 micrograms rifocin/ml, supplemented with 20 micrograms cycloheximide/ml in both cases. The indicator of resistance to rifampicin or rifocin was stable when the bacteria were grown in culture media or on beans; no reversion to rifampicin or rifocin sensitivity was detected. The color of the rifampicin medium was more stable than that of the rifocin medium; however, rifocin was cheaper and easier to use than rifampicin. (AS)

0339

29643 ZAPATA, M. 1985. Effect of pure and mixed suspensions of virulent and heterologous isolates of Xanthomonas campestris on the infectivity of the inoculum on two species of Phaseolus. Journal of Agriculture of the University of Puerto Rico 69(2):191-199. En., Sum. En., Es., 22 Ref. [Dept. of Crop Protection, College of Agriculture Sciences, Univ. of Puerto Rico, Mayaguez, Puerto Rico]

Phaseolus vulgaris. Xanthomonas campestris pv. phaseoli. Xanthomonas campestris pv. glycines. Inoculation. Phaseolus coccineus. Isolation. Pathogenicity. Symptomatology. Puerto Rico.

The virulence of Xanthomonas campestris pv. phaseoli (virulent) in mixed suspensions with the closely related heterologous X. campestris pv. glycines (avirulent) was studied on Phaseolus vulgaris and P. coccineus. Differences produced by inoculation with mixed suspensions of X. campestris pv. phaseoli depended on host susceptibility and on the ratio of the pathogen in the suspensions. No synergistic or antagonistic effect was found to be related to the combination of the different pathogenic isolates; however, suspensions of X. campestris pv. phaseoli mixed with heterologous X. campestris pv. glycines showed decreased symptom development on the pods, which did not depend on host susceptibility or on relative proportion of the pathogens in the suspension. Results indicate that in a mixed bacterial suspension of different isolates, the resistant reaction does not always correspond to the more virulent isolate. (AS (extract)) See also 0289

E03 Mycoses

0340

30766 ARAYA, C.M.; DHINGRA, O.D.; KUSHALAPPA, A.C. 1986. Incidencia de antracnose em feijoeiro (Phaseolus vulgaris) sob diferentes pressões de inóculo. (Incidence of anthracnose in bean under different inoculum pressures). Fitopatologia Brasileira 11(4):795-801. Pt., Sum. Pt., En., 21 Ref., Il. [Escuela de Ciencias Agrarias, Univ. Nacional, Apartado 86-3000, Heredia, Costa Rica]

Phaseolus vulgaris. Colletotrichum lindemuthianum. Rainfall. Drought. Seeds. Disease transmission. Seed transmission. Brazil.

The incidence of anthracnose in dry bean cv. Manteigao Fosco-11 was evaluated during the rainy and dry seasons in 2 plots at the U. Federal de Vicosa (Minas Gerais, Brazil) in an attempt to determine the influence of the initial sanitary condition of bean seeds on disease development. The symptoms appearing on the leaves and pods and the percentage of infected seed were recorded following the infection of an established percentage o. seedlings (initial source of inoculum). Treatments were 0, 1.5, 3.0, 4.5, 6.0, and 7.5 percent infection foci. Disease incidence and seed transmission were higher during the rainy season. The no. of infection foci was proportional to pod infection. A significant positive correlation was observed between the percentage of infected pods and the seed transmission of Colletotrichum lindemuthianum; no correlation was observed, however, between the latter and disease incidence of the leaves. (AS)

0341

29956 CHOI, G.H.; RICHEY, M.G.; TURBEK, C.S.M.; SMITH, D.A. 1987. Comparative characteristics of a kievitone hydratase-producing isolate of

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Fusarium solani f.sp. phaseoli and of two strains deficient in this enzyme. Physiological and Molecular Plant Pathology 30(2):215-224. En., Sum. En., 26 Ref., Il. [Plant Pathology Dept., Univ. of Kentucky, Lexington, KY 40546-0091, USA]

Phaseolus vulgaris. Fusarium solani phaseoli. Isolation. Enzymes. Phytoalexins. Analysis. USA.

Fusarium solani sp. phaseoli, isolate FBI-S, is a wild-type virulent pathogen of Phaseolus vulgaris and a good source of kievitone hydratase (KHase), which catalyses detoxification of the isoflavonoid phytoalexin, kievitone. Two strains derived from the wild-type, one an induced mutant (FBI-S4) and the other a colony variant (FBI-SX), produced little or no detectable KHase and were more sensitive to kievitone than the original isolate. The strains were also more vulnerable to phaseollin and phaseollinisoflavan treatments than FBI-S. In addition, FBI-S4 and FBI-SX were also deficient in their abilities to convert these 2 isoflavonoid phytoalexins to the known products, 1a-hydroxyphaseollone and metabolite-1. Several differences were apparent in the extracellular protein-banding patterns, revealed by polyacrylamide gel electrophoresis, of acetone precipitates from the 3 fungi. Although FBI-S4 and FBI-SX were more sensitive to kievitone, phaseollin, and phaseollinisoflavan than the wild-type, they were less susceptible to osmotic stress. The several differences between FBI-S, FBI-S4, and FBI-SX, in addition to KHase activity, rendered the association between KHase and virulence in F. solani sp. phaseoli less certain. (AS)

0342

31055 CORREA V., F.J.; SAETTLER, A.W. 1987. Angular leaf spot of red kidney beans in Michigan. Plant Disease 71(10):915-918. En., Sum. En., 12 Ref. [Dept. of Botany & Plant Pathology, Michigan State Univ., East Lansing, MI 48824-1312, USA]

Phaseolus vulgaris. Cultivars. Resistance. Isariopsis griseola. Disease control. Cultural control. USA.

Numerous outbreaks of angular leaf spot were noted in Michigan (USA) fields of red kidney beans in 1982 and 1983. Var. tests revealed that navy, tropical black, and pinto beans were resistant, whereas red kidney and cranberry beans were susceptible. In some cases, foliage and pod reactions differed within the same cv. The pathogen survived at least 2 winters under Michigan conditions, both in buried tissue and in infected standing plants. Strategies for control of angular leaf spot in Michigan should include crop rotation and incorporation of disease resistance into commercial red kidney bean cv. (AS)

0343

29994 CORREA V., F.J. 1987. Pathogenic variation, production of toxic metabolites, and isoenzyme analysis in Phaeoisariopsis griseola (Sacc.)Ferr. Ph.D. Thesis. East Lansing, Michigan State University. 164p. En., Sum. En., 56 Ref., Il.

Phaseolus vulgaris. Isariopsis griseola. Isolation. Pathogenicity. Cultivars. Resistance. Enzymes. Analysis. Latin America. Africa.

Seventeen Latin American Isariopsis griseola isolates were studied for virulence characteristics on a group of 21 bean cv. Large differences in virulence were found among isolates for disease severity, lesion size and no., sporulation capacity, and no. of days required to cause a given level of disease. No cv. was resistant to all isolates of the pathogen; however, regression analyses indicated that several cv. such as A 339 and BAT 1647

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show presence of several components of nonspecific resistance. Forty-two isolates of the pathogen obtained from Latin America and Africa were separated into 14 pathogenicity groups on the basis of their reactions on 8 differential bean cv. Studies were conducted on production of toxic metabolites in vitro by 2 I. grisecola isolates representing the most pathogenic (Colombia 1) and the least pathogenic (Michigan 5) groups. Results indicate that isolate Colombia 1 produces several toxic compounds which differ in host-specificity on the bean cv. Montcalm and BAT 1647. Isolate Michigan 5 produced toxic metabolites with a degree of specificity towards the susceptible cv. Montcalm. A 10-fold difference in the concn. of toxin required to induce the same symptoms on the resistant cv. BAT 1647, with respect to susceptible Montcalm, was found. Further studies are needed to elucidate the role of these toxic compounds in the angular leaf spot disease. Isoenzyme variation among 55 I. grisecola isolates from Latin America, Africa, and USA was studied. Two isoenzyme patterns were found for each of the 4 enzymes (esterase, catalase, leucine aminopeptidase, and adenylate kinase). All African isolates exhibited pattern 1 for each enzyme while Latin American isolates exhibited both patterns 1 and 2. Pattern 1 of each enzyme was associated with large-seeded bean types, suggesting coevolution with this bean type in the Andean zone of South America. Pattern 2 was associated with small-seeded bean types suggesting coevolution with this bean type in Central and North America. (AS)

0344

30767 FERNANDEZ, M.R.; HEATH, M.C. 1986. Cytological responses induced by five phytopathogenic fungi in a nonhost plant, Phaseolus vulgaris. Canadian Journal of Botany 64(3):648-657. En., Sum. En., Fr., 47 Ref., Il. [Botany Dept., Univ. of Toronto, Toronto, Ont., Canada M5S 1A1]

Phaseolus vulgaris. Snap beans. Mycoses. Cytology. Canada.

Responses of the French bean plant cv. Pinto to the nonpathogenic fungi Helminthosporium maydis, Stemphylium sarcinaeforme, S. botryosum, Cladosporium fulvum, and Uromyces vignae were examined by cytological and histochemical techniques. All fungi penetrated bean leaves through stomata, and elicited similar modifications in guard and mesophyll cells. Responses involving cell contents were collapse, browning, autofluorescence, and a toluidine blue reaction indicative of the presence of phenolic compounds. Responses associated with cell walls were yellowing, autofluorescence, staining for phenolic compounds, and deposition of callose and of noncallosic, refractive material. In some of the interactions, decolorization and clearing of the tissue for light microscopy induced changes in the frequencies of autofluorescence of cell contents and walls when compared with those observed in fresh tissue. Despite the general similarity of responses elicited by each fungus, striking variations were found among fungi in the percentage of infection sites showing a particular response. For some responses, this variation seemed to be related to the type of interaction each of the fungi has with its susceptible host. It is suggested that even in nonhost plants, the nature and activities of the fungus determine the frequency and extent of the plant's responses. Also, it seems unlikely that all of these responses are involved in the cessation of fungal growth. (AS)

0345

30704 FERRANDINO, F.J.; AYLOR, D.E. 1987. Relative abundance and deposition gradients of clusters of urediniospores of Uromyces phaseoli. Phytopathology 77(1):107-111. En., Sum. En., 15 Ref., Il. [Dept. of Plant Pathology & Ecology, The Connecticut Agricultural Experiment Station, P.O. Box 1106, New Haven, CT 06504, USA]

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Phaseolus vulgaris. Snap beans. Uromyces phaseoli. Inoculation.

Singlets and clusters of urediniospores of Uromyces phaseoli were released naturally from a small area of infected plants within a 0.25-ha bean field. Deposition gradients were assessed by counting the no. of singlets and clusters containing 2, 3, 4.....N urediniospores deposited on sticky, horizontal microscope slides located at various distances downwind of the source and by counting the no. of lesions that developed on the leaves of potted trap plants that were exposed in the field concurrently with the slides. Clusters accounted for more than 50 percent of the dispersal units and about 80 percent of the total no. of spores deposited on the slides. Fully 30 percent of the clusters contained 5 or more urediniospores. Both the no. of dispersal units deposited on slides and no. of lesions that developed on trap plants decreased approx. with the inverse square of distance from the source. (AS)

0346

30791 GALVEZ, G.; FRANCO, T.; MORA, R.; ROJAS, M. 1987. Mustia hilachosa del frijol y su control. (Web blight of beans and its control). Cali, Colombia, Centro Internacional de Agricultura Tropical. Centro de Información sobre Frijol-Patología. 4p. Es., Il. Es plegable.

Phaseolus vulgaris. Rhizoctonia solani. Symptomatology. Epidemiology. Cultural control. Chemical control. Integrated control. Disease control. CIAT-1. Colombia.

The symptomatology, biological cycle, epidemiology, and var., cultural, chemical, and integrated control of web blight of beans (Thanatephorus cucumeris) are briefly analyzed. Color photos are included. (CIAT)

0347

31034 HAMDAN, M.A.M.S.; DIXON, R.A. 1987. Differential patterns of protein synthesis in bean cells exposed to elicitor fractions from Colletotrichum lindemuthianum. Physiological and Molecular Plant Pathology 31(1):105-121. Sum. En., 32 Ref., Il. [Dept. of Biochemistry, Royal Holloway & Bedford New College, Univ. of London, Egham Hill, Surrey TW20 0EX, U.K]

Phaseolus vulgaris. Colletotrichum lindemuthianum. Enzymes. RNA. United Kingdom.

Elicitor-active fractions from a culture filtrate of Colletotrichum lindemuthianum were separated on the basis of their affinity for Concanavalin A Sepharose, and were compared with unfractionated culture filtrate and elicitor from cell walls of the fungus in terms of their effects on induced protein synthesis in cultured bean cells. In vitro translation of polysomal mRNA followed by 1- and 2-dimensional electrophoretic analyses revealed both similarities and differences in the patterns of mRNA induction in response to different elicitor preparations. All elicitors induced mRNA activities encoding the phytoalexin biosynthetic enzymes phenylalanine ammonia-lyase, chalcone synthase, and chalcone isomerase. Chalcone synthase subunits, synthesized in vivo and in vitro from mRNA, were resolved into a no. of charge isoforms whose relative proportions, although not constant, did not appear to reflect substantial differential induction by specific elicitor fractions. Chromatofocussing analysis revealed that culture filtrate and cell wall elicitors induced similar patterns of phenylalanine ammonia-lyase and chalcone synthase intact enzyme charge isoforms which were, however, different from those observed in unelicited cells. The results indicate that the elicitor preparations contain components, separable on the basis of structural

criteria, which exhibit both common and differential effects on host protein synthesis. (AS)

0348

31033 HAMDAN, M.A.M.S.; DIXON, R.A. 1987. Fractionation and properties of elicitors of the phenylpropanoid pathway from culture filtrates of Colletotrichum lindemuthianum. Physiological and Molecular Plant Pathology 31(1):91-103. Sum. En., 22 Ref., Il. [Dept. of Biochemistry, Royal Holloway & Bedford New College, Univ. of London, Egham Hill, Egham, Surrey TW20 OEX, U.K.]

Phaseolus vulgaris. Colletotrichum lindemuthianum. Enzymes. United Kingdom.

Galactose- and mannose-rich polysaccharides from a culture filtrate of Colletotrichum lindemuthianum were fractionated on the basis of size, charge, and affinity for Concanavalin A. Fractions were assayed for elicitor activity by their ability to induce phenylpropanoid pathway biosynthetic enzymes in cell suspension cultures of Phaseolus vulgaris. Elicitor-active components were associated with all the fractions. Fractions obtained after chromatography on Concanavalin A Sepharose exhibited differential effects on the induction of phenylalanine ammonia-lyase, chalcone synthase, and chalcone isomerase activities. A highly mannose-rich fraction was a potent elicitor of all 3 enzymes, whereas other fractions of lower mannose content preferentially induced chalcone synthase activity. The results indicate that the elicitor activity present in the culture filtrate resides in a no. of components of differing, but probably closely related, chemical composition, which have nonidentical biological activity. (AS)

0349

30760 HERNANDEZ L., M.T. 1986. Efecto individual y combinado de Uromyces phaseoli (Rabenh.) Wint., y Meloidogyne incognita (Kofoid y White) Chitwood en frijol. (Individual and combined effects of Uromyces phaseoli and Meloidogyne incognita on beans). Tesis Mag.Sc. Chapingo, México, Universidad Autónoma de Chapingo. Colegio de Postgraduados. 67p. Es., Sum. En., 48 Ref., Il.

Phaseolus vulgaris. Uromyces phaseoli. Meloidogyne incognita. Cultivars. Yield components. Mexico.

A series of expt. were conducted to determine the individual effect of Uromyces phaseoli and Meloidogyne incognita on bean var. Pinto 133 and Canario 107, and to establish whether inhibitory, additive, or synergetic effects are produced if both the fungus and the nematode occur simultaneously. The treatments were: rust inoculation at 10 (R1) and 15 (R2) days after planting; inoculation of M. incognita at 5 (N1) and 10 (N2) days after planting; combinations (N1 + R1, N1 + R2, N2 + R1); and a control. U. phaseoli infection was more severe in both var. when plants were inoculated 15 days after planting, based on pustule no. and infection sites/square centimeter. In all cases, nematode occurrence induced pustule no. reduction in var. Pinto 133. M. incognita root infection in both var. was most severe when inoculated at 5 than at 10 days after planting. In both cases, it was proved that there is a direct relationship between gall no. and egg no. contained in the galls. In Pinto 133, the combination N1 + R1 reduced pod and seed no. more than when inoculated separately, indicating a synergetic effect. Foliage fresh wt. reduction was lower than when pathogens occurred separately. In Pinto 133, N2 + R1 showed an inhibitory effect since it induced a lower leaf and root dry wt. reduction, and an additive effect regarding fresh root wt. In Canario 107, N2 + R1 caused a synergetic effect regarding the reduction in seed and pod no. Similarly, foliage fresh and dry wt. reduction was higher than when

pathogens occurred separately. In this same var., root fresh and dry wt. reduction was higher with R2, while pathogen combination had little effect when the values obtained for these parameters were compared. (AS (extract)-CIAT)

0350

30733 HEUVEL, J. VAN DEN 1987. Substances in dead plant tissue that stimulate infection of French bean leaves by Botrytis cinerea. Netherlands Journal of Plant Pathology 93(3):135-146. En., Sum. En., Nl., 21 Ref., Il. [Willie Commelin Scholten Phytopathological Laboratory, Javalaan 20, 3742 CP Baarn, Netherlands]

Phaseolus vulgaris. Snap beans. Inoculation. Botrytis cinerea. Glucose. Carbohydrate content. Netherlands.

Spreading lesions were found in primary leaves of French bean after inoculation with pieces of dead bean tissue on which a droplet of a suspension of Botrytis cinerea conidia was placed, and after inoculation with conidia suspended in a diffusate from dead tissue. After fractionation of aqueous extracts from dead bean leaves, the infection-stimulating activity was confined to the fractions containing sugars and phosphate esters. The infection-stimulating activity and the concn. of carbohydrates and orthophosphate in extracts of liquid N2-killed bean leaves varied slightly with the manner and degree of senescence. No consistent correlation, however, was observed between infection-stimulating activity and concn. of particular components. This was also true for extracts from other dead bean tissues. The stimulation of infection exhibited by extracts from dead flowers of different plant species, however, was closely correlated with the orthophosphate concn. Inocula containing only orthophosphate and sugars in the same concn. as found in the extracts did not stimulate the infection to the same extent as the extracts did. It is concluded that, in addition to simple carbohydrates and orthophosphate, 1 or more other compounds in the extracts are involved in the stimulation of infection. (AS)

0351

30638 LAWTON, M.A.; LAMB, C.J. 1987. Transcriptional activation of plant defense genes by fungal elicitor, wounding, and infection. Molecular and Cellular Biology 7(1):335-341. En., Sum. En., 47 Ref., Il. [Plant Biology Laboratory, Salk Inst. for Biological Studies, San Diego, CA 92138, USA]

Phaseolus vulgaris. Isolation. Colletotrichum lindemuthianum. Hypocotyl. RNA. Enzymes. DNA. Genes. Resistance. USA.

Activation of plant defense genes was investigated by analysis of transcripts completed in vitro by isolated nuclei. Elicitor treatment of suspension-cultured bean cells caused marked transient stimulation of transcription of genes encoding apoproteins of cell wall hydroxyproline-rich glycoproteins (HRGP) and the phenylpropanoid biosynthetic enzymes phenylalanine ammonia-lyase (PAL) and chalcone synthase (CHS), concomitant with the onset of rapid accumulation of the resp. mRNAs and hence expression of the phytoalexin (PAL, CHS), lignin (PAL), and HRGP defense responses. While there was a lag of 2 h prior to stimulation of HRGP gene transcription, induction of the transcription of PAL and CHS genes occurred within 5 min of elicitor treatment. Induction of transcription of PAL, CHS, and HRGP genes was also observed in wounded hypocotyls and in infected hypocotyls during race-cv.-specific interactions with the fungus Colletotrichum lindemuthianum, the causal agent of anthracnose. Transcriptional activation occurred not only in directly infected tissue but also in distant, hitherto uninfected tissue, indicating intercellular transmission of an endogenous signal for defense gene activation. It is

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concluded that transcriptional activation of defense genes characteristically underlies induction of the corresponding defense responses and expression of disease resistance. (AS)

0352

30602 MAFFIA, L.A. 1985. Progress and spread of bean rust. Ph.D. Thesis. Gainesville, University of Florida. 139p. En., Sum. En., 150 Ref., Il.

Phaseolus vulgaris. Uromyces phaseoli. Epidemiology. Mathematical model. USA.

Progress (increase in time) and spread (increase in distance) of bean rust were studied from 3 source types (area, line, and point) with 3 assessment types (incidence of diseased plants, incidence of diseased leaves, and severity) in expt. in spring and fall. From 3 models of disease progress (logistic, Gompertz, and monomolecular), the best fit was obtained with the Gompertz model. Zellner's procedure was used to estimate and compare epidemic rates (k) and initial disease (Yo), with the linearized Gompertz model. Rates based on incidence of diseased plants were faster than rates for incidence of diseased leaves and severity. For the 3 source types, fastest rates were observed in epidemics originating from point sources. The rates, in general, did not differ between spring and fall epidemics, or between west and east directions. The Yo's were different among all treatments. As distance from the source increased, Yo's decreased. The K's in most cases did not vary with distance. From 7 nonlinear models of disease gradients, the best fit was observed with the 3-parameter models of Ho . and Lambert and coworkers. Zellner's procedure was used to estimate and compare gradient parameters with the linearized 2-parameter model of Kiyosawa and Shiyomi. Gradients based on assessment types were successively steeper from incidence of diseased plants to incidence of diseased leaves to severity. Gradients west from the source were flatter than those to the east. Gradient slopes flattened over time. The flattening probably occurred when the max. asymptote of disease was reached. Epidemics should be viewed as changes in disease with time and space; hence isopathic rates were estimated. Isopathic rates were faster for epidemics initiated from point sources. Jeger's tridimensional models were also tested. The model proposed for polycyclic diseases gave a good fit. (AS)

0353

30757 PEREZ S., M. DE LOS A.; GONZALEZ P., J. 1986. Incidencia de las enfermedades producidas por los hongos del suelo en zonas de producción de frijol en Cuba. (Incidence of diseases produced by soil-borne fungi in bean production regions in Cuba). Ciencias de la Agricultura no.29:28-33. Es., Sum. Es., En., 7 Ref., Il. [Inst. de Investigaciones Fundamentales en Agricultura Tropical Alejandro de Humboldt, Academia de Ciencias de Cuba, Cuba]

Phaseolus vulgaris. Rhizoctonia solani. Fusarium. Sclerotium rolfsii. Macrophomina phaseoli. Cuba.

Soil-borne fungi causing damage in bean crops in different localities in Matanzas, Cuba, during the 1981-84 planting seasons 1981-84 were determined. Generally, the highest incidence was for Rhizoctonia solani, followed by Fusarium spp. and Sclerotium rolfsii. Macrophomina phaseolina showed the lowest incidence; it produced the highest damage in Holguin Province on var. Velasco Largo. (AS)

0354

31036 RODRIGUES, C.F.; ZAMBOLIM, L.; MARTINS, M.C. DEL P. 1987. Eficiencia de fungicidas no controle da mancha angular (Isariopsis griseola) do feijoeiro (Phaseolus vulgaris). (Efficiency of fungicides in the control of

the bean angular leaf spot). Fitopatologia Brasileira 12(1):40-45. Pt., Sum. Pt., En., 17 Ref., Il. [EMCAPA, Est. Exp. Linhares, 29.900 Linhares-ES, Brasil]

Phaseolus vulgaris. Disease control. Isariopsis griseola. Fungicides. Yields. Brazil.

Protective and systemic fungicides were assessed as to their efficiency in the control of Isariopsis griseola under greenhouse conditions. Benomyl, methyl thiophanate plus thiram, triforine, triadimefon, bitertanol, mancozeb, and chlorothalonil, applied at 250, 400, 100, 125, 125, 1200, and 1125 ppm, gave protection against I. griseola when applied up to 15 days before inoculation with a spore suspension of 5 x 10(4) spores/ml. Benomyl, methyl thiophanate plus thiram, and triforine showed curative effects when applied up to 12, 9, and 6 days after inoculation, resp. Under field conditions, in 2 different periods (July-Sept. and Dec.-Feb.), the more efficient products for the control of the disease were benomyl and methyl thiophanate plus thiram (0.5-1.0 kg/ha) applied twice after flowering. Yield increases of up to 30 and 23 percent were obtained with methyl thiophanate plus thiram in the expt. carried out during summer-autumn and winter-spring, resp. The protective fungicides were less effective than systemic ones in controlling the disease. (AS)

0355

30734 ROGERS, K.R.; ANDERSON, A.J. 1987. The effect of extracellular components from Colletotrichum lindemuthianum on membrane transport in vesicles isolated from bean hypocotyl. Plant Physiology 84(2):428-432. En., Sum. En., 23 Ref., Il. [Dept. of Biology, Utah State Univ., Logan, UT 84322-4500, USA]

Phaseolus vulgaris. Colletotrichum lindemuthianum. Hypocotyl. Disease physiology and biochemistry. USA.

Extracellular components released from mycelia of the alpha and beta races of the bean pathogen, Colletotrichum lindemuthianum, inhibited proton uptake in sealed vesicles prepared from bean hypocotyls. Differential sensitivity of ATP-driven proton transport to nitrate, vanadate, N,N'-dicyclohexylcarbodiimide, diethylstilbestrol, and oligomycin suggested the vesicles were enriched for tonoplast. Anion stimulation of proton transport, by enhancement of ATPase activity and dissipation of the membrane potential, was consistent with this conclusion. Although fungal components inhibited the formation of a pH gradient, the membrane potential was unaffected and the ATPase activity slightly stimulated. These data suggest that the fungal components produce an electroneutral proton exchange. Proton transport in Dark Red Kidney bean tonoplast vesicles was inhibited by mycelial preparations from the incompatible alpha race and compatible beta race. Elicitor activity, however, was greater in the alpha race fractions. Elicitor purified from alpha race culture filtrate did not inhibit proton transport in vesicles isolated from Dark Red Kidney bean. Consequently, elicitor activity need not be associated with an ability to

0356

30625 SANCHO B., E. 1982. Efecto de las aplicaciones foliares del fungicida benomil para la producción de semilla sana de frijol (Phaseolus vulgaris L.). (Effect of foliar applications of benomyl on healthy bean seed production). Tesis Ing.Agr. San José, Universidad de Costa Rica. 32p. Es., Sum. Es., 24 Ref., Il.

Phaseolus vulgaris. Seeds. Fungicides. Flowering. Podding. Mycoses. Leaves. Disease control. Costa Rica.

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The effect of benomyl applications at doses of 0.5 and 1.0 g/liter during flowering and pod fill of bean cv. Talamanca in order to control fungi on seeds was evaluated. Seeds were harvested in 2 periods: at physiological maturity and 10 days after (total drying in the field). Benomyl at 1 g/liter gave a good control of most of the fungi present, and the best results were obtained when applied at flowering and the seeds were harvested at physiological maturity. The 0.5 g/liter dose also gave satisfactory results and is the most economical. The majority of colonies found on the seeds belonged to the genus Fusarium. Colonies of the genera Alternaria, Colletotrichum, Rhizoctonia, Phomopsis, and Esteromella were also found. A greater no. of colonies was found on seed from the 2nd harvest. It was thus demonstrated that the fungicide applied to the leaves can be translocated to the seeds, offering a certain degree of control over the fungi. Foliar application of benomyl was found to have positive effects on the production of very healthy bean seed. (AS (extract)-CIAT)

0357

31001 SHARMA, R.C.; BARTHE, J.P.; LAFITTE, C.; TOUZE, A. 1986. Adsorption, in vitro, de l'endopolygalacturonase secrétée par Colletotrichum lindemuthianum sur des parois de deux lignées de haricots isogéniques résistants et sensibles à l'anthracnose. (In vitro adsorption of the endopolygalacturonase secreted by Colletotrichum lindemuthianum on the cell walls of two isogenic lines of French bean resistant and susceptible to anthracnose). Canadian Journal of Botany 64(12):2903-2908. Fr., Sum. Fr., En., 24 Ref., Il. [Centre de Physiologie Végétale, Unité Associée 241, Centre National de la Recherche Scientifique, Univ. Paul Sabatier, 118, Route de Narbonne, 31062 Toulouse Cedex, France]

Phaseolus vulgaris. Snap beans. Cultivars. Cell walls. Resistance. Colletotrichum lindemuthianum. Enzymes. France.

As compared with the cell walls of anthracnose-sensitive beans, the cell walls of resistant beans, with the involvement of Cornell gene, adsorb, when cultivated in vitro, larger quantities of the endopolygalacturonase secreted by the fungus responsible for the disease, Colletotrichum lindemuthianum. This selective adsorption only occurs for the enzyme excreted by the pathogenic fungus. This phenomenon is observed with cell walls from which the constituent glycoproteins inhibitive for the endopolygalacturonase were previously removed. The adsorbing capacity of the 2 types of cell walls was reduced by a heat treatment (100 degrees Celsius, 30 min) and the differences between both types of walls for the selective binding with the endopolygalacturonase of C. lindemuthianum are reduced. This suggests that protein(s) are involved in this specific adsorption. Solubilization of the pectic substances of the walls by an enzymatic treatment strongly reduced the binding capacity of the walls for the endopolygalacturonase. It appears therefore that ionic bindings with the pectic polymers are also involved. The possible implication of this phenomenon in the resistance to anthracnose is discussed. (AS)

0358

30776 STATLER, G.D.; McVEY, M.A. 1987. Partial resistance to Uromyces appendiculatus in dry edible beans. Phytopathology 77(7):1101-1103. En., Sum. En., 14 Ref., Il. [Dept. of Plant Pathology, North Dakota State Univ., Fargo, ND 58105, USA]

Phaseolus vulgaris. Cultivars. Resistance. Uromyces phaseoli. USA.

Partial resistance was studied in 5 bean cv. that appeared to differ in their resistance to leaf rust. Inoculated leaves were sampled daily, then cleared and stained for fluorescent microscopy. The factors studied

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histologically were colony size, early and late colony abortion, proportion of successful penetrations, and uredial size. Cv. Nodak and Upland had a higher percentage of both early- and late-aborted colonies than the rust-susceptible cv. Fiesta and UI 114. Nodak and Upland had a lower proportion of successful penetrations than the susceptible cv. at 14 days. Nodak had smaller colonies than the rust-susceptible cv. after day 7. Uredia were counted daily to determine infection density (ID) and latent period (LP50). LP50 did not differ significantly among the cv. studied. The ID and no. of uredia/square centimeter were significantly lower for Nodak and Upland than for the susceptible cv. Nodak and Pindak had smaller uredia at 14 days than the susceptible cv. Partial resistance was documented for Nodak and Upland. The only component of partial resistance demonstrated for Pindak was small uredia. (AS)

0359

30775 STOCKWELL, V.; HANCHEY, P. 1987. Lignification of lesion borders in Rhizoctonia-infected bean hypocotyls. Phytopathology 77(4):589-593. En., Sum. En., 20 Ref., Il. [Dept. of Plant Pathology & Weed Science, Colorado State Univ., Fort Collins, CO 80523, USA]

Phaseolus vulgaris. Hypocotyl. Rhizoctonia solani. Enzymes. Resistance. USA.

Lesions formed on Red Kidney bean hypocotyls infected with Rhizoctonia solani are surrounded by autofluorescent cell walls resistant to maceration by cell wall-degrading enzymes. These lesion border cell walls stained positively for lignin and phenols. Lesion border walls were macerated by a mixture of cellulase and macerase after delignification, but not after extraction of Ca or fats and waxes. Peroxidase and polyphenoloxidase were active in young lesions in advance of fungal hyphae. Results suggest that lignification of cell walls may be an important factor in limiting lesion expansion in stem canker of beans. (AS)

0360

30799 SUMNER, D.R. 1987. Efficacy of pencycuron against isolates representing different anastomosis groups of Rhizoctonia solani and Rhizoctonia-like binucleate fungi. Plant Disease 71(6):515-518. En., Sum. En., 18 Ref. [Dept. of Plant Pathology, Univ. of Georgia, Coastal Plain Experiment Station, Tifton, GA 31793-0748, USA]

Phaseolus vulgaris. Snap beans. Rhizoctonia solani. Fungicides. Disease control. USA.

Pencycuron was evaluated for efficacy against isolates of Rhizoctonia solani and Rhizoctonia-like binucleate fungi in soil in the greenhouse at 10.0, 1.0, and 0.1 micrograms/g soil. Soil was infested separately with isolates of R. solani (AG-2 type 1, AG-2 type 2, and AG-4) and isolates of Rhizoctonia-like binucleate fungi (CAG-2, CAG-3, CAG-4, and CAG-5) from soil and plants in Georgia, USA. Of the 14 isolates, only 1 isolate of R. solani, AG-2 type 1, was resistant to pencycuron and caused root and hypocotyl rot in snap bean at all dosages tested. Root and hypocotyl rots of snap bean caused by isolates of R. solani AG-2 type 2, AG-4, a 2nd isolate of AG-2 type 1, and isolates of CAG-5 were controlled by pencycuron at 10.0 and 1.0 micrograms/g soil. Colony-forming units of only 1 isolate each of AG-2 type 1, CAG-4, and CAG-5 were detected in soil 3 wk. after treatment at 10.0 micrograms/g. (AS) See also 0337 0369 0370 0384 0388 0390

0361

30764 AZZAM, O.I.; MAKKOUK, K.M. 1986. Purification of two potyvirus isolates infecting Phaseolus vulgaris L. in Lebanon. Phytopathologia Mediterranea 25:125-130. En., Sum. En., It., 17 Ref., Il. [ICARDA, P.O. Box 5466, Aleppo, Syria]

Phaseolus vulgaris. Viroses. Isolation. Analysis. Lebanon.

A purification procedure was developed for the 2 potyvirus isolates (52-82 and 53-82) recently reported from Lebanon. Virus isolates were propagated in Phaseolus vulgaris cv. Sutter Pink and/or Black Turtle Soup and harvested around 3 wk. after inoculation. Infected tissue was extracted in 0.5 molar K2HPO4 containing 0.005 molar EDTA, 0.02 molar Na2SO3, 0.01 molar DIECA, and 3 percent Triton X-100 pH 8.5, clarified with 25 percent chloroform + 25 percent carbon tetrachloride, and concentrated by high speed centrifugation. The pellet obtained was suspended in 0.5 molar sodium citrate buffer pH 7.5, and further purified by centrifugation on sucrose density gradients prepared with the same buffer. Virus concn. at the different steps of the purification procedure was monitored by ELISA, and the final purified material was assessed for purity and recovery of nonaggregated virus particles by sucrose density gradient centrifugation. Virus yield was estimated to range between 20-30 mg/kg tissue. The purified virus (53-82) was injected into a rabbit. The antiserum produced was used for virus detection in infected bean leaves by ELISA. The A405 values obtained for infected tissue were high (1.5), whereas those for healthy bean were 0.1 after a 90 min substrate incubation, an indication that the procedure followed produced a fairly purified virus preparation. (AS)

0362

30611 BAJET, N.B. 1983. Detection of bean golden mosaic virus in host tissues and infectivity of its genome in bean mesophyll protoplasts. Ph.D. Thesis. Urbana, University of Illinois at Urbana-Champaign. 140p. En., Sum. En., 114 Ref., Il.

Phaseolus vulgaris. Bean golden mosaic virus. Analysis. Isolation. USA.

Indirect fluorescent antibody (F-Ab) staining, ELISA, and DNA-DNA hybridization on nitrocellulose (dot blot) were used to detect BGMV in Phaseolus vulgaris Top Crop. F-Ab staining of sections from leaves, stems, and roots showed that viral antigen was present in a limited no. of mesophyll cells, in some sieve elements and phloem parenchyma of trifoliolate leaves, and in sieve elements and phloem parenchyma of the stem. No viral antigen was detected from the roots. Isolated cells from trifoliolate leaves showed BGMV-specific fluorescence in the nucleus and cytoplasm. By ELISA, virus titers in trifoliolate leaves reached a max. of 73-125 micrograms/g tissue between 6-18 days after inoculation of the primary leaves. Max. titers in stems were 1.0-1.8 micrograms/g tissue between 16-22 days after inoculation, and in inoculated primary leaves 0.10-0.15 micrograms/g between 18-26 days after inoculation. Dot blots of sap or nucleic acid extracts from trifoliolate leaves showed signals even well into the chronic infection stage when viral titer by ELISA was low. These results suggest that BGMV genome exists in some stable form other than as an intact virion in chronically diseased plants. High yields of viable protoplasts were obtained from the primary leaves of Top Crop beans treated for 4 h in a mixture of Cellulase, Macerozyme, mannitol, and 2-N-morpholinoethane sulfonic acid. Protoplast yield and viability were affected by the age of the source plants, enzyme concn., pH, and the

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osmotic conditions. The protoplasts were infected with BGMV viral (single-stranded) DNA. F-Ab staining showed that up to 45 percent of the protoplasts were infected. Nucleic acid sequences complementary to the viral genome were detected by DNA-DNA hybridization after inoculation of the protoplasts. These findings confirm that bean mesophyll cells are susceptible to BGMV infection. (AS)

0363

31103 KYLE, M.M.; PROVVIDENTI, R. 1987. Inheritance of resistance to potato y viruses in Phaseolus vulgaris L. 1. Two independent genes for resistance to watermelon mosaic virus-2. Theoretical and Applied Genetics 74(5):595-600. En., Sum. En., 26 Ref. [Dept. of Plant Breeding, Bradfield Hall, Cornell Univ., Ithaca, NY 14853, USA]

Phaseolus vulgaris. Inheritance. Resistance. Watermelon mosaic virus. Crossbreeding. Bean common mosaic virus. Blackeye cowpea mosaic virus. Cowpea aphid-borne mosaic virus. Soybean mosaic virus. Genes. USA.

Resistance to watermelon mosaic virus-2 (WMV-2) in Phaseolus vulgaris is conferred by 2 distinct dominant alleles at independent loci. Based on segregation data 1 locus is designated Wmv and the other, Hsw. The dominant allele Wmv from cv. Great Northern 1140 prevents systemic spread of the virus but viral replication occurs in inoculated tissue. In contrast, Hsw confers both local and systemic resistance to WMV-2 below 30 degrees Celsius. At higher temp., plants that carry this allele in the absence of modifying or epistatic factors develop systemic veinal necrosis upon inoculation with the virus that results in rapid death. Pathotype specificity has not been demonstrated for either allele; both factors confer resistance to every isolate tested. A temp.-sensitive shift in epistasis is apparent between dominant alleles at these loci. Parental, reciprocal dihybrid F1 populations, and selected F3 families were inoculated with potyviruses I (BCMV), Bcm (blackeye cowpea mosaic virus), Cam (cowpea aphid-borne mosaic virus), and Hsm (soybean mosaic virus), and held at 35 degrees Celsius. F1 populations developed vascular necrosis completely or primarily limited to inoculated tissue, while F3 families from WMV-2-susceptible segregates were uniformly susceptible to these viruses. The relationship between Hsw, Wmv, and other genes for potyvirus resistance suggest patterns in the evolution of resistance and viral pathogenicity. (AS)

0364

30714 LISA, V.; DELLAVALLE, G.; PERESSINI, S. 1986. Broad bean wilt virus in fagiolo in Friuli-Venezia Giulia. (Broad bean wilt virus in climbing bean in Friuli-Venezia Giulia). Informatore Fitopatologico 36(4):31-32. It., Sum. It., En., 9 Ref., Il. [Istituto di Fitovirologia Applicata del CNR, Torino, Italy]

Phaseolus vulgaris. Broad bean wilt virus. Isolation. Cultivars. Pathogenicity. Italy.

Broad bean wilt virus was isolated in 1983 from climbing bean in Friuli-Venezia Giulia, NE Italy. The virus isolate belongs to serotype I. Experimentally the virus infected 8 P. vulgaris cv. out of 9 and 2 types of P. coccineus with symptoms ranging from mosaic and leaf distortion to symptomless infection. (AS)

0365

28978 OMAR, R.A.; MEHIAR, F.F.; ZAYED, E.A.; DEIF, A.A. 1985. Biological studies on some seed-borne viruses and their effect on vegetative growth and yield component of the host plants. Acta Phytopathologica Academiae

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Scientiarum Hungaricae 20(1-2):59-78. Sum. En., 39 Ref., Il. [Agricultural Botany Dept., Faculty of Agriculture, Tanta Univ., Kafr-El-Sheikh, Egypt]

Phaseolus vulgaris. Bean common mosaic virus. Host range. Disease transmission. Symptomatology. Yield components. Electron microscopy. Egypt.

BCMV was isolated from naturally infected bean plants and identified on the basis of the host range, modes of transmission, stability, and electron microscopy. Symptoms induced by this virus on host plants were recorded. BCMV was easily transmitted by sap using an abrasive. BCMV was found to be transmitted through bean seeds by 54.7 percent and transmitted by means of Myzus persicae. Electron microscopic examination of bean leaf extracts infected with BCMV isolates showed the presence of filamentous flexous particles. Infection with BCMV caused a significant reduction in plant height, leaf area and no. of leaves/bean plant. DM content of bean leaves decreased significantly as a result of infection with the virus. No. of pods/plant and no. of seeds/pod significantly decreased as a result of infection. A significant reduction in seed wt./plant (yield) of bean plants was recorded as a result of infection with BCMV. Seed index and seed DM produced by infected bean plants were significantly reduced in comparison with healthy ones. Similar studies were conducted on soybean mosaic virus and lettuce mosaic virus. (AS)

0366

31032 RAO, A.L.N.; LAKSHMAN, D.K.; OHKI, S.T.; HIRUKI, C. 1987. Identification of a new serotype and antigenic relationships among six strains of red clover necrotic mosaic virus. Phytopathology 77(7):995-999. En., Sum. En., 19 Ref., Il. [Dept. of Biology, Texas A & M Univ., College Station, TX 77843-3258, USA]

Phaseolus vulgaris. Red clover necrotic mosaic virus. Races. Canada.

The antigenic realtionships of 3 red clover necrotic mosaic virus (RCNMV) strains-Eng (England), Aus (Australia), and Can (Canada) were compared with the 3 established serotypes of the virus RCNMV-TpM 34 (serotype A), RCNMV-TpM 48 (serotype B), and RCNMV-Sw (serotype C) by immunodiffusion tests. All strains were maintained and propagated in Phaseolus vulgaris cv. Red Kidney. These tests differentiated RCNMV-Can from serotypes A and C but not from serotype B. It was demonstrated that both RCNMV-Eng and RCNMV-Aus constitute a new serotype, D, since they were serologically indistinguishable and differed from the 3 serotypes of the virus. By means of intragel cross-absorption expt., antibodies specific for each serotype were demonstrated. These tests also showed that RCNMV-Aus antiserum contained heterospecific antibodies reacting specifically with serotypes B and C. Coat proteins from 6 RCNMV strains migrated as a single component in polyacrylamide gel corresponding to polypeptides with a mol. wt. of about 40,000 daltons. Polyacrylamide gel electrophoretic analysis of coat proteins partially digested with V8 protease revealed significant differences between RCNMV-Sw (serotype C) and other strains of the virus. Similar analysis with chymotrypsin indicated that the coat proteins of RCNMV-Eng and RCNMV-Aus were identical and differed from the others. The antigenic and other properties of RCNMV serotypes are discussed in relation to taxonomic identity. (AS)

0367

31037 ZAMBOLIM, E.M.; CARVALHO, M.G. DE 1987. Teores do vírus do mosaico comum do feijoeiro (bean common mosaic virus), em folhas inoculadas e em sementes, detectados pelo teste de imunoadsorcao com enzima. (Levels of bean common mosaic virus in inoculated bean leaves and seeds, detected by enzyme-linked immunosorbent assays). Fitopatologia Brasileira 12(1):78-82.

Pt., Sum. Pt., En., 22 Ref., Il. [Depto. de Fitopatologia, Univ. Federal de Vicosa, 36.570 Vicosa-MG, Brasil]

Phaseolus vulgaris. Cultivars. Bean common mosaic virus. Inoculation. Analysis. Pathogenicity. Brazil.

Four dry bean cv. were compared as multiplication hosts for BCMV. Virus concn. were assayed in the inoculated, primary leaves by ELISA as a function of time. Results suggested that primary leaves of Red Kidney, Santana, and Bountiful can be advantageously employed as multiplication hosts; among the 4, Red Kidney is the best cv. Lower antigen contents were found in primary leaves of Rico 23, and Carioca, adopted as control, was confirmed as immune, with no virus increase detected throughout the expt. A clearly defined antigen peak was found for each of the 3 best host cv. between 9-12 days after inoculation. The antigen concn. fell off rapidly after that. BCMV was easily detected by ELISA in half-embryos from infected seeds; it was found in 68 percent of Santana and in 81 percent of Rico 23 seed taken from bean plants inoculated at the primary leaf stage and grown under greenhouse conditions. (AS)

0368

30739 ZAMBOLIM, E.M.; CARVALHO, M.G. DE; MATSUOKA, K. 1986. Método alternativo de purificacao do virus do mosaico-comum do feijoeiro. (Alternative method to purify bean common mosaic virus). Revista Ceres 33(188):341-351. Pt., Sum. Pt., En., 14 Ref., Il. [Depto. de Fitopatologia da U.F.V., 36.57 Vicosa-MG, Brasil]

Phaseolus vulgaris. Bean common mosaic virus. Isolation. Analysis. Brazil.

BCMV, a potyvirus, was purified employing borate buffer at moderately high pH in the extraction, and thereafter, in the presence of urea and 2-mercaptoethanol to prevent particle aggregation. Virus particles were precipitated with polyethyleneglycol just after juice extraction and clarification. Only 1 cycle of differential centrifugation was performed before the final isopynic centrifugation in CsCl. The virus was not stabilized for this latter step. Yield of purified BCMV was about 3 mg/kg primary leaves, which is acceptable in view of the high degree of purity of the final virus preparation. Antisera prepared with this antigen did not react at all in the microprecipitation and ELISA tests against healthy controls. (AS) See also 0337 0388 0395

E05 Nematodes

0369

30727 GADABU, A.D. 1986. Multipest economic thresholds on snap beans. Ph.D. Thesis. Gainesville, University of Florida. 199p. En., Sum. En., 252 Ref., Il.

Phaseolus vulgaris. Snap beans. Defoliation. Meloidogyne incognita. Uromyces phaseoli. Fungicides. Disease control. Yields. USA.

During 1984-85, a no. of greenhouse and field expt. were carried out at the Tropical Research and Education Center in Homestead (Dade County, Florida, USA) to determine the effect of manual defoliation, Meloidogyne incognita, bean rust, and various other nematodes on Sprite snap beans. Treatments consisted of total defoliation (100 percent), 0, 25, 50, and 75 percent defoliation at various plant growth stages; 0, 10, 100, 1000, 10,000, and 100,000 M. incognita eggs and juveniles/pot, fungicide sprays which included bitertanol at 7-day intervals, mancozeb tank-mixed with S at 4 to

5-, 7-, and 14-day intervals, resp., and soil fumigation with metam-sodium at 0, 47, 94, 187, 281, and 374 liters/ha and a separate one at 935 liters/ha. Manual defoliation caused the highest snap bean yield losses at full bloom and pod set both in the field and the greenhouse expt. Snap bean yield loss was observed at the 25 percent defoliation level in both expt. Total defoliation resulted in the highest yield losses. Yield was negatively correlated to M. incognita population levels when plants were grown in pots and the nematodes were used alone. Yield was also inversely related to nematode population levels when manual defoliation occurred on nematode-inoculated plants. Yield loss was observed on plants grown in soil inoculated with 10 eggs and juveniles/pot. It was observed that plants with the highest bean rust disease severity gave the lowest yield whereas plants which were virtually disease free had the highest yield. Generally, fungicide sprays increased yields. In some cases yield increases were not high enough to pay for the extra cost of fungicide sprays. Soil fumigation with metam-sodium increased yields slightly. The optimum metam-sodium application rate was 187 liters/ha. Yield was affected most by the bean rust disease when defoliation, metam-sodium, and the disease were used simultaneously. (AS)

0370

30752 MANSO, E.S.B.G.C.; HUANG, C.S. 1986. Interacao entre Meloidogyne incognita (raca 4) e isolados de Rhizoctonia solani, em Phaseolus vulgaris cv. Rico 23. (Interactions between Meloidogyne incognita race 4 and Rhizoctonia solani isolates in Phaseolus vulgaris cv. Rico 23). Fitopatologia Brasileira 11(4):857-864. Pt., Sum. Pt., En., 17 Ref., Il. [Centro Nacional de Recursos Genéticos/EMBRAPA-S.A.I.N. Parque Rural, Caixa Postal 10.2372, 70.770 Brasilia-DF, Brasil]

Phaseolus vulgaris. Meloidogyne incognita. Isolation. Rhizoctonia solani. Inoculation. Brazil.

The possible interactions between Meloidogyne incognita race 4 and 3 isolates of Rhizoctonia solani on Phaseolus vulgaris cv. Rico 23 were studied in greenhouse expt. Treatments were (1) pots with sterile soil, infested with nematode eggs prior to bean planting and infested with the fungus 2 wk. after planting; (2) nematode and fungus simultaneously placed in the pots prior to bean planting; (3) pots infested with the fungus prior to bean planting and nematode eggs introduced 2 wk. after planting; (4) pots infested with the nematode and fungus simultaneously 2 wk. after bean planting; (5) pots infested with nematode and fungus before and after bean planting; (6) noninfested pot as check. Results were evaluated 45 days after planting. Dry wt. of roots and aerial parts as well as root symptoms were assessed. There were no synergistic pathological effects of the nematode and the fungus on beans. The effect of the nematode alone or combined with the fungus caused few, small root galls; however, root branching appeared to be stimulated by the nematode. Nematode-infested plants appeared to grow more than noninfested ones. These effects seemed to offer some protection against infection by R. solani. (AS)

0371

30708 MELAKEBERHAN, H.; WEBSTER, J.M.; BROOKE, R.C. 1985. Response of Phaseolus vulgaris to a single generation of Meloidogyne incognita. Nematologica 31(2):190-202. En., Sum. En., Fr., 29 Ref., Il. [Dept. of Nematology, Univ. of California, Davis, CA 95616, USA]

Phaseolus vulgaris. Snap beans. Meloidogyne incognita. Mineral content. C. N. Growth. Photosynthesis. Chlorophyll. Leaf area. Shoots. Roots. Yields. Canada.

One-wk.-old Phaseolus vulgaris plants were inoculated with 0, 2000, 4000, and 8000 Meloidogyne incognita juveniles/plant and grown under controlled conditions (21 degrees Celsius, 14-h day at 400 microE/square meter/s, 16 degrees Celsius, 10-h night cycle). At intervals up to 28 days after inoculation, morphological and physiological characteristics of the bean plants were measured using destructive and nondestructive assays. Nematode significantly decreased total C, H, and N contents, and plant dry wt. from 8 days, and flowers, pods, seeds, and leaf area after 15 days. Plant respiration rate was not significantly changed by nematode infection, but photosynthetic rate, based on leaf area and/or chlorophyll and N contents; decreased within 1 wk. and chlorophyll content within 2. Chlorophyll content and photosynthetic rate for all treatments decreased with time. The interaction between the physiological and chronological age of the nematode and host in relation to the reduced productivity of infected plants is discussed. (AS)

0372

30800 SPIEGEL, Y.; CHET, I.; COHN, E. 1987. Use of chitin for controlling plant plant-parasitic nematodes. II. Mode of action. Plant and Soil 98(3):337-345. Il., Sum. En., 16 Ref. [Dept. of Nematology, ARO, The Volcani Center, P.O.B. 6, Bet Dagan, Israel]

Phaseolus vulgaris. Meloidogyne javanica. Nematode control. Chemical control. Israel.

Bean and tomato seedlings, treated with different amounts of ammonia and chitin, and inoculated with the root-knot nematode, Meloidogyne javanica, were reared in consecutive 30-day growth cycles of shoot and root. The condition of the root systems of both plant species and degree of infection by M. javanica were decreased by increasing amounts of ammonia. Chitin caused a relatively small reduction in gall formation but almost no changes in fresh shoot wt. The effect of chitin on plant growth and nematode attack were also compared in irradiated and nonirradiated soil. In the 1st cycle galling index of the chitin-treated plant was similar to that of untreated plants maintained in the irradiated soil conditions, while in the nonirradiated soil, chitin treatment reduced galling index. In the 2nd cycle, chitin treatment reduced galling index in both irradiated and nonirradiated soils, especially in the latter, where galling index greatly decreased compared with the nontreated plants. Differences in fresh shoot wt. between nematode-infected and nematode-free plants amended with chitin were greater under nonirradiated than irradiated soil conditions, especially in the 2nd cycle. In nonirradiated soil, a higher level of chitinolytic microorganisms, particularly actinomycetes, was found in the 2nd cycle. (AS) See also 0319

E06 Physiological Disorders

0373

29997 BORGMAN, L.M. 1982. The effect of air pollutants on the photosynthetic and dark respiration rates of Phaseolus vulgaris. Ph.D. Thesis. Boston, Massachusetts, Northeastern University. 127p. En., 96 Ref., Il.

Phaseolus vulgaris. Air pollution. SO2. Ozone. Photosynthesis. Plant respiration. Electron microscopy. Plant physiological disorders. USA.

The effects of continuous fumigation with pollutant gases on net and gross photosynthesis, dark respiration, respiration:gross photosynthesis ratios, root:shoot ratios, and chloroplast ultrastructure were examined. Plants of

bean cv. Blue Lakes were grown in paired plexi-glass chambers given a continuous supply of synthetic pollutant-free air. In addition to this air supply 1 chamber received a low concn. of either CO or NO2, or SO2, or a mixture of the 3. Plants in O3 expt. were grown in polyethylene greenhouses. Photosynthetic and respiration rates of 12- to 19-day-old plants were measured by infrared gas analysis. The plants were dried and root:shoot ratios calculated. Tissue samples were excised from plants used in the study and prepared for electron microscopy. A significant increase (28.9 percent) in gross photosynthesis of plants exposed to 10 ppm CO was evident compared with the controls. Although net photosynthesis was not significantly affected by 0.035-0.040 ppm NO2, gross photosynthesis, dark respiration, and respiration:gross photosynthesis ratios were significantly greater than in controls. Concn. of 0.04-0.05 SO2 resulted in significantly greater respiration and respiration:gross photosynthesis ratios. A 2nd SO2 expt. received 0.04-0.05 ppm SO2 continuously plus a 6-to 10-h fumigation period with 0.22 ppm SO2. This procedure resulted in significantly reduced net and gross photosynthetic rates. A mixture of CO, SO2, and NO2 in concn. of 10, 0.04-0.05, and 0.035-0.040 ppm, resp., had no significant effect on the above physiological processes. O3 exposures of 10-20 ppm for 8 h a day, 5 days a week, resulted in progressively lower net and gross photosynthetic rates as the week progressed and respiration:gross photosynthesis ratios were significantly higher. O3 exposures of 6-8 ppm reduced net and gross photosynthetic rates significantly. It was concluded that these low levels of pollutant gases are capable of altering physiological activities which may result in reduced yield. (AS)

0374

30723 LIETH, J.H.; REINGLING, J.F. 1986. Plant growth analysis of discontinuous growth data: a modified Richards function. Scientia Horticulturae 28(4):301-314. Sum. En., 20 Ref., Il. [Dept. of Environmental Horticulture, Univ. of California, Davis, CA 95616, USA]

Phaseolus vulgaris. Snap beans. Growth. Ozone. Mathematical model. USA.

A method is presented for analyzing growth data of plants with discontinuous RGR resulting from a sudden short-term change in the environment of the plants. This technique provides a quantification of a treatment effect on plant growth where the growth of the control plants can be represented by the Richards function. Growth data from phytotron-grown snap bean plants subjected to episodic O3 exposures are used to illustrate the method. Further applications of the approach are suggested, including the analysis of multiple and single, short-term and long-term episodic events on plant growth. (AS) See also 0260

F00 PEST CONTROL AND ENTOMOLOGY

0375

31003 RAFFA, K.F. 1987. Effect of host plant on cannibalism rates by fall armyworm (Lepidoptera: Noctuidae) larvae. Environmental Entomology 16(3):672-675. En., Sum. En., 18 Ref. [Dept. of Entomology, Univ. of Wisconsin, Madison, WI 53706, USA]

Phaseolus vulgaris. Spodoptera frugiperda. Insect biology. USA.

The fall armyworm, Spodoptera frugiperda, a polyphagous pest of grasses and legumes, showed higher rates of cannibalism when feeding on red kidney bean seedlings than on maize seedlings. These differences are related to behavioral preferences. In choice tests, the larvae showed a strong preference for maize. To see if these differences in cannibalism rates

could be attributed to host chemistry alone, these tests were repeated using detached maize and bean leaf disks. No differences in cannibalism rates were observed under these conditions, although cannibalism on maize was higher than in earlier expt. In no-choice tests, the efficiency of conversion of ingested food was higher on maize seedling foliage than on bean seedling foliage. The efficiency of conversion of ingested food of cannibalizing larvae that were limited to other larvae as a food source was equivalent to that on maize. Larvae were able to offset these differences in food quality to some degree by increasing relative consumption rates on beans. The RGR was highest on maize, 2nd highest on other larvae, and lowest on beans. These data provide the 1st nutritional indices for a normally herbivorous species on a carnivorous diet, and so are useful for ecological studies of between-species comparisons relating growth to food-source differences. (AS) See also 0283

F01 Injurious Insects, Mites and their Control

0376

30760 BOICA JUNIOR, A.L.; VENDRAMIM, J.D. 1986. Desenvolvimento de Bemisia tabaci (Gennadius, 1889) (Homoptera, Aleyrodidae) em genótipos de feijao (Phaseolus vulgaris L.). (Development of Bemisia tabaci (Homoptera, Aleyroididae) in bean genotypes). Anais da Sociedade Entomológica do Brasil 15(2):231-238. Pt., Sum. Pt., En., 11 Ref., Il. [Depto. de Biologia Aplicada a Agropecuaria, FEIS/UNESP, Caixa Postal 31, 15.37[illegible] Ilha Solteira-SP, Brasil]

Phaseolus vulgaris. Bemisia tabaci. Genotypes. Cultivars. Insect biology. Brazil.

The biological cycle of Bemisia tabaci in bean genotypes (Goiano Precoce, Carioca, G 2618, BAT 363, and Bolinha) was studied by evaluating the egg-nymph, nymph-adult, and egg-adult phases of pest development. The cycle was very short on Goiano Precoce, Carioca, and G 2618, and long on Bolinha; the latter genotype could have antibiosis-type resistance. Development from egg to adult on the bean genotypes was 17.61 more or less 0.44 and 31.79 more or less 1.44 days in the wet and dry seasons, resp. (AS)

0377

30655 DORMOND H., M. 1987. Eficacia de siete acaricidas en el combate químico de la arañita roja (Tetranychus spp.) en frijol (Phaseolus vulgaris L.). (Efficiency of seven acaricides in the chemical control of the red spider mite (Tetranychus spp.) in beans). Tesis Ing.Agr. San José, Universidad de Costa Rica. 87p. Es., Sum. Es., 50 Ref., Il.

Phaseolus vulgaris. Tetranychus neocaledonicus. Tetranychus urticae. Mite control. Acaricides. Costa Rica.

At the Fabio Baudrit Moreno agricultural exptl. station and on a commercial plantation in El Coco de Alajuela, Costa Rica, a trial was conducted to determine the efficiency of 7 acaricides (profenofos, ethion, fenbutatin-oxide, cyhexatin, dicofol, tetradifon, and propargite) on the control of Tetranychus neocaledonicus and T. urticae in beans. T. neocaledonicus was more susceptible to ethion and profenofos than to the rest of the products used. This susceptibility was apparently similar during the egg and active stages. On the other hand, T. urticae was more susceptible to cyhexatin and dicofol than to the rest of the products used. Phytotoxicity was not observed in any case. On the contrary, several days after the application

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plants seemed to be rejuvenated in both localities; this effect was attributed to the nutritional status of the plants. (AS-CIAT)

0378

30784 GARZA G., E. Chapingo, México. 1985. Niveles económicos de daño de la conchuela, Epilachna varivestis Mulsant (Coleoptera:Coccinellidae), en tres variedades de frijol, Phaseolus vulgaris L. (Economic damage levels of Epilachna varivestis (Coleoptera:Coccinellidae) in three bean varieties). Tesis Mag.Sc. Universidad Autónoma de Chapingo. Colegio de Postgraduados. 86p. Es., Sum. Es., 40 Ref., Il.

Phaseolus vulgaris. Epilachna varivestis. Cultivars. Developmental stages. Resistance. Plant injuries. Defoliation. Mexico.

The no. of Epilachna varivestis larvae that plants of bean var. Canario 107, Ojo de Cabra 400, and Negro Puebla, at different development stages, can tolerate without significantly reducing yields, was determined at the Valle de Mexico Agricultural Exptl. Station (Chapingo, Mexico). The following E. varivestis larvae population levels/plant were studied: 0, 5, 10, 15, and 20 for var. Canario 107; 0, 7, 14, 21, and 28 for var. Ojo de Cabra 400; and 0, 8, 16, 24, and 32 for var. Negro Puebla. Four infestation dates were studied for the 3 var.: (1) from 15 days after germination; (2) from 30 days after germination; (3) from pod set; and (4) from seed set. It was concluded that the 3 var. differ as to the no. of E. varivestis larvae that they can tolerate per plant without suffering serious yield losses. These 3 var. were more susceptible to defoliation caused by E. varivestis larvae during the 1st stages of crop development. (AS (extract)-CIAT)

0379

29740 HALMAN, G.J.; POMMES, C.G.; HOLLANDS, J.M.J.; OREE, A. 1986. Infestación por el chinche verde de frijol Acrosternum marginatum (Palisot de Beauvois) sobre rendimiento de Phaseolus vulgaris L: su efecto. (The effect of infestation by the green stink bug Acrosternum marginatum on Phaseolus vulgaris yields). Turrialba 36(1):21-24. Es., Sum. Es., En., 7 Ref. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Phaseolus vulgaris. Acrosternum marginatum. Yields. Colombia.

Between March 1983-May 1984, 2 trials were carried out at CIAT-Palmira (Colombia) to determine the effect of different infestation levels of the green stink bug Acrosternum marginatum (Hemiptera: Pentatomidae) on the yield of dry bean Linea-24. Plants in 3.0 x 1.3 m-cages were infested with 0, 6, 12, and 24 4th and 5th instar nymphs during the entire postflowering period. The equation Y = 100 percent - 23 percent X + 3.8 percent X(2), where Y is the max. percentage yield and X = the no. of bugs/0.6 square meter significantly fitted the data. There was also a significant inverse relationship between 100-seed wt. and level of infestation. The cage alone significantly reduced yield by 15 percent. (AS)

0380

30782 MAHRT, G.G.; STOLTZ, R.L.; BLICKENSTAFF, C.C.; HOLTZER, T.O. 1987. Comparisons between blacklight and pheromone traps for monitoring the western bean cutworm (Lepidoptera:Noctuidae) in south central Idaho. Journal of Economic Entomology 80(1):242-247. En., Sum. En., 8 Ref., Il. [Beta Seed, Kimberly, ID 83341, USA]

Phaseolus vulgaris. Loxagrotis albicosta. Insect control. USA.

In 1982, 1983, and 1984, 2 types of pheromone traps were compared with the standard blacklight trap, used since 1958 in south central Idaho (USA) to

monitor western bean cutworm, Loxagrotis albicosta, populations and to predict damage on beans and maize. Pheromone traps were a handmade water-bucket trap and a modified Japanese beetle trap. For the overall trapping season, catches from both pheromone traps correlated well with catches from blacklight traps and with one another. In addition, total catches up to the time of peak moth flight from all 3 traps correlated well with percentage of damage to both bean pods and seeds. However, av. daily catch/trap showed a high amount of variability and lack of association between moth counts and damage. Traps located on the west side of fields at 1.2 m above ground provided the best catches. Results of this study suggest that pheromone traps can be used to replace the standard blacklight trap, which is expensive, nonselective, bulky, and dependent upon a power source. (AS)

0381

30654 VEGA M., R. 1981. Evaluación de insecticidas en el combate de larvas de lepidópteros del cultivo del frijol (Phaseolus vulgaris). (Evaluation of insecticides in the control of Lepidoptera larvae in beans). Tesis Ing.Agr. San José, Universidad de Costa Rica. 45p. Es., Sum. Es., 17 Ref.

Phaseolus vulgaris. Insecticides. Lepidoptera. Yields. Insect control. Costa Rica.

The effect of 5 insecticides (methomyl, cypermethrin, acephate, methyl parathion, and Bacillus thuringiensis) and a control treatment on the control of Lepidoptera in a commercial plantation of bean cv. Jamapa was studied in the Upala area (Alajuela, Costa Rica). The no. of larvae/plant, leaf area reduction (percentage), and yield were evaluated. The 1st evaluation was done 7 days after treatment application. Larvae population in the control treatment was significatively superior to that in the other treatments evaluated. Av. populations in the methyl parathion and B. thuringiensis treatments did not show significative differences, but were significatively greater than populations under the methomyl, cypermethrin, and acephate treatments. The 2nd evaluation was performed 17 days after treatment application. Larvae populations for the control, B. thuringiensis, methyl parathion, and methomyl treatments did not differ significatively among themselves, but were significatively greater than those under the cypermethrin and acephate treatments, between which no significative differences were found. Application of acephate surpassed all other treatments in terms of yield (except for cypermethrin). No statistically significative yield differences were found between the methyl parathion and methomyl treatments, but yield under both treatments was significatively superior to that of the control and B. thuringiensis treatments. Yield under the microbiologic treatment was significatively superior to that of the control. (AS (extract)-CIAT) See also 0304 0311 0418 0419 0421 0422

G00 GENETICS AND PLANT BREEDING

0382

30699 PATIL, M.M.; CHAUDHARI, A.N. 1986. Heterosis in French beans. Journal of Maharashtra Agricultural Universities 11(1):72-73. En., Sum. En., 6 Ref. [College of Agriculture, Pune-411 005, India]

Phaseolus vulgaris. Snap beans. Crossbreeding. Heterosis. Yields. Yield components. India.

Heterosis for grain yield and 6 yield components of 10 French bean F1 hybrids derived from crosses between 6 parents (Pusaparvati, Khaki, Vaghya,

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Jampa Improved, Contender, and Manus) was studied. A max. beneficial heterosis over the mid-parental value was obtained for no. of seeds/pod (64.18 percent), followed by grain yield (51.00 percent), no. of seeds/plant (46.00 percent), plant height (34.65 percent), and no. of pods/plant (34.55 percent). Comparatively, less heteroris was observed for pod length (2.04 percent). The parents Pusaparvati and Khaki, with mean seed yield of 40.60 and 33.16 g/plant, resp., present higher heterosis in most of the cross combinations; however, none of the crosses involving low x low yielding parents outyielded the high yielding parent Pusaparvati. (AS)

0383

30722 VOELKER, T.A.; STASWICK, P.; CHRISPEELS, M.J. 1986. Molecular analysis of two phytohemagglutinin genes and their expression in Phaseolus vulgaris cv. Pinto, a lectin-deficient cultivar of the bean. European Molecular Biology Organization Journal 5(12):3075-3082. En., Sum. En., 31 Ref., Il. [Dept. of Biology C-016, Univ. of California, San Diego, La Jolla, CA 92093, USA]

Phaseolus vulgaris. Seeds. Phytohemagglutinins. Genes. DNA. RNA. USA.

Phytohemagglutinin (PHA), the seed lectin of the common bean, is encoded by 2 highly homologous, tandemly linked genes, dlec1 and dlec1, which are coordinately expressed at high levels in developing cotyledons. Their resp. transcripts translate into closely related polypeptides, PHA-E and PHA-L, constituents of the tetrameric lectin which accumulates at high levels in developing seeds. In bean cv. Pinto UI111, PHA-E is not detectable, and PHA-L accumulates at very reduced levels. To investigate the cause of the Pinto phenotype, the 2 PHA genes of Pinto, called Pdlec1 and Pdlec2, were cloned and sequenced and the abundance of their resp. mRNAs in developing cotyledons was determined. Both genes are more than 90 percent homologous to the normal PHA genes found in other cv. Pdlec1 carries a 1-bp frameshift mutation close to the 5' end of its coding sequence. Only very truncated polypeptides could be made from its mRNA. The gene Pdlec2 encodes a polypeptide, which resembles PHA-L, and its predicted amino acid sequence agrees with the available Pinto PHA amino acid sequence data. Analysis of the mRNA of developing cotyledons revealed that the Pdlec1 message is reduced 600-fold, and Pdlec2 mRNA is reduced 20-fold with respect to mRNA levels in normal cv. A comparison of the sequences which are upstream from the coding sequence shows that Pdlec2 has a 100-bp deletion compared with the other genes (dlec1, dlec2, and Pdlec1). This deletion which contains a large tandem repeat may be responsible for the low level of expression of Pdlec2. The very low expression of Pdlec1 is as yet unexplained. (AS)
See also 0233 0283

G01 Breeding, Selection and Germplasm

0384

30783 DE LA TORRE., R. 1984. Determinación de algunos componentes de resistencia en frijol (Phaseolus vulgaris L.) a la roya (Uromyces phaseoli) (Pers.) Wint. var. typica (Arth.). (Determination of several resistance components in beans to rust (Uromyces phaseoli var. typica)). Tesis Mag.Sc. Chapingo, México, Universidad Autónoma de Chapingo. Colegio de Postgraduados. 93p. Es., Sum. Es., 49 Ref., Il.

Phaseolus vulgaris. Cultivars. Resistance. Uromyces phaseoli. Mexico.

Possible sources of resistance to Uromyces phaseoli among several bean lines and var. were determined by evaluating some resistance components.

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Furthermore, some morphophysiological elements in several bean var. that could be involved in the resistance response to rust were identified. Parameters measured in each var. were receptivity (no. of pustules/square centimeter), latent period (from inoculation to rupture of 50 percent of the pustules), type of infection, and time to teliospore appearance. Receptivity was the most unstable resistance component, since it varied with temp., leaf age, and inoculum concn. and application mean used. On the other hand, and within given limits, the most stable resistance components were type of infection, latent period, and teliospore formation. Stomatal index, stomata no. and size, and trichome no. had no significant effect on resistance components, and according to these results, were independent from leaf morphology. (AS (extract)-CIAT)

0385

30615 DETONGNON, J. 1985. Inheritance of stem elongation tendency in determinate forms of Phaseolus vulgaris (L.). Ph.D. Thesis. Corvallis, Oregon State University. 84p. En., Sum. En., 41 Ref., Il.

Phaseolus vulgaris. Cultivars. Plant habit. Shading. Inheritance. Crossbreeding. Stems. USA.

Preliminary observations were made to determine the effect of shading on the growth habit characteristics of 21 bean lines and cv. Based on these observations, 5 parents were selected for the inheritance study and crossed in all combinations including the reciprocals for a total of 20 crosses. Along with the preliminary observations, 10 lines and cv. were used in the greenhouse to determine the effect of artificial lighting on stem elongation. There were no significant differences between the 3 types of lighting, and there was no interaction between bean lines and light sources. The shading by maize plants significantly reduced both bean internode length and plant height. Heritability estimates varied widely between crosses and were higher for plant height than for internode length. Narrow-sense heritability estimates for both traits were relatively high in the cross E6211 x 5062. (CIAT)

0386

28210 IZQUIERDO, J.A.; KELLY, J.D.; HOSFIELD, G.L.; UEBERSAX, M.A. 1981. Common bean parental influence on white & off-white seed coat color in the common bean. Michigan Dry Bean Digest 5(4):13. En., 6 Ref., Il.

Phaseolus vulgaris. Seed coat. Seed color. Crossbreeding. Inheritance. USA.

Based on the Hunter L colorimetric scale, the whiteness indexes of 3 bean progeny groups (Nep-2 x Blacks, Nep-2 x Navies, and Navies x Blacks) and white parents (Nep-2 and Navies), namely Seafarer, Sanilac, and Tuscola, were analyzed, showing that progeny resulting from crosses of Nep-2 x Blacks never approached the desired degree of whiteness characteristics of the navy class. Since the whiteness of both navy and Nep-2 beans is due genetically to the presence of the recessive p or groundfactor gene, and since variation in whiteness between navy and Nep-2 beans may be due to the interference of a 2nd groundfactor Gri, it is recommended that Nep-2 should not be used as the only white color source in navy bean architectural breeding. (CIAT)

0387

27751 KELLY, J.D.; ADAMS, M.W. 1986. Utilization of phenotypic recurrent selection in bean breeding. Bean Improvement Cooperative. Annual Report

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29:11-12. En., [Dept. of Crop & Soil Sciences, Michigan State Univ., East Lansing, MI 48824, USA]

Phaseolus vulgaris. Plant breeding. Selection. USA.

Limitations of the system of conventional repetitive cycling of a biparental cross commonly used in the breeding of self-pollinated crops, in this case beans, are mentioned. A system of phenotypic recurrent selection (PRS) using S1 selection is suggested as a means of recombining desirable traits from 2 diverse germplasm pools. Different steps of such a breeding method are detailed, and advantages and disadvantages are mentioned. (CIAT)

0388

31105 PARK, S.J.; TU, J.C.; AYLESWORTH, J.W.; BUZZELL, R.I. 1987. Aresteuben field bean. Canadian Journal of Plant Science 67(3):817-818. En., Sum. En., Fr. [Research Station, Agriculture Canada, Harrow, Ontario, Canada NOR 1GO]

Phaseolus vulgaris. Cultivars. Resistance. Colletotrichum lindemuthianum. Bean common mosaic virus. Canada.

Aresteuben, an anthracnose-resistant cv. of yellow eye Phaseolus vulgaris with higher seed yield and earlier maturity than Steuben, was developed at the Research Station, Agriculture Canada, in Harrow (Ontario, Canada) and registered in Oct. 1986. Aresteuben carries the Are gene that confers resistance to the alpha, beta, gamma, delta, epsilon, and lambda races of bean anthracnose, Colletotrichum lindemuthianum, and the gene for resistance to race 15 of BCMV. (AS)

0389

30772 PARK, S.J.; DHANVANTARI, B.N. 1987. Transfer of common blight (Xanthomonas campestris pv. phaseoli) resistance from Phaseolus coccineus Lam. to P. vulgaris L. through interspecific hybridization. Canadian Journal of Plant Science 67(3):685-695. En., Sum. En., Fr., 22 Ref., Il. [Research Station, Agriculture Canada, Harrow, Ontario, Canada NOR 1GO]

Phaseolus vulgaris. Backcrossing. Hybridizing. Phaseolus coccineus. Resistance. Inheritance. Xanthomonas campestris pv. phaseoli. Flowering. Plant habit. Podding. Canada.

Four interspecific backcross populations derived from hybridizations between Phaseolus vulgaris x (P. vulgaris x P. coccineus) were produced to transfer common blight (Xanthomonas campestris pv. phaseoli) resistance from a blight-resistant accession of P. coccineus to white bean cv. and to determine the association between blight resistance and some agronomic characteristics. Frequency distribution of leaf blight resistance ratings in the BCF2 and BCF3 generations and of percent pod blight infection in the BCF3 generation appeared to be continuous, ranging between the resp. parental resistance reactions. This indicated that the transfer of common blight resistance from P. coccineus to P. vulgaris was feasible. Scores for leaf and pod blight were not associated, indicating differential blight resistance reactions of the 2 plant organs. Leaf blight was negatively correlated with days to blossom but was not correlated with growth habit and pod set except for 1 cross in which leaf blight and pod set were associated. Percent pod blight was negatively correlated with days to blossom in 2 crosses. Pod blight was not associated with growth habit and pod set except for 1 cross in which it was associated with pod set. Days to blossom and pod set were associated. Implications of these findings in the breeding of blight-resistant white bean cv. are discussed. (AS)

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0390

29995 PELOSO, M.J. DEL 1987. Genética da reacao do feijoeiro (Phaseolus vulgaris L.) a três racas fisiológicas de Colletotrichum lindemuthianum (Sacc. et Magn.) Scrib. (Genetics of bean reaction to three physiological races of Colletotrichum lindemuthianum). Tese Doctor Sc. Vicosa-MG, Brasil, Universidade Federal de Vicosa. 64p. Pt., Sum. Pt., 55 Ref., Il.

Phaseolus vulgaris. Inheritance. Resistance. Colletotrichum lindemuthianum. Cultivars. Crossbreeding. Genes. Brazil.

To study the inheritance of bean resistance to Colletotrichum lindemuthianum races BA-2 (alpha group), BA-5 (Brazilian group I), and BA-10 (delta group), all possible crosses were made between the anthracnose differential var. Michelite, Emerson 847, Dark Red Kidney, Costa Rica 1031, Perry Marrow, Phaseolus aborigineus 283, and Cornell 49-242. Progenies and plants of the F1 and F2 generations were inoculated using the multiple inoculation technique and were evaluated for resistance reaction to all 3 races. For race BA-2, the independent transmission of 4 dominant resistance genes, which Are and A perform as duplicate genes and X and Y as complementary genes, is proposed. For race BA-5, the independent transmission of 6 pairs of genes is proposed: Are performs as a dominant resistance gene; Br and S are duplicate recessive resistance genes that when dominant have an epistatic action on Are; and Q, Z, and W act as complementary recessive resistance genes. For race BA-10, the independent transmission of 7 pairs of genes is proposed: Are and R are complementary dominant resistance genes, as well as N and P; T, U, and V are complementary recessive resistance genes. The proposed genotypes for the different var. evaluated are described. (AS (extract)-CIAT)

0391

30713 RAM, H.H.; PRASAD, N.B. 1985. Linkage among genes for growth habit, plant height, pod size and pod shape in Phaseolus vulgaris L. Crop Improvement 12(1):14-17. En., Sum. En., 10 Ref. [Dept. of Plant Breeding, G.B. Pant Univ. of Agriculture & Technology, Pantnagar 263145 U.P., India]

Phaseolus vulgaris. Snap beans. Crossbreeding. Inheritance. Plant habit. Pod characters. Genes. Climbing beans. Dwarf beans. India.

Four plant type traits in French bean (indeterminate vs. determinate growth habit, tall vs. dwarf plant, round vs. flat pod, and long vs. short pod) were each found to be governed by a single pair of genes. The former form of the characters was detected to be dominant in the F2 of 2 crosses (Contender x Big Bend Red and UPF-488 x Big Bend Red). Pod size and shape assorted independently. The indeterminate growth habit was assorted with round pods, tall plant, and long pods. Similarly, round pod and tall plant, and tall plant and long pods were also found to be linked. The av. recombination value estimated between these pairs of traits was 22.75, 6.47, 33.36, 19.62, and 34.21 percent, resp., in the cross Contender x Big Bend Red. The corresponding recombination values in the cross UPF-488 x Big Bend Red were 30.04, 0.00, 32.02, 26.81, and 32.36 percent. (AS)

0392

29990 RUANO, R. 1984. Efecto del Cycocel (cloruro de 2 cloroetiltrimetilamonio). sobre la resistencia a sequía edáfica en plántulas de frijol mejorado (Phaseolus vulgaris L.) bajo condiciones de invernadero. (Effect of Cycocel (2-chloroethyl trimethylammonium chloride) on the resistance of improved bean seedlings to soil water stress under greenhouse conditions). Tesis Ing.Agr. Guatemala, Universidad de San Carlos. 48p. Es., Sum. Es., 17 Ref., Il.

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Phaseolus vulgaris. Resistance. Drought. Cultivars. Plant growth substances. Inhibitors. Guatemala.

An expt. was conducted under greenhouse conditions at the U. of San Carlos de Guatemala to determine (1) the adequate rate of chlormequat chloride to obtain optimum resistance of bean seedlings to soil water stress; (2) the bean var. that during the seedling stage withstands the longest drought periods; and (3) the effects of chlormequat chloride on bean performance. Three bean var. (Tamazulapa, Quetzal, and Jutiapan) and 4 chlormequat chloride rates (200, 500, 1000, and 2000 ppm) were used, in addition to the resp. controls. The longest drought resistance periods (21 and 17 days) were obtained with 500 ppm chlormequat chloride for seedlings of var. Quetzal and Tamazulapa, resp. The response of these var. to each rate of chlormequat chloride was different, while no favorable or significant response to treatments was obtained with var. Jutiapan, since its seedlings wilted severely and prematurely until completely dried due to the exptl. conditions. Av. resistance to drought due to chlormequat chloride treatments were 14.0, 12.0, and 3.5 days for seedlings of var. Quetzal, Tamazulapa, and Jutiapan, resp. On the other hand, the best av. resistances for chlormequat chloride rates were obtained with 500 and 1000 ppm (14 and 11 days, resp.). (AS (extract)-CIAT)

0393

30751 SANTOS, P.C. DOS; CARDOSO, A.A.; VIEIRA, C.; SILVA, J.C. 1986. Herdabilidade e correlacoes do rendimento com seus componentes, em dois cruzamentos de feijao. (Heritability and correlation of yields and yield components in two beans crosses). Revista Ceres 33(189):404-412. Pt., Sum. Pt., En., 12 Ref. [UNESP - Campus de Ilha Solteira, Sao Paulo-SP, Brasil]

Phaseolus vulgaris. Crossbreeding. Inheritance. Yields. Yield components. Brazil.

The heritabilities and correlation coefficients between yield and yield components were estimated in 2 Phaseolus vulgaris crosses: Preto Sessenta Dias 40 x Ricopardo 896 and Preto Sessenta Dias 53 x Ricopardo 896. Narrow-sense heritability estimates for mean seed no./pod, yield/plant, and pod no./plant were high in the cross Preto Sessenta Dias 53 x Ricopardo 896. In the cross Preto Sessenta Dias 40 x Ricopardo 896, however, heritability estimates were very low. In both crosses, the highest phenotypic, genotypic, and environmental correlations were between pod no./plant and yield/plant. Phenotypic correlations between mean seed no./pod and yield/plant were high in both crosses. Phenotypic correlations among yield components were low in both crosses. Path coefficient analysis showed that in the cross Preto Sessenta Dias 53 x Ricopardo 896 the highest direct genotypic effect on yield was caused by pod no./plant, while in the cross Preto Sessenta Dias 40 x Ricopardo 896, it was caused by mean seed no./pod. In both crosses, mean seed wt. had the lowest direct genotypic effect on yield. (AS)

0394

29999 SCHETTINI, T.M. 1985. Field and growth room studies of phosphorus efficiency in two inbred backcross populations of common bean (Phaseolus vulgaris L.). Ph.D. Thesis. Madison, University of Wisconsin. 180p. En., Sum. En., 67 Ref., Il.

Phaseolus vulgaris. Cultivars. Backcrossing. Nutrient solution. Mineral deficiencies. P. Growth. Shoots. Yields. Mineral content. USA.

Bean line PI 206002, identified as P efficient in low-P nutrient solution culture, was used as the donor parent in 2 inbred backcross (IB) populations with the cv. Sanilac and Black Turtle Soup (BTS) as the

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recurrent parents. Vegetative growth was measured in a P-deficient nutrient solution culture (3 mg P/plant) and in field trials on a soil moderately deficient in P (29 kg Bray 1 P/ha), in plots with (high-P) or without (low-P) added P fertilizer. Plants in the field plots were harvested at 1st flower for determination of shoot biomass, accumulation of P in the shoot (low-P plot only), and at maturity for seed yield. In the Sanilac IB population several lines that resembled Sanilac in general morphology were identified as P-efficient in the nutrient solution culture (10-25 percent more shoot dry wt. accumulation than Sanilac). Some of these lines accumulated 30-50 percent more shoot dry wt. and more P in the shoot tissue at 1st flower than Sanilac in the low-P field plot but did not differ from Sanilac in the high-P field plot. Since lines did not differ for shoot P efficiency ratio (mg dry wt./unit tissue P), vegetative P-efficiency in the field may be related to differences in acquisition of P from the soil, or to general tolerance to P stress since growth in standing nutrient solution culture should not be due to acquisition of P from the medium. Some lines with seed yields higher than Sanilac may have both the vegetative P efficiency of PI 206002 and the ability to convert this growth into seed production. The BTS IB population was derived from a cross between 2 P-efficient parents: BTS and PI 206002. Transgressive segregation for P efficiency was not observed in this population in the growth room or field studies, therefore the parents may not differ for the genetic factors controlling P efficiency. (AS (extract))

0395

31049 TAY U., J.; FRANCE I., A.; PAREDES C., M.; KRAMM M., V. 1987. Cuyano-INIA, nuevo cultivar de poroto, resistente al mosaico común. (Cuyano-INIA, a new mosaic-resistant bean cultivar). Agricultura Técnica 47(2):187-188. Es., Sum. En., 2 Ref. [Estación Experimental Quilamapu, INIA, Casilla 426, Chillán, Chile]

Phaseolus vulgaris. Cultivars. Resistance. Bean common mosaic virus. Uses. Agronomic characters. Chile.

The origin, agronomic and grain characteristics, disease resistance, cultivation area, and uses of the new BCMV-resistant bean cv. Cuyano-INIA, released by the Instituto Nacional de Investigaciones Agropecuarias-Chile, are briefly indicated. (AS)

0396

30698 VAID, K.; SINGH, F.M.; GUPTA, V.P. 1985. Combining ability in dry beans (Phaseolus vulgaris L.). Crop Improvement 12(2):155-158. En., Sum. En., 2 Ref. [S.K. Univ. of Agricultural Sciences & Technology, Shalimar, Kashmir, India]

Phaseolus vulgaris. Snap beans. Crossbreeding. Inheritance. India.

In the combining ability analysis in 6 x 6 diallel cross of rajmash (French beans), HUR-91 was found to be best combiner for grain yield. This parent was also a good combiner for tallness, late maturity, late flowering, pod no. and length, seeds/pod, and 100-grain wt. Among the crosses, HUR-9 x HUR-67, HUR-9 x HUR-87, and HUR-37 x HUR-91 were found to have high specific combining ability effects; however, high specific combining effects were retained for grain yield only in HUR-9 x HUR-67 in the F2 generation. For protein content, HUR-9 and HUR-37 were high combiners in both generations. The specific combining ability effects were largely unfixable for most of the traits. In future breeding programs in India, emphasis should be placed on breeding for better combining ability of the material by creating more divergence for predominantly additive gene effects. (AS) See also 0249 0326 0330 0363 0378

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G02 Cytogenetics

0397

31101 MACKENZIE, S.A.; BASSETT, M.J. 1987. Genetics of fertility restoration in cytoplasmic male sterile Phaseolus vulgaris L. 1. Cytoplasmic alteration by a nuclear restorer gene. Theoretical and Applied Genetics 74(5):642-645. En., Sum. En., 9 Ref. [Vegetable Crops Dept., Univ. of Florida, Gainesville, FL 32611, USA]

Phaseolus vulgaris. Plant fertility. Sterility. Backcrossing. Genes. Inheritance.

Restoration of fertility in cytoplasmic male sterile Phaseolus vulgaris by line R-351 was controlled by a single gene. The restorer gene (Fr) displayed incomplete dominance leading to partial restoration of fertility in F1 generations; full restoration was not achieved until the F2 generation. Once full restoration of fertility was produced in the F2 generation, no segregation for sterility was observed in subsequent generations derived from heterozygotes Frfr, either by test crossing (restored x maintainer) or in F3 progenies. Implications of the irreversible nature of this restoration are discussed. (AS)

H00 NUTRITION

0398

31429 FLEMING, S.E.; VOSE, J.R. 1979. Digestibility of raw and cooked starches from legume seeds using the laboratory rat. Journal of Nutrition 109:2067-2075. En., Sum. En., 34 Ref.

Phaseolus vulgaris. Laboratory animals. Diets. Animal nutrition. Digestibility. Bean starch. Cooking. Canada.

The in vivo digestibility and growth responses to diets containing raw and cooked legume starches were determined using male Wistar rats. These starches were obtained from 7 legumes including smooth- and wrinkled-seeded field peas, navy beans, kidney beans, garbanzo beans, mung beans, and lentils. Wheat and potato starch diets were fed for comparative purposes. With the exception of potato and the field pea starches, rats fed uncooked starch diets had higher wt. gains than those fed cooked starch diets. The starches from wheat and all legumes, excluding the high-amylose wrinkled pea, were nearly 100 percent digestible but the legume starches reduced the digestibility of casein protein by 3-4 percent. Raw potato starch was shown to be only 57 percent digestible. The starches from potato and wrinkled pea reduced the digestibility of casein protein to 87 percent and gave high cecum wt. These characteristics were not altered by cooking the starch of wrinkled pea. The starches of smooth-seeded peas, lentils, and all beans were highly digestible, showed no adverse effects on growth and were comparable with wheat starch in this evaluation. (AS)

0399

30636 GUYENET, P.G.; YOUNG, W.S. 1987. Projections of nucleus paragigantocellularis lateralis to locus coeruleus and other structures in rat. Brain Research 406(1-2):171-184. Sum. En., 48 Ref., 11. [Univ. of Virginia School of Medicine, Dept. of Pharmacology, 1300 Jefferson Park Ave., Charlottesville, VA 22908, USA]

Phaseolus vulgaris. Phytohemagglutinins. Animal nutrition. USA.

The projections of the retrofacial portion of nucleus paragigantocellularis lateralis (retrofacial PGCL) were mapped in the rat with the Phaseolus vulgaris leucoagglutinin anterograde tracing technique. This structure projects to a restricted no. of bulbar or spinal nuclei involved in autonomic regulation, principally the intermediolateral cell column of the spinal cord, the nucleus tractus solitarius complex, the lateral parabrachial and Kolliker-Fuse nuclei, and the ventrolateral medulla. Retrofacial PGCL also densely innervates the locus coeruleus. This projection originates in large part from phenylethanolamine-N-methyltransferase-immunoreactive cells (C1 adrenergic cluster) as demonstrated by immunohistochemistry combined with the retrograde transport of rhodamine-tagged microbeads. A very small suprabulbar projection of retrofacial PGCL was also detected in some cases. (AS)

0400

31410 KURTZMAN JUNIOR, R.H.; HALBROOK, W.U. 1970. Polysaccharide from dry navy beans, Phaseolus vulgaris: its isolation and stimulation of Clostridium perfringens. Applied Microbiology 20(5):715-719. En., Sum. En., 12 Ref., Il.

Phaseolus vulgaris. Flatulence. Microbiology. Carbohydrate content. USA.

A microbiological assay is described for determining gas produced by Clostridium perfringens from materials believed to be flatulent. A rationale for its use is given and analyzed. The fractionation and the results of the assay for several components of lima beans and navy beans are given. In particular, a polysaccharide was isolated from dried navy bean seeds. Only about 1/7 as much could be isolated from green lima bean seeds as from navy bean seeds. The polysaccharide stimulates voluminous gas production by C. perfringens and meets all criteria of the rationale for flatulent suspects. It has not been tested on humans; however, data from the microbiological assay correlate well with human results for green and dry lima beans and navy beans. (AS)

0401

31104 PROCTOR, J.P.; WATTS, B.M. 1987. Effect of cultivar, growing location, moisture and phytate content on the cooking times of freshly harvested navy beans. Canadian Journal of Plant Science 67(3):923-926. En., Sum. En., Fr., 18 Ref. [Dept. of Foods & Nutrition, Univ. of Manitoba, Winnipeg, Manitoba, Canada R3T 2N2]

Phaseolus vulgaris. Cultivars. Adaptation. Cooking. Timing. Water content. Canada.

The effects of cv. and growing location on cooking times of navy beans were determined. Freshly harvested samples of Seafarer, Ex Rico 23, and Fleetwood cv. were collected from 3 locations in Manitoba, Canada. Cooking times were determined using a Mattson Bean Cooker equipped with 48-g, 5-mm-diameter plungers. Times to reach the 92 percent cooked point were compared. The Ex Rico 23 cv. had a longer cooking time than the other cv. at one location. At other locations the cv. effect was not significant. All cv. had significantly longer cooking times when grown in Winnipeg than when grown in Brandon or Morden. No relationship could be established between moisture or phytate content of the samples and cooking times. (AS)

0402

31428 WAGNER, J.R.; CARSON, J.F.; BECKER, R.; GUMBMANN, M.R.; DANHOF, I.E. 1977. Comparative flatulence activity of beans and bean fractions for man and the rat. Journal of Nutrition 107:680-689. En., Sum. En., 18 Ref.

201

Phaseolus vulgaris. Laboratory animals. Flatulence. Diets. Animal nutrition . USA.

To evaluate H2 production in the rat after ingestion of legume products as a predictive bioassay of their flatulence activity for man, responses of man and the rat to (1) a bland formula diet, (2) cooked California Small White bean (CSW) solids, (3) 70 percent ethanol extract of (2), (4) oligosaccharide fraction of (3), (5) nonprotein N fraction of (3), and (6) combination of (4) and (5) were compared. Six human subjects were fed an 800 kcal breakfast of (1) or containing the amount of a test item equivalent to 100 g CSW. Each subject received all items once plus a single replicate of 3 items at the rate of 1/wk. in random order. Total flatus vol., H2, CO2, and CH4 vol. and breath H2 concn. were measured for the interval 2.5-8.5 h after breakfast. Young rats in metabolic chambers received known amounts of items 2 to 6 mixed with a bland basal diet. H2 trapped in the chambers was measured after 20 h. Correlation of rat H2 and to human breath H2 measurements and flatus gas vol. were significant and positive except for negative correlation with flatus methane vol. Measurement of H production in the rat has potential for a predictive bioassay for flatulence in man. (AS)

0403

31427 WAGNER, J.R.; BECKER, R.; GUMBMANN, M.R.; OLSON, A.C. 1976. Hydrogen production in the rat following ingestion of raffinose, stachyose and oligosaccharide-free bean residue. Journal of Nutrition 106:466-470. En., Sum. En., 11 Ref., Il.

Phaseolus vulgaris. Laboratory animals. Carbohydrate content. Flatulence. Animal nutrition. USA.

Raffinose and stachyose were compared with cooked California Small White beans (CSW) containing 4 percent alpha-oligosaccharides (stachyose and raffinose) and to oligosaccharide-free CSW solids (residue from hexane and 70 percent ethanol extraction of CSW) as sources of H when ingested by rats maintained in life support systems. If the oligosaccharide content were the only H source in CSW, it would have had to be 25 times as potent as CSW, but raffinose was only 5 times and stachyose 7 times as potent as CSW. Oligosaccharide-free residue was 0.4-0.5 as active as CSW. H producing potencies of stachyose and raffinose were enhanced by feeding in combinations with residue. The increases in H production from the combinations were more than additive. Thus, CSW contains at least one 70 percent alcohol-insoluble substance which, in addition to the oligosaccharides, is essential to bring about quantitatively the physiological response to whole beans observed in rats. (AS)

H01 Foods and Nutritive Value

0404

29998 BIRCH, R.E.W. 1985. Black beans (Phaseolus vulgaris), bean broth and growth of preschool Guatemalan children. Ph.D. Thesis. Pullman, Washington State University. 182p. En., Sum. En., 104 Ref., Il.

Phaseolus vulgaris. Human nutrition. Diets. Dietary value. Proteins. Guatemala.

Black beans and bean broth are fed as weaning foods to Guatemalan children. A bean broth-child growth study was designed to determine the frequency of weaning use of different bean foods, the relationship between growth and bean foods, and diarrhea and bean foods. Dietary growth and morbidity data

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from children in the 1969-77 Instituto de Nutrición de Centro America y Panama 4 village study were analyzed. From the 1227 children included in the bean broth-child growth study, 1149 of whom ate bean foods, 65 percent were given broth as the 1st bean weaning food, 24 percent bean solids, and 11 percent beans and broth. The mean age of broth introduction to children was 15 mo. Energy and protein were the 2 nutrients most notably low at all ages. Also lacking were ascorbic acid, Ca, thiamin, niacin, and Fe. Children who consumed high amounts of bean broth had less time ill with diarrhea (P less than 0.049). Children fed high amounts of bean solids were taller (P less than 0.0007) and heavier (P less than 0.012) than children fed less beans than the mean. Bean broth may be effective as an oral rehydration formula. (AS)

I00 MICROBIOLOGY

0405

30702 TRUFEM, S.F.B.; BONONI, V.L. 1985. Micorrizas vesículo-arbusculares de culturas introduzidas em áreas de Cerrado. (Vesicular-arbuscular mycorrhizae in crops introduced into Cerrado areas). Rickia 12:165-187. Pt., Sum. En., Pt., 85 Ref. [Inst. de Botânica, Caixa Postal 4005, Sao Paulo-SP, Brazil]

Phaseolus vulgaris. Mycorrhizae. Brazil.

From Aug. 1982 to April 1984 a survey was carried out in Moji-Guacu (Sao Paulo, Brazil) to identify the vesicular-arbuscular mycorrhizae from cotton, eggplant, sugarcane, beans, citrus, cassava, and maize from Cerrado soil as well as in 2 species of native Cerrado plants: Stryphnodendron adstringens and Bauhinia holophylla. Twenty-four taxa of vesicular-arbuscular mycorrhizae were identified and 4 patterns of distribution are proposed. The most frequent species found in beans were Gigaspora heterogama and Glomus macrocarpum. The av. no. of spores of vesicular-arbuscular mycorrhizae in Cerrado soils was 21.54 spores/100 g soil; soils of cultures show an av. of 20.63 spores/100 g soil vs. 35.42 spores/100 g soil for soils of natural vegetation. (AS) See also 0289 0298 0299 0310

I01 Rhizobium spp., Nitrogen Fixation and Nodulation

0406

30761 BORTHAKUR, P.; LAMB, J.W.; JOHNSTON, A.W.B. 1987. Identification of two classes of Rhizobium phaseoli genes required for melanin synthesis, one of which is required for nitrogen fixation and activates the transcription of the other. Molecular and General Genetics 207(1):155-160. En., Sum. En., 28 Ref., Il. [John Innes Inst., Colney Lane, Norwich NR4 7UH, UK]

Phaseolus vulgaris. Rhizobium phaseoli. Nitrogen fixation. Nodulation. United Kingdom.

The symbiotic plasmid pRP2JI of Rhizobium phaseoli strain 8002 was shown to contain 2 separate regions of DNA which are required and sufficient for the synthesis of the pigment melanin. One of these regions containing the class II mel gene(s) was located to other genes involved in nodulation and in N fixation. Mutations in this region abolished both the ability to synthesize melanin and to fix N in Phaseolus bean root nodules. Mutations

in the other, unlinked region, containing class I mel gene(s), also abolished melanin synthesis but did not affect symbiotic N fixation. Transcriptional fusions between the class I mel gene and the Escherichia coli lacZ gene were constructed and it was demonstrated that the class II mel gene(s) activated their transcription in free-living culture. Further, strains containing the cloned regulatory class II gene(s) synthesized melanin when growing in min. medium, in contrast to wild-type strains which became pigmented only in complete medium containing yeast extract and tryptone. It was shown by hybridization expt. that the regulatory mel gene was closely linked to or may correspond to the regulatory nifA gene; a fragment of R. phaseoli DNA which included the class II gene(s) of R. phaseoli hybridized to a previously identified nifA-like gene of R. leguminosarum, the species that nodulates peas. (AS)

0407

30633 CORDERO M., M.G. 1982. Respuesta de cuatro cultivares de frijol a la inoculación con Rhizobium phaseoli en la zona de Alajuela, Costa Rica. (Response of four bean cultivars to the inoculation with Rhizobium phaseoli in the Alajuela area, Costa Rica). Tesis Ing.Agr. San José, Universidad de Costa Rica. 72p. Es., Sum. Es., 97 Ref., Il.

Phaseolus vulgaris. Cultivars. Inoculation. Rhizobium phaseoli. Fertilizers. N. Nodulation. Mineral content. Canopy. Yields. Protein content. Seed. Costa Rica.

The response of 4 bean cv. (Ica Pijao, Jamapa, Porrillo Sintético, and Turrialba 4) to the inoculation with Rhizobium phaseoli in the presence of 2 levels of N (0 and 100 kg/ha) was evaluated in the Alajuela area, Costa Rica. Nodule no. and dry wt., dry wt. and total N content of the aerial part of the plants (50 percent flowering), grain yield, and percentage protein in grains were evaluated. Results obtained do not indicate a response to the variables studied, both in relation to the cv. or to the N fertilization treatments, although tendencies of response to this element were observed. Inoculation treatments only had significative effects on nodule no. and dry wt.; both registered an increase with the addition of the inoculant. The cv. x N interaction affected only the nodule no. and the percentage protein in the grain. For the nodule no., the opposite occurred between the addition of N and the formation of nodules for the 4 cv. tested. The highest percentage protein values were registered for cv. Jamapa and Turrialba 4 in the absence of N and for Porrillo Sintético and Ica Pijao in the presence of N. The N x inoculum interaction was statistically significative only for nodule no. and dry wt., both increasing in the absence of N. (AS (extract)-CIAT)

0408

30787 GARDEZI, A.K. 1986. Selección de genotipos de Phaseolus vulgaris de alta eficiencia en la fijación de nitrógeno asociado con Rhizobium phaseoli. (Selection of highly efficient Phaseolus vulgaris genotypes in nitrogen fixation associated with Rhizobium phaseoli). Tesis Mag.Sc. Chapingo, Mexico, Universidad Autónoma de Chapingo. Colegio de Postgraduados. 244p. Es., Sum. Es., 91 Ref., Il.

Phaseolus vulgaris. Genotypes. Rhizobium phaseoli. Inoculation. Fertilizers. N. Nitrogen fixation. Mineral content. Leaf area. Mexico.

The N fixation potential of 48 Mexican Phaseolus vulgaris genotypes was evaluated using 2 inoculation treatments, one with Rhizobium phaseoli strain CP.MEX-1, considered as highly effective, and the other with EL-57,

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considered ineffective. Two N application treatments (0 and 60 kg/ha) were also studied for comparative purposes; 3 replicates/treatment were used. Considering the percentage of total plant N and the no. of flowers/plant, it can be concluded that inoculation with strain CP.MEX-1 not only substitutes but surpasses fertilization with 60 kg N/ha. Inoculation can also substitute fertilization since, statistically, both provide the same leaf area value. Inoculation, however, was unable to substitute fertilization regarding dry wt. of aerial parts, since values were significantly higher for N fertilization. (CIAT)

0409

31024 PADILLA, J.E.; CAMPOS, F.; CONDE, V.; LARA, M.; SANCHEZ, F. 1987. Nodule-specific glutamine synthetase is expressed before the onset of nitrogen fixation in Phaseolus vulgaris L. Plant Molecular Biology 9(1):65-74. En., Sum. En., 40 Ref., Il. [Depto. de Biología Molecular de Plantas, Centro de Investigación sobre Fijación de Nitrógeno, U.N.A.M., Apartado Postal 565-A, Cuernava, Mor. México]

Phaseolus vulgaris. Nodulation. Enzymes. Acetylene reduction. Nitrogen fixation. Mexico.

Glutamine synthetase (GS) expression was studied in developing root nodules of common bean regarding the time-course of specific activity, antigen accumulation, polypeptide composition, and in vitro translation products. The nodule-specific GS polypeptide (GS-gamma) was detected prior to the nitrogenase acetylene-reducing activity and its accumulation together with that of the GS-alpha and GS-beta polypeptides was found to vary with nodule age. GS-gamma is present in ineffective nodules, although in a lower ratio to GS-beta than in wild-type nodules. Comparisons of in vitro translated and in vivo synthesized GS polypeptides suggest no post-translational modifications. The possible factors and mechanisms involved in the regulation of expression of GS polypeptides are discussed. (AS)

0410

30748 PIHA, M.I.; MUNNS, D.N. 1987. Nitrogen fixation potential of beans (Phaseolus vulgaris L.) compared with other grain legumes under controlled conditions. Plant and Soil 98(2):169-182. En., Sum. En., 20 Ref., Il. [Land, Air & Water Resources, Univ. of California, Davis, CA 95616, USA]

Phaseolus vulgaris. Rhizobium phaseoli. Nitrogen fixation. Nodulation. Growth. Acetylene reduction. USA.

Greenhouse expt. were carried out under favorable conditions to compare effective bean symbiosis with cowpea and soybean symbioses and with N-fertilized controls. Growth, N accumulation, nodulation, acetylene reduction, H evolution, and the effect of native rhizobia on symbiotic performance were evaluated. Inferior performance of beans could not be attributed to differences in acetylene reduction or nodule wt., but bean nodules were smaller and more numerous and evolved more H (relative energetic efficiency was 0.5-0.7 in bean). Relative N accumulation was influenced by N accumulation characteristics of the fertilized plants as well as the symbiotic plants. The vegetative N-fixation period of early maturing beans was shorter than for cowpeas of similar maturation date; the beans flowered earlier and had a longer pod-filling period. There was no evidence that the common bean symbiosis was more sensitive than the others to competition from native rhizobia. With mixed populations of effective rhizobia, H evolution in other Phaseolus species (P. acutifolius, P. coccineus, P. filiformis, P. lunatus) was similar to that in P. vulgaris. Although failure to establish effective nodulation is often considered the reason for poor N-fixation by common bean in the field, the species may be

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genetically predisposed to poor fixation because of symbiotic inefficiency and the short vegetative fixation period. (AS)

0411

30770 PIHA, M.I.; MUNNS, D.N. 1987. Sensitivity of the common bean (Phaseolus vulgaris L.) symbiosis to high soil temperature. Plant and Soil 98(2):183-194. En., Sum. En., 15 Ref., Il. [Land, Air & Water Resources, Univ. of California, Davis, CA 95616, USA]

Phaseolus vulgaris. Nitrogen fixation. Soil temperature. Nodulation. Growth. Fertilizers. N. Rhizobium. Symbiosis. USA.

Expt. were done to test whether N fixation is more sensitive to high soil temp. in common bean than in cowpea or soybean. Greenhouse expt. compared nodulation, nitrogenase activity, growth, and N accumulation of several host/strain combinations of common bean with the other grain legumes and with N fertilization, at various root temp. Field expt. compared relative N accumulation (in symbiotic relative to N-fertilized plants) of common bean with cowpea under different soil thermal regimes. N-fertilized beans were unaffected by the higher temp., but N accumulation by symbiotic beans was always more sensitive to high root temp. (33, 33/28, 34/28 degrees Celsius compared with 28 degrees Celsius) than were cowpea and soybean symbioses. Healthy bean nodules that had developed at low temp. functioned normally in acetylene reduction tests done at 35 degrees Celsius. High temp. caused little or no suppression of nodule no.; however, bean nodules produced at high temp. were small and had low specific activity. For common bean some tolerance to high temp. was observed among rhizobium strains (e.g., CIAT 899 was tolerant) but not among host cv. Heat tolerance of Phaseolus acutifolius and P. lunatus symbioses was similar to that of cowpea and soybean. In the field, high surface soil temp. did not reduce N accumulation in symbiotic beans more than in cowpea, probably because of compensatory nodulation in the deeper and cooler parts of the soil. (AS)

0412

31039 SANCHEZ, F.; CAMPOS, F.; PADILLA, J.; BONNEVILLE, J.M.; ENRIQUEZ, C.; CAPUT, D. 1987. Purification, cDNA cloning, and developmental expression of the nodule-specific uricase from Phaseolus vulgaris L. Plant Physiology 84(4):1143-1147. En., Sum. En., 22 Ref., Il.

Phaseolus vulgaris. Enzymes. Nodulation. Nitrogen fixation. Analysis. Mexico.

Nodule-specific uricase (uricase II) from Phaseolus vulgaris was purified to homogeneity by chromatographic methods. Purification data indicated that uricase II is approx. 2 percent of the total soluble protein from mature nodules. Specific antiserum was raised and used to determine the developmental expression and for immunoselection of polysomes. Uricase II was antigenically detected early in nodule development, 2-3 days before N fixation. Uricase-encoding cDNA clones were isolated by hybridizing a nodule-specific pUC9 cDNA library with labeled mRNA from immunoselected polysomes and a 35,000 mol. wt. uricase II-encoding cDNA from soybean. An homologous clone (pNF-UR07) was used to assess the expression pattern of the specific transcript during development. Northern-blot analysis indicated that uricase II mRNA is exclusively expressed in nodule tissue. (AS)

0413

30700 SURYANARAYANA, V.; PRAMODKUMAR, J. 1985. Plant composition, nitrogen relations and yield of French bean as influenced by Rhizobium inoculation and applied nitrogen and phosphorus. Andhra Agricultural Journal

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32(4):259-262. En., Sum. En., 10 Ref. [Dept. of Horticulture, Agricultural College, Bapatla 522 101, India]

Phaseolus vulgaris. Snap beans. Inoculation. Rhizobium phaseoli. Fertilizers. N. P. Chlorophyll. Yields. Protein content. Mineral content. India.

Rhizobium phaseoli inoculation, combined with 20 kg N/ha and graded doses of P, significantly increased leaf chlorophyll content, available N in the soil at harvest, and yield of French bean fresh pods. DM production, N and protein contents in the whole plant, and N uptake varied significantly for N and P alone. The interaction N x P had a significant effect only on chlorophyll content and available residual N in the soil. The interaction N x Rhizobium was significant regarding chlorophyll, N, and protein contents, available residual N in the soil, and pod yield. P x Rhizobium significantly increased all parameters, except N uptake and yield. The 2nd-order interaction (N x P x Rhizobium) was significant in all cases, except N uptake. In general, the combination of 20 kg N and 100 kg P/ha along with Rhizobium inoculation was ideal for higher French bean yields in sandy loam soils. (AS) See also 0289 0298 0299 0310

J00 ECONOMICS AND DEVELOPMENT

0414

29981 HEATH, M.C. 1987. Grain legumes in UK agriculture. Outlook on Agriculture 16(1):2-7. En., Sum. En., 47 Ref., Il. [MAFF/ADAS, Midlands & Western Regional Office, Woodthorpe, Wolverhampton, United Kingdom]

Phaseolus vulgaris. Production. United Kingdom.

A brief historical account on grain legume (peas, broad beans, beans, lupin, and soybeans) production for human and animal consumption in the United Kingdom is presented. Future projections of these legumes are also analyzed. It is concluded that plant breeders play an important role in developing new lupin, soybean, and navy bean var. adapted to conditions prevailing in the United Kingdom; likewise, agronomists should develop optimum cultural practices for the new var. or cropping models. The future importance of grain legumes in United Kingdom agriculture will depend on the success of breeders and agronomists. (CIAT)

0415

27638 SANINT, L.R.; NIVAS, L.; DUQUE, M.C.; SERE, C. 1984. Food consumption patterns in Colombia--a cross-sectional analysis of the DANE/DRI 1981 household survey. In Centro Internacional de Agricultura Tropical. Trends in CIAT commodities. Cali, Colombia, Internal Document-Economics 1.9 pp.31-63. En., 8 Ref.

Phaseolus vulgaris. Consumption. Income. Prices. Colombia. CIAT-1.

Quantitative information on Colombian consumption of different foods (among them beans) is presented by region, urban or rural sector, and income strata in terms of physical amounts, contribution to protein and calorie supply, and expenditure share. The study was based on a cross sectional survey of 9000 households undertaken by the Depto. Nacional de Planeación and the Depto. Administrativo Nacional de Estadística during the last trimester of 1981. Data are also included on the estimation of income, price and cross-price elasticities for various types of foods of particular relevance to CIAT research by income strata. (CIAT)

0416

30716 WILHELM, L.R. 1981. Bulk density of fresh snap beans in commercial shipments. Tennessee Farm and Home Science no.117:6-7. En., Sum. En., 3 Ref., Il.

Phaseolus vulgaris. Snap beans. Trade. USA.

Calculations of snap bean bulk density were made from mass and vol. measurements of bulk shipments delivered to processing plants. The mean bulk density value was 442.15 kg/cubic meter, considerably higher than the 386.08 kg/cubic meter found using the conventional mass designation for a bushel of snap beans. In addition to compaction during loading, an additional in-transit compaction of about 3 percent was observed. (AS) See also 0283 0308 0309

L00 GRAIN STORAGE

0417

30796 KERMASHA, S.; METCHE, M. 1987. Changes in lipoxygenase and hydroperoxide isomerase activities during the development and storage of French bean seed. Journal of the Science of Food and Agriculture 40(1):1-10. En., Sum. En., 37 Ref., Il. [Dept. of Food Science & Agricultural Chemistry, MacDonald College of McGill Univ., 21111 Lakeshore Road, Ste Anne de Bellevue, Quebec, Canada H9X 1C0]

Phaseolus vulgaris. Enzymes. Snap beans. Seed. Storage. Canada.

Lipoxygenase and hydroperoxide isomerase activities were investigated during the development and maturation of French bean seed after freeze-storage or drying. Enzyme activities were determined in French bean seed prior to germination, 5 days after germination, 30 days before maturity, and in the mature succulent green bean (at maturity). Activities of both enzymes were very low before germination, increased dramatically after 5 days of germination, then decreased slightly with time to maturity. Blanching treatment inhibited both activities completely when seed was stored for 18 mo. at -18 degrees Celsius. Lipoxygenase activity increased in the unblanched seed whereas hydroperoxide isomerase activity decreased after 18 mo. of freezer storage at -18 degrees Celsius. Air drying inhibited the activities of both enzymes. (AS) See also 0267 0329

L01 Stored Grain Pests

0418

28260 CORTES G., M.L. 1985. Evaluación de la resistencia de nueve genotipos de frijol común (Phaseolus vulgaris L.) al ataque de Acanthoscelides obtectus Say, a nivel de campo y laboratorio. (Evaluation of resistance of nine bean genotypes to the attack of Acanthoscelides obtectus, in the field and lab). Tesis Ing.Agr. Bogotá, Universidad Nacional de Colombia. 102p. Es., Sum. Es., En., 37 Ref., Il.

Phaseolus vulgaris. Genotypes. Acanthoscelides obtectus. Resistance. Insect biology. Yield components. Yields. CIAT-2. Colombia.

At CIAT 9 Phaseolus vulgaris genotypes, harvested in Palmira and Popayan, were evaluated for their susceptibility to the attack of Acanthoscelides

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obtectus. Three strains of the insect from different origins (Bogota, Palmira, and Rionegro) were used. Resistance of the material was also evaluated at 3 temp. (20, 25, and 28 degrees Celsius) and a RH of 70-80 percent. Pods were infested at 4 different developmental stages in the field to determine the stage preferred for oviposition by A. obtectus females. This also served to classify the genotypes according to their resistance. Fifty seeds/genotype were infested with 2 eggs/seed in the lab. studies. Pods were harvested 10 days after infestation to be evaluated in the lab. The greatest emergence of adults occurred in seed harvested in Palmira while the highest dry wt./adult was greater in seed harvested in Popayan. There were no location effects for the life cycle. Regarding the colonies, the Bogota colony had a significantly greater av. no. of emerged adults while the Rionegro colony had a significantly higher dry wt./adult and a longer life cycle. For both locations, genotypes G12895, G09983, and G12938 did not differ significantly from the susceptible checks. Genotypes G11051, G12909, and G12946 were not significantly different from the resistant check G12952. There was a significant variation for genotypes, temp., and their interaction for the no. of emerged adults, dry wt./adult, and life cycle. The best temp. for rearing A. obtectus was 28 degrees Celsius. This was significantly different from 20 degrees Celsius in its effect on the no. of emerged adults and life cycle. In the field there were significant variations for genotypes and developmental stages for all parameters, except for the no. of emerged adults/seed. In the stage of dry light-brown pods there was greater infestation and development of A. obtectus in the field. The susceptible var. had a significantly greater dry wt./adult than all the other lines, except G12895 and G09983, and a shorter shorter life cycle than G12952, G12946, G11051, and G12938. Lines G12952 and G09983 had fewer adults/pod than G12895, G12938, and G12946 but were not significantly different from Bunsi and Calima. Positive correlations were found among the variables: seeds/pod and punctures/pod; seeds/pod and life cycle; percentage of seeds with exit holes and adults/seeds. Negative correlations were found among seed/pod and adults/seed; seed/pod and dry wt./adult, punctures/pod and dry wt./adult; life cycle and dry wt./adult. The negative correlation between dry wt./adult and life cycle showed an antibiotic effect on A. obtectus in resistant lines. (AS (extract))

0419

29795 FRANCO, T.L. 1986. Insectos del frijol almacenado y su control. (Stored bean pests and their control). Cali, Colombia, Centro Internacional de Agricultura Tropical. Centro de Información sobre Frijol. 4p. Es., Il. Es plegable. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Phaseolus vulgaris. Zabrotes subfasciatus. Acanthoscelides obtectus. Insect biology. Insect control. Cultural control. Chemical control. Stored grain pests. CIAT-1. Colombia.

The biology of the main stored bean pests (Zabrotes subfasciatus and Acanthoscelides obtectus), their control at the small-farmer (cultural control and use of vegetable oils and ash) and commercial levels (disinfestation and protection), and control by var. resistance are briefly analyzed. Color photos are included. (CIAT)

0420

28620 GATEHOUSE, A.M.R.; FENTON, K.A.; JEPSON, I.; PAVEY, D.J. 1986. The effects of alpha-amylase inhibitors on insect storage pests: inhibition of alpha-amylase in vitro and effects on development in vivo. Journal of the Science of Food and Agriculture 37(8):727-734. En., Sum. En., 25 Ref., Il. [Dept. of Botany, Univ. of Durham, South Road, Durham DH1 3LE, England]

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Phaseolus vulgaris. Enzymes. Inhibitors. Callosobruchus maculatus. Stored grain pests. United Kingdom.

Protein alpha-amylase inhibitors were prepared from wheat and their effects tested against insect storage pests both in vitro against the insect alpha-amylases and in vivo in insect feeding trials. Inhibitor fraction A was found to inhibit porcine pancreatic alpha-amylase but not insect alpha-amylases, whereas fractions B, C, and D (0.28) did not inhibit porcine pancreatic alpha-amylase but were strong inhibitors of digestive alpha-amylases from larvae of Tribolium confusum, a storage pest of wheat products, and Callosobruchus maculatus, a storage pest of legume seeds. Fraction D, which was a single polypeptide of Mr 13 000 was the most effective inhibitor in vitro. It would appear that the degree of inhibition by the wheat alpha-amylase inhibitor preparations can be correlated with the presence of the Mr 13 000 (0.28) polypeptide since the purer this polypeptide the stronger was the inhibition; fraction A which contained 2 polypeptides of Mr 60 000 and 58 000 caused no inhibition. The effects of fractions B and C on larval development were determined in insect feeding trials. With C. maculatus both fractions were toxic, their relative effectiveness being directly paralleled by their effectiveness observed in vitro. Only fraction C was tested against T. confusum in feeding trials. Despite this fraction being equally effective against both pests in vitro it had very little effect upon larval development of T. confusum in vivo, thus suggesting that this organism is able to detoxify the wheat alpha-amylase inhibitors. This is the 1st time that the effects of identified inhibitor fractions have been monitored both in vitro and in vivo. The results, in contrast to previous proposals, suggest that selecting wheat var. for high alpha-amylase inhibitory activity may not be a very reliable criterion in selecting for insect resistance. (AS)

0421

29715 GONZALEZ V., M.; ROCHE, R.; SIMANCA, M.E. 1985. Capacidad de infestación y emergencia del coleóptero Zabrotes subfasciatus, plaga de granos almacenados. (Infestation capacity and emergence of Zabrotes subfasciatus, a pest of stored beans). Ciencias de la Agricultura 23:31-37. Es., Sum. Es., En., 8 Ref.

Phaseolus vulgaris. Zabrotes subfasciatus. Insect biology. Cuba.

Studies carried out in black bean var. ICA-Pijao indicated that the female of Zabrotes subfasciatus is capable of laying up to 56 eggs and infesting 36 beans during its whole life cycle. Fecundity and infestation increase proportionately to the no. of beans exposed, and there is a tendency to a max. value. Data are provided regarding mean values of oviposition, no. of grains infested, and the percentages of adult emergence. Other interesting biological aspects are also discussed. (AS)

0422

30792 MEIK, J.; DOBIE, P. 1986. The ability of Zabrotes subfasciatus to attack cowpeas. Entomologia Experimentalis et Applicata 42(2):151-158. En., Sum. En., Fr., 16 Ref., Il. [Tropical Development & Research Inst., London Road, Slough, Berks, SL3 7HL, United Kingdom]

Phaseolus vulgaris. Zabrotes subfasciatus. Insect biology. Callosobruchus maculatus. Colombia. United Kingdom.

The biological and behavioral responses of 2 strains of Zabrotes subfasciatus to beans and cowpeas were compared. One strain was collected from beans in Colombia and the other from cowpeas in Uganda. The 2 strains

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irrespective of their geographical or nutritional histories laid eggs on both types of seed and the distribution over time of egg laying for the 2 strains was found to be similar on each commodity. Both strains fed and developed on the 2 types of seed and no significant differences were found between the no. of progeny developing on each. Competition between Z. subfasciatus and Callosobruchus maculatus was investigated using replacement series expt. at high and low population densities. Competition coefficients were calculated for the 2 species and at both densities neither species had a clear competitive advantage over the other. (AS)

MOO USES, INDUSTRIALIZATION AND PROCESSING

0423

28220 DAJANI, U.H. 1977. Dry edible beans quality aspects that concern the canner. Michigan Dry Bean Digest 2(1):6-7. En., Il.

Phaseolus vulgaris. Processing. Canned beans. Seed characters. USA.

Problems faced by bean canners regarding the quality of the finished product are discussed. Some of their problems directly concern the grower, when he fails to apply good crop management practices. Although many of these problems (except mold) can be eliminated or minimized, the grower should implement good horticultural, harvesting, and storage practices. Cracked skins, another important problem, can cause both qualitative (matting of beans inside the can and degradation due to mushiness and graininess) and quantitative (disintegration of beans during the process of canning and loss of skins and split to disposing areas) losses. Since cracked skins are detected through seed sampling and evaluation, some guidelines are given to ensure a good grading for dry edible beans for the canning industry. (CIAT)

0424

30608 FENNO JUNIOR, C.W. 1984. Use of specially treated starches in bread baking. Ph.D. Thesis. Fargo, North Dakota State University. 126p. En., Sum. En., 127 Ref., Il.

Phaseolus vulgaris. Bean starch. Irradiation. Bean flour. Uses. USA.

Wheat, barley, and navy bean starches were modified by sprouting and irradiation. Starch was extracted from grains sprouted for 1-3 days and was treated with gamma radiation at levels of 1000 and 5000 Gray (Gy). The physicochemical properties of native starches extracted from wheat, barley, and navy bean generally conformed to results reported by other researchers. Sprouting had only a slight effect on the physicochemical properties of navy bean starch and a pronounced effect on barley and wheat starches. Sprouting generally increased the amylose content, lowered the temp. of initial pasting and the peak height, and increased the swelling power of the starches, although there was no linear pattern coinciding with the length of sprouting time. Irradiation caused a weakening of the starch granule structure. The results were more pronounced with the higher level of radiation treatment. Radiation treatment increased amylose content, lowered the peak height, lowered the intrinsic viscosity, increased starch damage as well as the swelling power of the various starches. There were no apparent changes in the appearance of navy bean starch granules modified by sprouting. All starch granules modified by both levels of irradiation showed no visible changes from the native starch granules of the same species. Farinograph results showed very little differences in all of the reconstituted flours. The physical handling characteristics of doughs produced with identical mixing times and identical additional water did not

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vary significantly from sample to sample. Panning heights of loaves including all native and modified starches were not significantly different. This evidence suggests that gluten, water-solubles, and sludge are the deciding factors in the performance of a dough system. All the reconstituted flours produced acceptable loaves of bread. There was an increase in vol. for loaves baked with 5000 Gy-irradiated starch. (AS (extract))

0425

30604 LEE, J.J. 1984. Studies of dry-roasted and air-classified navy bean flour fractions: physicochemical characteristics, storage stability, and rheological properties. Ph.D. Thesis. East Lansing, Michigan State University. 183p. En., Sum. En., 173 Ref., Il.

Phaseolus vulgaris. Processing. Bean flour. Bean starch. Temperature. Storage. USA.

Navy beans were dry-roasted in a particle-to-particle heat exchanger under various roasting conditions, dehulled by air aspiration, pin-milled, and air-classified to yield whole, hull, high protein, and high starch flour fractions. Evaluation of these flours was conducted in 3 studies. Compositional differences were demonstrated among all flour fractions. Stachyose was the major oligosaccharide in all fractions and was the highest in the protein fraction. Substituting 10 percent bean flour for wheat changed water absorption and dough stability for all fractions. Pasting characteristics of whole flour and high starch flours were demonstrated to be controlled swelling at high temp. Flour fractions from 4 roasting treatments were stored under 8 water activity levels (aw's). High roasting time/temp. conditions resulted in decreased equilibrium moisture. After 2 mo. storage, flours in aw above 0.75 were moldy. Flours stored in increased aw showed increased browning with concurrent decrease of protein solubility and glucose content. Flours stored up to 24 mo. with 6 and 9 percent moisture at 20 degrees Celsius or with 6 percent moisture at 37.7 degrees Celsius retained good quality. Gelatinization and rheological properties of purified starch pastes (6, 8, 10, and 12 percent) were evaluated using a computer-assisted Haake Viscometer. Pastes were stirred at a constant shear rate of 50 rpm at 75, 85, and 95 degrees Celsius for up to 60 min. Activation energy of starch gelatinization was estimated to be 14.5 Kcal/g mole. Various swelling responses of starch during cooking were demonstrated. Max. final viscosity values were obtained at 85 degrees Celsius for all starch concn. except a max. at 95 degrees Celsius for 6 percent. (AS (extract)) See also 0283 0401

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ABBREVIATIONS AND ACRONYMS

A	Angstrom(s)
ABA	Abscisic acid
ac	Acre(s)
Af.	Afrikaans
a.i.	Active ingredient
alt.	Altitude
AMV	Alfalfa mosaic virus
approx.	Approximate(ly)
Ar.	Arab
atm.	Atmosphere
ATP	Adenosine 5'-triphosphate
av.	Average
BAP	6-Benzylaminopurine
BBMV	Broad bean mosaic virus
BCMV	Bean common mosaic virus
Bg.	Bulgarian
BGMV	Bean golden mosaic virus
BGYMV	Bean golden yellow mosaic virus
BOD	Biochemical oxigen demand
BPMV	Bean pod mottle virus
BRMV	Bean rugose mosaic virus
BSMV	Bean southern mosaic virus
BV	Biological value
BYMV	Bean yellow mosaic virus
ca.	About (circa)
CAMD	Cassava African mosaic disease
CMV	Cassava African mosaic virus
CBB	Cassava bacterial blight
CBSD	Cassava brown streak disease
CEC	Cation exchange capacity
CER	CO2 exchange rate
CF	Cassava flour
CGR	Crop growth rate
Ch.	Chinese
CLM	Cassava leaf meal
CLV	Cassava latent virus
CM	Cassava meal
cm	Centimeter(s)
COD	Chemical oxigen demand
concn.	Concentration
CP	Crude protein
Cs.	Czech
CSL	Calcium stearyl lactylate
CSW	Cassava starch wastes
C.V.	Coefficient of variation
cv.	Cultivar(s)
2,4-D	2,4-dichlorophenoxyacetic acid
Da.	Danish
DM	Dry matter
DNA	Deoxyribonucleic acid
EC	Emulsifiable concentrate
EDTA	Ethylenediaminetetraacetic acid
EEC	European Economic Community
e.g.	For example
ELISA	Enzyme-linked immunosorbent assays
EMS	Ethyl methane sulfonate
En.	English
EP	Preliminary Trials, CIAT
Es.	Spanish
expt.	Experiment(s)
exptl.	Experimental
Fr.	French
ft-ca	Foot candles (10.76 lux)
FYM	Farmyard manure
g	Gram(s)
G	Giga (109)
GA	Gibberellic acid
gal	Gallon(s)
GE	Gross energy
GERs	Glucose entry rates
GLC	Gas-liquid chromatography
Gr.	Greek
h	Hour(s)
ha	Hectare(s)
HCN	Hydrocyanic acid
HDP	Hydroxypropyl distarch phosphate (modified cassava starch)
He.	Hebrew
Hi.	Hindi
HI	Harvest index
hp	Horsepower
Hu.	Hungarian
IAA	Indoleacetic acid
IBA	Indolebutyric acid
IBYAN	International Bean Yield and Adaptation Nursery, CIAT
Il.	Illustrations
in.	Inches
In.	Indonesian
It.	Italian
IU	International unit
J	Joule
Ja.	Japanese
kat	Katal(amount of enzymatic activity that converts 1 mole of substrate/s)
kcal	Kilocalorie(s)
kg	Kilogram(s)
De.	
km	
KNap	
Ko.	
kR	
La.	
LAD	
LAI	
lat.	
lb	
LD50	
LER	
LPC	
lx	
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Mal.	
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mol.	
m.p.	
NAA	
NAD	
NADH	
NAR	
NCE	
NE	
NER	
Nl.	
nm	
no.	
No.	
NPFs	
NPR	
NPU	
NW	
OM	
oz	
p.	
P	
Pa	
PAN	
PCNB	
PDA	
PER	
pH	
Pl.	

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German	kJ	Kilojoule
Kilometer(s)	pp.	Pages
Potassium naphthenate	pphm	Parts per hundred million
Korean	PPI	Preplanting incorporation
Kiloroentgen(s)	ppm	Parts per million
Latin	PSA	Potato sucrose agar
Leaf area duration	Pt.	Portuguese
Leaf area index	pv.	Pathovar
Latitude	Ref.	Reference
Pound(s)	resp.	Respective(ly)
Mean lethal dose	Rf	Retardation factor-chromatography
Land efficiency ratio		
Leaf protein concentrate	RGR	Relative growth rate
Lux	RH	Relative humidity
Mega	RNA	Ribonucleic acid
Meter(s)	Ro.	Romanian
Malay	rpm	Revolutions per minute
Maximum	Ru.	Russian
Moisture content	s	Second
Metabolizable energy	SBM	Soybean meal
Milliequivalent(s)	SCN	Thiocyanate
Methionine	SCP	Single cell protein
Milligram(s)	SDS	Sodium dodecyl sulfate
Reciprocal ohm	Sk.	Slovak
Minimum	Sn.	Slovene
Minute(s)	sp.	Species
Milliliter(s)	spp.	Species
Millimeter(s)	SSL	Sodium stearyl-2-lactylate
Month	Sum.	Summary
Molecular weight	Sv.	Sweddish
Melting point	t	Ton(s)
Alpha-naphthalene acetic acid	TDN	Total digestible nutrients
	temp.	Temperature
Nicotinamide adenine dinucleotide	TIA	Trypsin inhibitor activity
	TIBA	2,3,5-Triiodobenzoic acid compound with N-methylmethanamine
Nicotinamide adenine dinuclectide, reduced form		
Net assimilation rate	TLC	Thin-layer chromatography
Net CO2 exchange	TMV	Tobacco mosaic virus
Northeast	Tr.	Turkish
Net energy ratio	TSH	Thyroid-stimulating hormone
Dutch	UDPG	Uridine diphosphate glucose
Nanometer(s) (10-9 m)	Uk.	Ukrainian
Number(s)	UMS	Unmodified cassava starch
Norwegian	Ur.	Urdu
Negative production factors	UV	Ultraviolet
Net protein ratio	var.	Variety(ies), varietal
Net protein utilization	VEF	Bean Team Nursery, CIAT
Northwest	VFA	Volatile fatty acids
Organic matter	vol.	Volume
Ounce(s)	VPD	Vapor pressure deficit
Page	vpm	Volume per million
Probability	vs.	Versus
Pascal(s)	W	West, watt
Peroxyacetic nitrate	wk.	Week
Pentachloronitrobenzene	WP	Wettable powder
Potato dextrose agar	wt.	Weight
Protein efficiency ratio	yr	Year(s)
Hydrogen ion concentration	/	Per
Polish		

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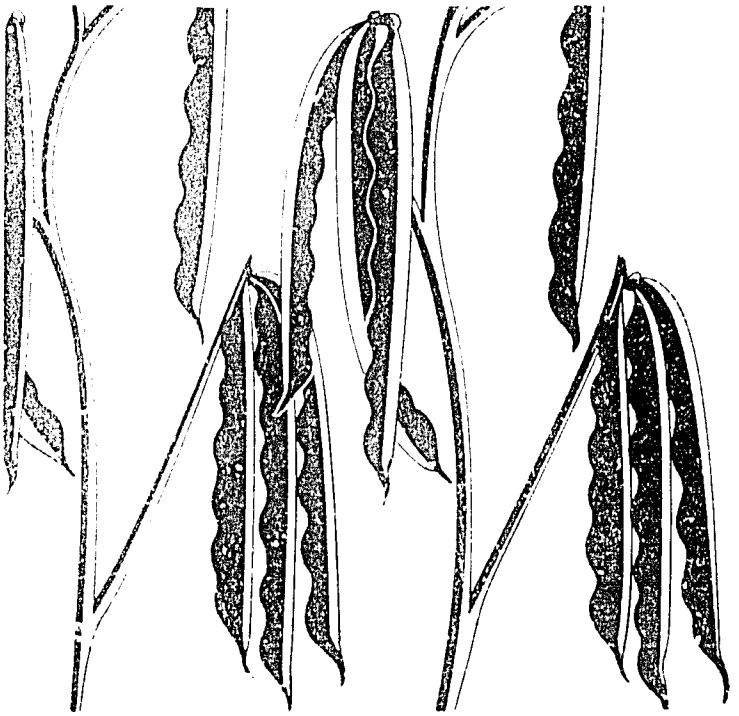

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Abstracts on Field Beans

(*Phaseolus vulgaris* L.)

Vol. XIII No. 3 December, 1988

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INTRODUCTION

This journal of analytical abstracts is designed to provide a specialized guide to the world's literature on field beans (*Phaseolus vulgaris* L.), disseminating research results and ongoing activities related to the crop.

The abstracts present condensed information from journal articles, booklets, reports, theses, manuals, and other conventional and nonconventional material, categorized into broad disciplinary fields. These are complemented with author and subject indexes to enable more comprehensive consultation.

When information is required on a specific topic, CIAT's Bean Information Center can carry out bibliographic searches of its entire document collection. As part of this service, users receive a set of abstracts of the articles related to the topic of their interest. The full text of these articles is available through the Photocopy Service of the Communication and Information Support Unit.

The Specialized Information Centers on cassava (*Manihot esculenta* Crantz) and on tropical pastures also publish abstract journals in their respective areas.

COMPONENTS OF AN ABSTRACT

Accession number (for photocopy requests) — Authors — Year of publication — Sequential number in the journal (for use of indices) — Original title — Additional notes — Source — Pages — Language of paper — Language of summary — Author address

[19421 ABATE, T.; NEGASI, A. 1981. 0118 Chemical control of American bollworm (Heliothis armigera) (Hubner) with ultra-low-volume sprays. Ethiopian Journal of Agricultural Science 3(1):44-55. Engl., Sum. Engl., 11 Refs.
[Inst. of Agricultural Research, P.O. Box 2003, Addis Ababa, Ethiopia]

Descriptors

Phaseolus vulgaris. Injurious insects. Lepidoptera. Heliothis armigera. Insect control. Chemical control. Ethiopia.

Abstract

Expt. consisting of ultralow vol. formulations of endosulfan (500 and 750 g a.i./ha), cypermethrin (150 g a.i./ha), fenitrothion (960 g a.i./ha), profenofos (750 g a.i./ha), and an untreated check were conducted for 2 consecutive yr against Heliothis armigera on haricot beans at the Awassa and Nazareth Expt. Stations of the Institute of Agricultural Research (IAR), Ethiopia. The treatments were replicated 5 times in a randomized complete block design on 20 x 20 m plots. Of the insecticides used, single application of cypermethrin gave a more consistent and significant control than the check in both seasons at both stations. A new product, cypermethrin/profenofos 166^{R}, substituted for fenitrothion at Nazareth in the 1980 season, gave promising results to warrant further testing. Endosulfan, a recommended insecticide against the American bollworm in the past, was not as satisfactory as cypermethrin in its control of H. armigera on haricot beans. [AS]

Abstractor and/or translator

HOW TO USE THE INDEXES

The numbers listed under each entry in the author and subject indexes correspond to the abstract's sequential number, found above each abstract within the journal.

The last issue of the year contains cumulative author and subject indexes for the year.

Author Index

The Author Index can be used to find abstracts when the personal or corporate authors are known. The Author Index, which is alphabetically arranged, lists *all* author and co-author names cited in the publication.

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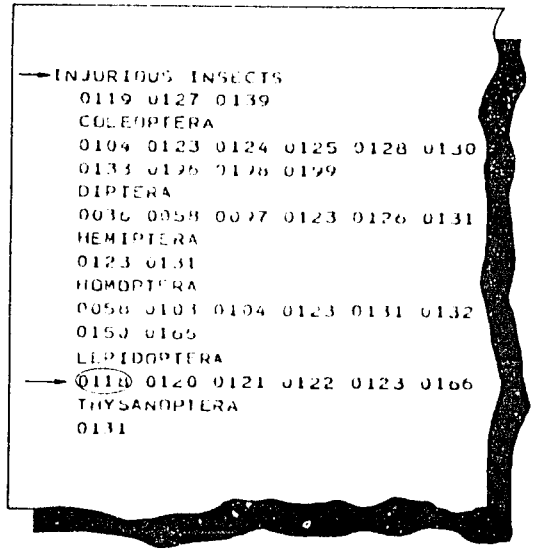
The Subject Index presents an alphabetical list of descriptors used in beans research, many of which are combined with other descriptors, allowing the identification of more specific topics.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A00 BOTANY, TAXONOMY AND GEOGRAPHICAL DISTRIBUTION

0426

28604 CARDENAS R., F. 1984. Clasificación preliminar de los frijoles en México. (Preliminary classification of beans in Mexico). México, Secretaría de Agricultura y Recursos Hidráulicos. Instituto Nacional de Investigaciones Agrícolas. Folleto Técnico no.81. 59p. Es., 9 Ref., Il.

Phaseolus vulgaris. Seeds. Plant anatomy. Seed characters. Podr. Mexico.

Various morphological and agronomical characteristics of 495 bean collections, most of them from Mexico and several from Guatemala and USA, were studied in order to form groups. The parameters used were grain, plant, and pod characteristics, earliness, and reaction to pests and diseases. The samples studied were divided into 6 large groups designated as I (canary type), II (round type), III (mixed characteristics), IV (cinnamon type), V (black type), and VI (large kidney bean); the 1st 5 belonging to Phaseolus vulgaris, and the latter to P. coccineus. A description of the different groups and subgroups found is included, and their distribution in the different areas of Mexico is indicated. (CIAT)

B00 PLANT ANATOMY, MORPHOLOGY AND CYTOLOGY

0427

29913 REUNIAO NACIONAL DE PESQUISA DE FEIJAO, 2. GOIANIA-GO, BRASIL. 1987. 1987. Resumos. (Summaries). Brasilia, Empresa Brasileira de Pesquisa Agropecuaria. Centro Nacional de Pesquisa de Arroz e Feijao. Documentos no.20. 113p. Pt., 180 Ref.

Phaseolus vulgaris. Cultivation. Diseases and pathogens. Injurious insects. Microbiology. Weeds. Plant physiology. Plant breeding. Economics. Brazil.

One-hundred eighty summaries of articles on bean agrometeorology, botany, intercropping, economics, rural engineering, entomology, soil fertility, physiology, pathology, breeding, microbiology, weeds, cultural practices, and seeds, presented at the 2nd national meeting on bean research held in Goiana (Goias, Brazil), are presented. An author index is also included. (CIAT)

0428

31731 SILVA, D.M.; MIACHIR, J.I.; SILVA, M.C.; REIS, B.F. DOS 1987. Fusao de protoplastos de duas espécies de solanaceas e de duas leguminosas em campos elétricos. (Protoplast fusion of two solanaceous and two legume species in electric fields). Summa Phytopathologica 13(1-2):113-121. Pt., Sum. Pt., En., 11 Ref., Il. [Secao Fitovirologia e Microscopia Electronica, CENA e Depto. de Química, ESALQ/USP, Piracicaba-SP, Brasil]

Phaseolus vulgaris. Analysis. Resistance. Cytology. Diseases and pathogens. Brazil.

Protoplast electrofusion of Nicotiana tabacum vs. Lycopersicon peruvianum and 2 Phaseolus vulgaris cv. (Mulatinha and Parana 1) was studied. The electric fields necessary to produce protoplast fusion were generated by alternating current field 600 kilocycles/s and 150 V/cm; direct current field 700 V/cm square wave pulses with 44 microsecond in duration. For fusion the 2 types of protoplasts with cells/ml, suspended in 0.4 molar mannitol, were mixed together in equal amounts and pipetted into fusion chamber. All manipulation for protoplast fusion was carried out in a

laminar-flow hood. The results observed under inverted optical microscopy show that electrofusion among the Solanaceae or Leguminosae as well as cell multiplication during 6 days are possible. This method can be considered an additional way to produce resistant plants against several pathogens. (AS)

0429

31491 VAN VOLKENBURGH, E.; CLELAND, R.E. 1986. Wall yield threshold and effective turgor in growing bean leaves. Planta 167(1):37-43. En., Sum. En., 29 Ref., Il. [Dept. of Botany, Univ. of Washington, Seattle, WA 98195, USA]

Phaseolus vulgaris. Cell walls. Cell division. Leaves. Growth. Mathematical model. USA.

The rate of cell enlargement depends on cell-wall extensibility (m) and on the amount of turgor pressure (P) which exceeds the wall yield threshold (Y). The difference (P-Y) is the growth-effective turgor (Pe). Values of P, Y, and Pe have been measured in growing bean leaves with an isopiestic psychrometer, using the stress-relaxation method to derive Y. When rapid leaf growth is initiated by light, P, Y, and Pe all decrease. Thereafter, while the growth rate declines in maturing leaves, Y continues to decrease, and Pe actually increases. These data confirm earlier results indicating that the changes in light-stimulated leaf growth rate are primarily controlled by changes in m, and not by changes in Pe. Seedlings incubated at 100 percent RH have increased P, but this treatment does not increase growth rate. In some cases Y changes in parallel with P so that Pe remains unchanged. These data point out the importance of determining Pe, rather than just P, when relating cell turgor to the growth rate. (AS)

0430

24875 YEUNG, E.C. 1983. Developmental changes in the branched parenchyma cells of bean-seed coat. Protoplasma 118(3):225-229. En., Sum. En., 9 Ref., Il. [Dept. of Biology, Univ. of Calgary, Calgary, Alberta, Canada T2N 1N4]

Phaseolus vulgaris. Seeds. Seed coat. Embryo. Cell structure. Canada.

Structural specializations occurring in the branched parenchyma cells of the seed coat of Phaseolus vulgaris started at the globular stage of embryo development with the formation of rough endoplasmic reticulum (RER). The cytoplasm of the branched parenchyma cells was gradually filled with an extensive system of RER cisternae. Other cytoplasmic organelles also increased in abundance, particularly the dictyosomes and mitochondria. In the cotyledon stage, the ER cisternae became dilated and formed a labyrinthine system of intercommunicating spaces separated by channels of cytoplasm. There was little further change in the overall ultrastructural pattern of the cell till the maturation stage when the ER cisternae became gradually reduced in size and fragmented into short segments. Other cytoplasmic organelles were also greatly reduced in no. As the seed started to dry out, these parenchyma cells were crushed and dehydrated. (AS)

C00 PLANT PHYSIOLOGY

0431

31733 ALBERT, F.; ANDERSON, A.J. 1987. The effect of Pseudomonas putida colonization on root surface peroxidase. Plant Physiology 85(2):537-541.

248

En., Sum. En., 30 Ref., Il. [Dept. of Biology, Utah State Univ., Logan, UT 84322-4500, USA]

Phaseolus vulgaris. Enzymes. Pseudomonas putida. Analysis. Roots. USA.

Increased activities of peroxidase and IAA oxidase were detected on root surfaces of bean seedlings colonized with a soil saprophytic bacterium, Pseudomonas putida. IAA oxidase activity increased over 250-fold and peroxidase 8-fold. Enhancement was greater for 6-day-old than for 4- or 8-day-old inoculated plants. No IAA oxidase or peroxidase activities were associated with the bacterial cells. Native polyacrylamide gel electrophoresis demonstrated that washes of P. putida-inoculated roots contained 2 zones of peroxidase activity. Only the more anodic bands were detected in washes from noninoculated roots. Ion exchange and molecular sizing gel chromatography of washes from P. putida-colonized roots separated 2 fractions of peroxidase activity. One fraction corresponded to the anodic bands detected in washes of P. putida inoculated and in noninoculated roots. A 2nd fraction corresponded to the less anodic zone of peroxidase which was characteristic of P. putida-inoculated plants. This peroxidase had a higher IAA oxidase to peroxidase ratio than the more anodic, common enzyme. The changes in root surface peroxidases caused by colonization by a saprophytic bacterium are discussed with reference to plant x pathogen interactions. (AS)

0432

31462 BOLHAR-NORDENKAMPF, H.; GRUNWEIS, E. 1987. Determination of the total chlorophyll distribution pattern in living leaves. Photosynthesis Research 12(1):13-23. En., Sum. En., 18 Ref., Il. [Inst. fur Pflanzenphysiologie, Univ. Wien, A-1091 Vienna, Althanstrabe 14, Austria]

Phaseolus vulgaris. Leaves. Chlorophyll. Herbicides. Fe. Mineral deficiencies. Austria.

The chlorophyll content of small areas on the living leaf blade of Phaseolus vulgaris was determined using a microscopic spectrophotometer. As consequence of the thicker mesophyll accompanying the veins, the chlorophyll concn. was 50 percent higher in this tissue. A lower chlorophyll concn. was observed in the thinner leaf tip and in the oldest regions at the leaf base. At the leaf tip, the leaf base, and in the tissue along the veins an Fe deficit causes less bleaching than in the areoles. In the same leaf regions the bleaching herbicide atrazine induces rapid bleaching if supplied through transpiration stream. The application of atrazine on the leaf surface gives rise to the contrary effect. All these phenomena seem to be a result of a differing water supply by the xylem vessels. (AS (extract))

0433

31748 CERVONE, F.; DE LORENZO, G.; DEGRA, L.; SALVI, G.; BERGAMI, M. 1987. Purification and characterization of a polygalacturonase-inhibiting protein from Phaseolus vulgaris L. Plant Physiology 85(3):631-637. En., Sum. En., 34 Ref., Il. [Depto. di Biologia Vegetale, Universita di Roma La Sapienza, Piazzale A. Moro, 00100, Rome, Italy]

Phaseolus vulgaris. Enzymes. Inhibitors. Proteins. Italy.

Homogeneous endopolygalacturonase (PG) was covalently bound to cyanogen bromide-activated Sepharose, and the resulting PG-Sepharose conjugate was utilized to purify, by affinity chromatography, a protein from Phaseolus vulgaris hypocotyls that binds to and inhibits polygalacturonase. Isoelectric focusing of the purified polygalacturonase-inhibiting protein (PGIP) showed a major protein band that coincided with polygalacturonase-

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inhibiting activity. PGIP formed a complex with polygalacturonase at pH 5.0 and at low salt concn. The complex dissociated in 0.5 molar Na-acetate and pH values lower than 4.5 or higher than 6.0. Formation of the polygalacturonase-PGIP complex resulted in complete inhibition of PG activity. Polygalacturonase activity was restored upon dissociation of the complex. The protein exhibited inhibitory activity toward polygalacturonases from Colletotrichum lindemuthianum, Fusarium moniliforme, and Aspergillus niger. The possible role of PGIP in regulating the activity of fungal polygalaturonases and their ability to elicit plant defense reactions are discussed. (AS)

0434

31772 HOLUBOWICZ, R.; TAYLOR, A.G.; GOFFINET, M.C.; DICKSON, M.H. 1987. The physiological nature of snap bean semi-hard seeds. bean Improvement Cooperative. Annual Report 30:85-86. En., 3 Ref., Il. [Poznan Agricultural Univ., Faculty of Horticulture, Dept. of Seed Science & Nursery, Seed Science Division, Baranowo, 62-081, Przezmierowo, Poland]

Phaseolus vulgaris. Snap beans. Seeds. Plant physiology. Seed hardening. Water content. Seed coat. Phenol content. USA.

Research was conducted on the physiological characteristics of snap bean semi-hard seeds where germination and plant growth are more vigorous depending on the initial seed moisture content. The anatomical and chemical properties of the seed coat were studied to determine where and how water enters the seed. Both total phenol in the osteosclereid cells underlying the palisade layer and the presence of more pectic substances in the palisade cells of chalazal part of the testa could account for the impermeability of snap bean semi-hard seeds. (CIAT)

0435

31721 MOVILLA D., B.J.; GONZALEZ, A.M.; MARULANDA V., E. 1986. Necesidades hídricas de dos variedades de frijol (Phaseolus vulgaris L.) en condiciones de invernadero. (Water requirements of two bean varieties under greenhouse conditions). Acta Agronómica 36(2):168-176. Es., Sum. Es., En., 4 Ref.

Phaseolus vulgaris. Cultivars. Irrigation. Evapotranspiration. Yield components. Yields. Colombia.

The effect of different water sheets, determined by the evaporation in a type A evaporimeter tank located outside the U. Nacional de Colombia (Palmira) greenhouse, on the var. Porrillo Sintetico and Calima was analyzed. Significant differences were found between the humid and dry treatments with increasing plant development as the amount of water in the soil increased. The highest bean yields in the Porrillo Sintetico and Calima var. were obtained with water sheets of 229 and 199 mm, resp. (AS)

0436

30759 PALAVAN-UNSAL, N. 1987. Polyamine metabolism in the roots of Phaseolus vulgaris. Interaction of the inhibitors of polyamide biosynthesis with putrescine in growth and polyamide biosynthesis. Plant and Cell Physiology 28(4):565-572. En., Sum. En., 27 Ref., Il. [Dept. of Biology, Faculty of Science, Univ. of Istambul, Turkey]

Phaseolus vulgaris. Enzymes. Inhibitors. Roots. Turkey.

The effects of the inhibitors of polyamine biosynthesis, canavanine, and alpha-methyl ornithine on growth, arginine decarboxylase and ornithine decarboxylase activities, and polyamine content were examined in 2 different growth regions of Phaseolus vulgaris cv. Taylor's Horticultural roots. The effect of exogenous putrescine and the interaction of

canavanine with putrescine were also determined in the same bean root system. The arginine and ornithine decarboxylase activities found in the root apex were high where cell division activity was highest. Polyamine (putrescine and spermine) content did not correlate with these activities, but polyamine level was high in the root base where cell elongation is the main process. The arginine analogue, canavanine, inhibited arginine decarboxylase activity and polyamine titers. Putrescine partially reversed the canavanine inhibition of root growth as well as arginine decarboxylase activity and polyamine content. Similarly alpha-methyl ornithine slightly inhibited the root length and ornithine decarboxylase activity in the root apex. Besides, exogenous putrescine did not significantly affect the endogenous polyamine titers. These results reinforce the growing connection between polyamines and the rates of cell division in the roots of bean plants. Arginine decarboxylase was the main enzyme in the bean roots. (AS)

0437

31473 PATRICK, J.W. 1987. Effect of potassium on photosynthate unloading from seed coats of Phaseolus vulgaris L. Specificity and membrane location. Annals of Botany 59(2):181-190. En., Sum. En., 29 Ref., Il. [Dept. of Biological Sciences, The Univ. of Newcastle, New South Wales, 2308, Australia]

Phaseolus vulgaris. Seed coat. K. Sucrose.

Rates of (14)C-photosynthate unloading from excised seed coat halves of Phaseolus vulgaris plants were stimulated by external KCl concn. in excess of 10 millimolar with an optimal response at 100-150 millimolar KCl. The cellular pattern of (14)C-photosynthate metabolism was not altered by KCl but the treatment preferentially stimulated the release of sucrose from the seed coats. Photosynthate unloading was insensitive to Cl(-) and was stimulated by a range of membrane-permeable cations (Na(+), Mg(2+) and tetraphenylphosphonium ion) in addition to K(+). The K(+) ionophore, valinomycin, abolished the K(+) stimulation of (14)C-photosynthate unloading. A switch to a wash solution containing K(+) elicited a rapid burst of (14)C-photosynthate unloading; the rate constant for the final phase of (14)C-efflux (probably across the tonoplast) was unaffected by K(+). The KCl treatment did not change the passive permeability of either the plasmalemma or tonoplast. While sucrose influx across the plasmalemma was insensitive to K(+), sucrose transfer to the vacuole was slowed. The results obtained support the postulate that K(+) (and other membrane permeable cations) [illegible]rentially stimulate sucrose efflux across the plasmalemma of the unloading cells by [illegible]serving to carry positive charge in the opposite direction. (AS)

0438

30785 RODRIGUEZ Z., C. 1986. Fotosíntesis, transpiración, eficiencia en el uso de agua, análisis de crecimiento de cuatro cultivares de frijol (Phaseolus vulgaris L.). (Growth analysis, photosynthesis, transpiration, and water use efficiency in four bean cultivars). Tesis D[illegible]tor en Ciencias. Chapingo, México, Universidad Autónoma de Chapingo. Colegio de Postgraduados. 356p. En., Sum. En., 98 Ref., Il.

Phaseolus vulgaris. Cultivars. Leaf area. Transpiration. Evapotranspiration. Growth. Water absorption. Yields. Irradiation. Temperature. Photosynthesis. Mexico.

Two expt. were conducted under greenhouse conditions (I and II) and another in the lab. (III) with bean var. Cacahuete 72, Michoacán 12 A 3, Flor de Mayo X-16441, and Negro 150 to determine differences in water use efficiency among var. The dry wt. of the stem + the dry wt. of the leaves

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were directly related with the vegetative cycle of the var. (greater dry wt. for longer cycle var.). In expt. I and II, Negro 150 and Flor de Mayo X-16441 showed greater accumulation of DM than Michoacán and Cacahuate. Leaf area performance was similar to that of dry wt; var. requiring props had greater leaf area than the bush-like ones. In expt. I, accumulated DM and leaf area, at the beginning of flowering showed a highly significant linear correlation with seed yield. Transpiration and evapotranspiration showed the same tendencies in expt. I and II; however, the transpiration rate was greater than the evapotranspiration rate until approx. the 1st week after flowering initiation and was the opposite afterwards. The greatest water demand occurred during the flowering period, independent of the genotype and greenhouse used. The RGR, NAR, and relative leaf area rate showed greater growth efficiency and greater photosynthetic efficiency in var. Flor de Mayo X-16441 and Negro 150; Cacahuate and Michoacán showed the lowest values. In these parameters, data of expt. II were better than those of expt. I. At the beginning of flowering, the NAR was highly correlated with seed yield in expt. I. The water efficiency rate (WER) varied for each genotype. Var. Negro 150 and Flor de Mayo X-16441 were more efficient in water use during all the harvesting cycle than Cacahuate and Michoacán in both expt.; the WER values indicated that the vegetative period of the bean crop in its different growth habits is the most efficient in water use. Photosynthetic variations/genotype were found. The photosynthetic rate was linearly related with the concn. of chlorophyll types (A, B, and A + B), and was highly significant. Transpiration varied due to solar radiation, temp. and the genotype. The effect of solar radiation on transpiration was less pronounced than that of the temp. Negro 150 was the var. with the greatest transpiration rate, followed by Michoacán and Flor de Mayo X-16441; Cacahuate had the lowest transpiration values. (AS (extract)-CIAT)

0439

31711 SAGE, R.F.; SHARKEY, T.D. 1987. The effect of temperature on the occurrence of O2 and CO2 insensitive photosynthesis in field grown plants. Plant Physiology 84(3):658-664. En., Sum. En., 25 Ref., Il. [Biological Sciences Center, Desert Research Inst., P.O. Box 60220, Reno, NV 89506, USA]

Phaseolus vulgaris. Photosynthesis. O. CO2. Leaves. Temperature. Stomata. USA.

The sensitivity of photosynthesis to O2 and CO2 was measured in leaves from field grown plants of 6 species (Phaseolus vulgaris, Capsicum annuum, Lycopersicon esculentum, Scrophularia desertorum, Cardaria draba, and Populus fremontii) from 5 to 35 degrees Celsius using gas-exchange techniques. In all species but Phaseolus, photosynthesis was insensitive to O2 in normal air below a species-dependent temp. CO2 insensitivity occurred under the same conditions that resulted in O2 insensitivity. Because O2 insensitivity is an indicator of feedback-limited photosynthesis, these results indicate that feedback limitations can play a role in determining the diurnal C gain in the field. At higher partial pressures of CO2 the temp. at which O2 insensitivity occurred was higher, indicating that feedback limitations in the field will become more important as the CO2 concn. in the atm. increases. (AS (extract))

0440

31710 SPRUYT, E.; VERBELEN, J-P.; DE GREEF, J.A. 1987. Expression of circaseptan and circannual rhythmicity in the imbibition of dry stored bean seeds. Plant Physiology 84(3):707-710. En., Sum. En., 30 Ref., Il. [Dept. of Biology, Univ. of Antwerpen, U.I.A., Universiteitsplein 1, B-2610-Wilrijk, Belgium]

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Phaseolus vulgaris. Seed. Water absorption. Belgium.

Water uptake of seeds of Phaseolus vulgaris cv. Limburg was monitored in a controlled atm. every day at solar noon for a period of 2 yr. The imbibition rate, determined as the mean of 5 replications, was related to the lunar cycle, max. water uptake occurring between the new phases of the cycle. The monthly mean value of imbibition rate, calculated from the daily measurements, displayed a circannual rhythm reaching max. values in Aug.-Sept. and min. values in Feb.-March. These monthly values were positively correlated with the mean of the max. temp recorded daily outside. (AS) See also 0427 0553

C01 Plant Nutrition

0441

29952 CHAILLOU, S.; MOROT-GAUDRY, J.F.; SALSAC, L.; LESAINT, C.; JOLIVET, E. 1986. Compared effects of NO3(-) and NH4(+) on growth and metabolism of French bean. Physiologie Vegetale 24(6):679-687. En., Sum. En., Fr., 18 Ref., Il. [I.N.A.P.-G, 16 rue Claude Bernard, 75005, Paris, France]

Phaseolus vulgaris. Nutrie. solution. N. Composition. Mineral and nutrients. Aminoacids. Mineral content. Carbohydrate content. France.

Bean plants were grown in a greenhouse with nutrient solutions containing either nitrate (2 millimolar) or ammonium (2 millimolar) and renewed 3-4 times/h. After 35-45 days, NH4(+)-fed plants had half the fresh matter of NO3(-)-fed plants. Their mineral cation concn. was 30-40 percent lower and their organic acid (malic, malonic, citric) concn. was 80-90 percent lower than in NO3(-) plants. Amino acids (seryl, asparaginyl, glutaminyl) were 3- to 10-fold higher and carbohydrates (glucose, fructose, sucrose, starch) 1.5-to 5.0-fold higher in NH4(+) plants than in NO3(-) plants. In general, solute concn. in NH4(+) plants were lower than in NO3(-) plants, but the energetic cost (ATP equivalents) for synthesis of organic acids, amino acids, and free sugars was similar for both N nutrition treatments. The growth deficit in NH4(+) plants, which did not appear to be due to pH changes (min.) in the solution, may be explained by an osmotic handicap in those plants and by perturbations in the chloroplast functioning because of a possible excess of photosynthetic reducing power in the absence of NO3(-). Starch accumulation in the leaves of NH4(+) plants is an argument for this hypothesis. (AS)

0442

27777 CHAILLOU, S.; MOROT-GAUDRY, J.F.; LESAINT, C.; SALSAC, L.; JOLIVET, E. 1986. Nitrate or ammonium nutrition in French bean. Plant and Soil 91(3):363-365. En., Sum. En., 10 Ref. [Laboratoire du Metabolisme et de la Nutrition des Plantes, Inst. National de Recherche Agronomique, route de st-Cyr, F-78000 Versailles, France]

Phaseolus vulgaris. Nutrient solution. pH. Minerals and nutrients. Rhizobium phaseoli. Composition. Aminoacids. Plant nutrition. N. Mineral content. France.

Bean plants were grown in a greenhouse in sand irrigated with nutrient solutions containing either 2 millimolar NO3(-) or 2 millimolar NH4(+). After 45 days, fresh wt. of NH4(+) plants was half that of NO3(-) plants. Cation concn. in NH4(+) plants was 30 percent less than in NO3(-) plants. Amino acids (seryl, glutaminyl, asparaginyl) accumulated 3-10 times more in NH4(+) plants. The concn. of organic acids (malic, malonic, citric) was 10-30 times higher in NO3(-) plants. The ATP-costings for the synthesis of

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amino acids and organic acids in NH4(+) plants was half that of NO3(-) ones; therefore, it could not account for the reduction of growth in the ammonium-fed plants. (AS)

0443

29948 GOOSSENS, J.F.; STABEL, A.; VENDRIG, J.C. 1987. Relationships between kievitone and phaseollin accumulation in different tissues of Phaseolus vulgaris in response to treatment with mercuric chloride, a fungal cell wall elicitor and abscisic acid. Physiological and Molecular Plant Pathology 30(1):1-12. En., Sum. En., 30 Ref., Il. [Katholieke Universiteit Lueven, Laboratorium voor Plantenfysiologie, Kardinaal Mercierlaan, 92, B-3030 Leuven (Heverlee), Belgium]

Phaseolus vulgaris. Phaseollin. Cotyledons. Hypocotyl. Roots. Rhizoctonia solani. Plant physiology. Belgium.

The two principal phytoalexins of Phaseolus vulgaris, phaseollin and kievitone, accumulated in cotyledons, hypocotyls, and roots in response to treatment with mercuric chloride. Calculations of the natural logarithm of the kievitone:phaseollin ratio (ln K:P) show that the ratio of kievitone:phaseollin was highest in the cotyledons and decreased through the hypocotyls to the roots. Cell wall preparations from Rhizoctonia solani induced relatively higher levels of kievitone than phaseollin (high ln K:P) and the ratio was the same for the 3 types of tissue. Thus, the 2 elicitors probably operate at different stages of the regulatory mechanisms. High concn. (0.0001 and 0.000001 molar) of exogenously applied ABA reduced the kievitone:phaseollin ratio in all tissues, regardless of which elicitor was used Endogenous ABA levels in hypocotyls were found to be the same in both mercuric chloride- and Rhizoctonia-treated tissue. Thus, differences in endogenous ABA levels do not determine the differences in the ln K:P induced by the 2 elicitors. In all 3 tissues, the changes leading to the differences in ln K:P brought about by ABA were achieved in different ways. Both phaseollin and kievitone production in hypocotyls and roots was reduced by a concn. of 0.0001 molar ABA but slightly stimulated by a concn. of 0.000001 molar. The similar effects of ABA on tissues treated with mercuric chloride and the Rhizoctonia elicitor preparation suggests that they both affect the same regulatory mechanism. (AS)

0444

31007 MINNICH, M.M. 1985. Measurement of soil copper activity and its relation to plant copper accumulation. Ph.D. Thesis. Ithaca, N.Y, Cornell University. 76p. En., Sum. En., 63 Ref., Il.

Phaseolus vulgaris. Snap beans. Mineral nutrition. Cu. Nutrient uptake. Toxicity. Roots. Shoots. Mineral content. Translocation. USA.

Three expt. were carried out to: (1) evaluate the effect of Cu on C and N mineralization rates in field-aged Cu-enriched soils; (2) study the methods of cupric ion-selective electrode and Donnan dialysis with a cation-exchange membrane for measuring Cu(2+) activity in soil solution; (3) determine Cu toxicity on snap bean plants grown in soil with a high-Cu sludge source. Five Cu-enriched New York (USA) soils were chosen, each of which had a suitable control site nearby and had Cu as the only metal considered in a high enough concn. to affect mineralization. The mean rate of N mineralization for a particular soil was quite constant over 10 wk., and in most cases, throughout the entire 13-wk. period. It showed that neither C nor N mineralization was inhibited in these soils at the levels of Cu enrichment observed. With respect to treatment Cu and sludge levels, both the ion-selective electrode and cation dialysis methods demonstrated expected trends. Cu (2+) activity increased with increasing Cu additions at any one sludge level. The root Cu concn. are approx. 10 times greater

than the shoot Cu concn. Shoot Cu concn. are subject to internal translocation mechanisms; thus, they are a less direct measure of ion uptake. Although the yield differences were generally not significant (5 percent), the data for total plant Cu reflect the general variability in yields, probably due to extraneous factors. (CIAT)

0445

31709 SEEMANN, J.R.; SHARKEY, T.D.; WANG, J.; OSMOND, C.B. 1987. Environmental effects on photosynthesis, nitrogen-use efficiency, and metabolite pool: in leaves of sun and shade plants. Plant Physiology 84(3):796-802. En., Sum. En., 28 Ref., Il. [Biological Sciences Center, Desert Research Inst., P.O. Box 60220, Reno, NV 89506, USA]

Phaseolus vulgaris. Light. Mineral nutrition. N. Nutrient solution. Photosynthesis. Mineral content. Leaves. USA.

Effects of varying light intensity and N nutrition on photosynthetic physiology and biochemistry were examined in the sun plant Phaseolus vulgaris (common bean) and in the shade plant Alocasia macrorrhiza. In both Phaseolus and Alocasia, the differing growth regimes produced large changes in photosynthetic capacity and composition of the photosynthetic apparatus. CO_2-saturated rates of photosynthesis were linearly related to leaf N content in both species but photosynthesis/unit leaf N was markedly higher for Phaseolus than for Alocasia. Photosynthetic capacity was also higher in Phaseolus/unit ribulose 1,5-bisphosphate (RuBP) carboxylase (RuBPCase) protein. The leaf content of RuBPCase was linearly dependent on leaf content in the 2 species. The proportion of leaf N which was RuBPCase, however, was greater in Phaseolus than in Alocasia and was more sensitive to growth conditions, ranging from 6 percent of leaf N at low light to 20 percent at high light. Thus, the RuBPCase/chlorophyll ratio was quite responsive to N availability and light intensity in both species (but for different reasons), ranging from 6 g/g for Phaseolus and 2 g/g for Alocasia at high leaf N to 1.5 g/g for Phaseolus and 0.5 g/g for Alocasia at low leaf N. These large changes in the proportions of components of the photosynthetic apparatus had marked effects on the sensitivity of these species to photoinhibition. (RA (extract))

0446

31489 TRIES, L.F.; PIEWELL, G.S. 1987. Effect of acidic precipitation on bean plants. Canadian Journal of Botany 65(6):1121-1126. En., Sum. En., Fr., 18 Ref., Il [Dept. of Biology, Dalhousie Univ., Halifax, N.S. Canada B3H 4J1]

Phaseolus vulgaris. Nutrient solution. Acid rain. Plant physiological disorders. Mineral deficiencies. Ca. Mg. P. N. Canada.

Direct and indirect effects of acidic precipitation on the rates of CO_2 exchange of plants of bean cv. Tendergreen were measured. Solutions of HCl, HNO_3, H_2SO_4, and artificial acid rain at pH values from 2.7 to 5.0 sprayed on leaves at intervals (varying from 1 to 5 days in different expt.) for 3 wk. had no effect on rates of CO_2 exchange. Some lesions appeared on leaves where chlorophyll was destroyed; apparently undamaged areas of the leaf compensated by increasing the rate of photosynthesis. Application of acidic solutions to pot soil in which the plants were growing or growing plants in nutrient solutions at pH 3.0 had serious effect on the leaves, resembling Ca or Mg deficiency symptoms, but no obvious deleterious effects on the roots. Effects of acid were greater when Ca, Mg, P, or N were supplied at reduced concn. Reducing the concn. of K, Fe, or the mixture of trace elements normally supplied did not influence the effect of acidity of the nutrient solution. The uptake and distribution of Ca, Mg, P, and N throughout the plant was not affected by

the acid treatments. It is concluded that acidic soil water or nutrient solutions interfere with the metabolism of Ca, Mg and N in the leaves. (AS)

0447

31494 WALLACE, W. 1986. Distribution of nitrate assimilation between the root and shoot of legumes and a comparison with wheat. Physiologia Plantarum 66(4):630-636. En., Sum. En., 24 Ref., Il. [Dept. of Agricultural Biochemistry, Waite Agricultural Research Inst., Univ. of Adelaide, Glen Osmond, S.A., 5064, Australia]

Phaseolus vulgaris. Roots. Shoots. Enzymes. N. Nutrient uptake. Mineral content. Australia.

Legumes belonging to the Phaseoleae (soybeans, Phaseolus coccineus, P. vulgaris, Vigna radiata, and V. unguiculata) when grown on 10 millimolar nitrate, had a low in vitro nitrate reductase (NR) activity in the root compared with the shoot (less than 15 percent). In species belonging to the Vicieae (Cicer arietinum, Pisum sativum, and Vicia faba), Genisteae (Lupinus albus) and Trifolieae (Medicago sativa and M. truncatula), 30-60 percent of their total NR activity was in the root. The Phaseoleae had a higher nitrate content in the shoot. Decreasing the nitrate supply increased the relative proportion of NR activity in the pea and wheat roots but did not alter the predominantly leaf-based assimilation of nitrate in P. vulgaris. (AS (extract))

0448

31498 ZAITER, H.Z.; COYNE, D.P.; CLARK, R.B. 1987. Genetic variation and genotype x environment interaction for leaf iron-deficiency chlorosis in dry beans (Phaseolus vulgaris L.). Bean Improvement Cooperative. Annual Report 30:60-61. En. [Dept. of Horticulture & Agronomy, Univ. of Nebraska, Lincoln, NE 68583, USA]

Phaseolus vulgaris. Cultivars. Mineral deficiencies. Fe. Chlorosis. Symptomatology. Resistance. Adaptation. Genotypes. USA.

Forty dry bean cv./lines were evaluated in 1986 for leaf Fe chlorosis on a highly calcareous soil site at the U. of Nebraska, USA. The cv./lines differed in the severity of Fe chlorosis symptoms and showed a continous variation in symptoms ranging from high resistant to susceptible. Some of the highly resistant cv./lines (no symptoms) were G.N. Sapphire, Pinto UI 111, A-55, G.N. WM1-85-46, and G.N. WM-86-40. Eleven of these 40 cv./lines had been previously screened for Fe-deficiency chlorosis under field conditions in a calcareous soil in 1985. A genotype x environment interaction was observed between 1983-86. (CIAT) See also 0548

C02 Plant Development

0449

31738 BIDDINGTON, N.L.; DEARMAN, A.S. 1987. The effects of mechanically-induced stress and plant growth regulators on the growth of lettuce, cauliflower and bean (Phaseolus vulgaris L.) plants. Plant Growth Regulation 5(3):183-194. En., Sum. En., 21 Ref., Il. [Inst. of Horticultural Research, Wellesbourne, Warwick CV35 9EF, UK]

Phaseolus vulgaris. Gibberellins. Plant growth substances. Growth. United Kingdom.

The plant growth regulators, (PGR) GA, ethephon, and chlormequat chloride (CCC) were sprayed on young lettuce, cauliflower, and bean plants, which

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had either been given or not been given a mechanically-induced stress (MIS) treatment. MIS was applied by brushing the plants with paper for 1.5 min. each day. GA increased extension growth of bean and leaf length of lettuce in unbrushed plants as much as in brushed ones. CCC and ethephon were less effective at reducing the height of brushed bean plants compared with unbrushed ones. The effects of CCC on the growth of cauliflower and lettuce plants was not influenced by brushing, whereas unbrushed plants responded more readily to ethephon than did brushed ones. The effects of CCC on growth were generally similar to those of MIS whereas the effects of ethephon were in many ways different to MIS. The results are discussed in relation to the use of PGR and MIS treatments for modifying plant growth. (AS)

0450

31019 CHIANG LOK, M.L.; HEYER, W.; CABALLERO G., R.; CRUZ, B. 1986. Relación entre el incremento del área foliar y la edad del cultivo en tres variedades de Phaseolus vulgaris. (Relationship between leaf area increase and crop age in 3 Phaseolus vulgaris varieties). Ciencias de la Agricultura no.29:157-159. Es., 3 Ref. [Inst. de Investigaciones Fundamentales en Agricultura Tropical Alejandro de Humboldt, de la Academia de Ciencias de Cuba]

Phaseolus vulgaris. Cultivars. Determinate cultivars. Indeterminate cultivars. Leaf area. Plant age. Mathematical model. Cuba.

Bean var. of determinate growth ICA-Pijao and Guira 31 and the bean var. of indeterminate growth C.C. 25-9 were planted in summer and winter seasons to study no. of leaves and leaf area. The constant values of the quadratic regressions of leaf area increase and av. no. of leaves/var. according to crop age were calculated. Var. of determinate growth tended to show equal no. of leaves and total leaf area in both planting seasons, while no. of leaves and leaf area of the indeterminate var. were higher in winter. All var. and seasons tested responded to the equation $y = ax(2) + bx + c$, where y represents the leaf area or no. of leaves, and x the crop age expressed in days after planting. (CIAT)

0451

31020 DIAZ, M.; FUNDORA M., Z.; ISASI, E.M.; SANCHEZ, J.A. 1986. Abscisión de flores y vainas, y aborto de semillas, en el frijol común (Phaseolus vulgaris). (Flower and pod abscission and seed abortion in beans). Ciencias de la Agricultura no.28:143-144. Es., 3 Ref.

Phaseolus vulgaris. Cultivars. Determinate cultivars. Indeterminate cultivars. Gibberellins. Abscission. Flowers. Pods. Timing. Planting. Cuba.

Bean var. Velasco Largo and Borinquen Jaspeado of growth habit I and M-112 of growth habit II were planted in pots in 3 different planting dates (Sept., Nov. and Jan.), with or without foliar spraying with 0.001 percent GA (5 ml/plant) at flowering initiation, to study the effects on flower and pod abscission and seed abortion. GA at the applied concn. had no effect on the parameters studied. Nov. was considered the best mo. for planting since pod retention and production of normal seed were superior (pod abscission and seed abortion values were 43.47 and 56.90 percent, resp., compared to 48.03 and 64.00 percent, resp. in Sept. and 45.74 and 54.95 percent, resp. in Jan.). Pod abscission was significantly higher for type I var. (46.90 and 47.29 percent for Borinquen Jaspeado and Velasco Largo, resp.) than for type II var. (43.06 percent). All var. presented different mature pod distribution. Parents for crossings are recommended to be planted in Nov. (CIAT)

0452

31472 PATRICK, J.W.; STEAINS, K.H. 1987. Auxin-promoted transport of metabolites in stems of Phaseolus vulgaris L.: auxin dose-response curves and effects of inhibitors of polar auxin transport. Journal of Experimental Botany 38(187):203-210. En., Sum. En., 14 Ref., Il. [Dept. of Biological Sciences, Univ. of Newcastle, N.S.W. 2308, Australia]

Phaseolus vulgaris. Stems. Auxins. Indoleacetic acid. Nutrient transport. Australia.

Transport of (14)C-photosynthate in decapitated stems of Phaseolus vulgaris explants was dependent on the concn. of IAA applied to the cut surfaces of the stem stumps. The physiological age of the stem influenced the nature of the transport response to IAA with stems that had ceased elongation exhibiting a more pronounced response with a distinct optimum. Increased nutrient status of the explants had little influence on the shape of the IAA dose-response curve but increased, by 2 orders of magnitude, the IAA concn. that elicited the optimal response. Applications of the inhibitor of polar auxin transport, 1-(2-carboxyphenyl)-3-phenylpropane-1, 3-dione (CPD), affected IAA-promoted transport of (14)C-photosynthates. At suboptimal IAA concn., CPD inhibited transport, whereas at supraoptimal IAA concn., (14)C-photosynthate transport was marginally stimulated by CPD. Treatment with CPD resulted in a significant reduction in stem levels of ((14)C)IAA below the site of inhibitor application, while above this point, levels of ((14)C)IAA remained unaltered. The divergent responses of auxin-promoted transport to CPD treatment are most consistent with a remote action of IAA on photosynthate transport in the decapitated stems. (AS)

0453

31713 SAUNDERS, J.W.; BOSHIELD, G.I.; LEVI, A. 1987. Morphogenetic effects of 2,4-dichlorophenoxyacetic acid on pinto bean (Phaseolus vulgaris L.) leaf explants in vitro. Plant Cell Reports 6:46-49. En., Sum. En., 16 Ref., Il. [USDA-ARS Crops & Entomology Research Unit, P.O. Box 1633, East Lansing, MI 48823-0633, USA]

Phaseolus vulgaris. Tissue culture. Culture media. Leaves. Rooting. USA.

Roots, callus and/or globular structures were produced on primary leaf and distal cotyledon explants of pinto bean (Phaseolus vulgaris cv. UI 114) cultured on semisolid Murashige-Skoog (MS) medium with a wide range of 2,4-D concn. (0.01 to 80 mg/liter with either 0 or 1 mg/liter kinetin. Explants rooted at lower 2,4-D concn. than at those favoring globule formation on callus, although roots, callus and globules often developed from the same explant. Isolated opaque green globular structures developed when callus initiated on media with 3 or more mg/liter 2,4-D was subcultured in liquid MS + 30 mg/liter 2,4-D. These structures multiplied with a fresh wt. doubling time of 8-9 days in MS + 30 mg/liter 2,4-D. Although this multiplicative behavior and opaque color were reminiscent of embryoids reported for other species, no cotyledons or roots were seen. (AS)

0454

27716 VAN BEL, A.J.E.; PATRICK, J.W. 1984. No direct linkage between proton pumping and photosynthate unloading from seed coats of Phaseolus vulgaris L. Plant Growth Regulation 2(4):319-326. En., Sum. En., 18 Ref., Il. [Botanisch Laboratorium, Rijksuniversiteit Utrecht, Lange Nieuwstraat 106, 3512 PN Utrecht, The Netherlands]

Phaseolus vulgaris. Seed coat. Translocation. Plant assimilation. Netherlands.

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The energization of the active sucrose release from bean seed coat halves was investigated. For this purpose, seed coat tissues adjacent to the apoplastic space were exposed to a var. of treatments and proton and photosynthate release were measured. Fusicoccin (10(-5) mol/liter) stimulated proton pump activities. Orthovanadate (2 x 10(-4) mol/liter) and (10(5) mol/liter) diminished the proton extrusion evoked by fusicoccin. Fusicoccin inhibited sucrose release, whereas orthovanadate and ABA stimulated it. Addition of 100 mmol K(+)/liter had a promotory effect on photosynthate unloading, fading away with time. This extra unloading was linearly related to an enhanced proton loss. (AS (extract))

0455

15830 YEUNG, F.C. 1980. Embryogeny of Phaseolus: the role of the suspensor. Zeitschrift fur Pflanzenphysiologie 96(1):17-28. En., Sum. En., 29 Ref., Il.

Phaseolus vulgaris. Embryo. Sucrose. Plant assimilation. Plant development. Canada.

Labelled (14)C-sucrose was administered to developing embryos of Phaseolus coccineus and P. vulgaris via the base of the excised pod, through the endosperm cavity of the seeds, and directly to the excised embryos. Results indicated that the suspensor was the uptake site during early stages of embrye development. The labelling pattern was unexpected since the cotyledonary half of the embryo-proper is nearer to the endosperm, the source of radioactivity. The uptake pattern changed at the mid-maturation stage, when it appeared that the cotyledons became the major uptake site for the maturing embryo. The results are discussed in relation to the current hypothesis of suspensor function. (AS (extract)) See also 0471 0474 0476 0479 0482 0484 0546 0573 0580 0589

C03 Chemical Composition, Methodology and Analyses

0456

31737 BENEDETTI, B.C.; JORGE, J.T. 1987. Influencia da variacao do teor de umidade sobre o angulo de talude de vários graos. (Effect of moisture content on the angle of repose of several grains). Ciencia e Cultura 39(2):189-192. Pt., Sum. Pt., En., 8 Ref., Il. [Faculdade de Engenharia Agrícola, Unicamp, Caixa Postal 6011, 13.081 Campinas-SP, Brasil]

Phaseolus vulgaris. Snap beans. Seeds. Water content. Brazil.

The effect of MC on the angle of repose of peanuts, rough rice, snap beans, maize, soybeans, and wheat was determined. Four different moisture levels were considered: 10, 15, 20, and 25 percent (wet wt. basis). Peanuts and snap beans presented an increase in the angle of repose in relation to an increase on the moisture level. In this case, a 3rd-degree model was adapted to the exptl. data, with correlation coefficients of 0.824 and 0.839, resp., and 1 percent significance. (AS (extract))

0457

31053 BOLWELL, G.P. 1987. Elicitor induction of the synthesis of a novel lectin-like arabinosylated hydroxyproline-rich glycoprotein in suspension cultures of Phaseolus vulgaris L.. Planta 172(2):184-191. En., Sum. En., 37 Ref., Il. [Biological Sciences Dept., City of London Polytechnic, Old Castle Street, London E1 7NT, UK]

Phaseolus vulgaris. Analysis. Proteins. Composition. Aminoacids. United Kingdom.

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A novel lectin-like glycoprotein, which accumulates in response to fungal elicitor action, has been characterized in endomembranes from suspension cultures of French bean. The lectin, specific to N-acetylglucosamine oligomers, consists of a polypeptide of apparent mol. wt. (Mr) 31000 is rich in glycine and contains 6.7 percent hydroxyproline O-linked to arabinose-containing oligosaccharides to give a glycoprotein of Mr 42500. A dual-labelling technique has been used to identify changes in the synthesis of the glycoprotein in cells exposed to fungal elicitor molecules. Thus, incorporation of (14C)proline into membranes in vivo and of (1-3H)arabinose from uridine 5'-diphosphate (1-3H)arabinose in vitro and analysis by isoelectric focussing-polyacrylamide gel electrophoresis gave absolute correspondence of the labelled isoforms of the glycoprotein. Having established the absence of contaminating polypeptides, subsequent analysis of microsomal fractions by SDS-polyacrylamide gel electrophoresis showed that the peak of synthesis of the Mr-42500 glycoprotein occurred 4 h after the addition of fungal elicitor. The changes in the level of incorporation into the glycoprotein monomers were concomitant with increases in the activity of prolyl hydroxylase. (AS (extract))

0458

29935 BOYLAN, M.T.; SUSSEX, I.M. 1987. Purification of an endopeptidase involved with storage-protein degradation in Phaseolus vulgaris L. cotyledons. Planta 170(3):343-352. En., Sum. En., 21 Ref., Il. [Dept. of Genetics, Univ. of Georgia, Athens, GA 30602, USA]

Phaseolus vulgaris. Cotyledons. Proteins. Enzymes. Analysis. Seed. Germination. Phytohemagglutinins. USA.

Cotyledon extracts for protease activity were evaluated by using (3)H)phaseolin as a substrate and then fractionated the digestion mixtures by SDS-polyacrylamide gel electrophoresis in order to identify the cleavage products. The cotyledons of 4-day-old bean seedlings contained an endopeptidase which cleaves the polypeptides of ((3)H)phaseolin (apparent mol. wt. = 51000, 46000, 46000, and 43000) into 3 discrete clusters of proteolytic fragments (Mrs = 27000, 25000, and 23000). Endopeptidase activity was not detected in the cotyledons until the protein content of these organs started to decline, shortly after the 1st day of seedling growth. Endopeptidase activity increased to a max. level in the cotyledons of 5-day-old seedlings and then declined to a min. value by day 10. The enzyme was purified 335-fold by ammonium-sulfate precipitation, organomercurial-agarose chromatography, gel filtration, and ion-exchange chromatography. The endopeptidase constituted 0.3 percent of the protein content in the cotyledons of 4-day-old seedlings. It was a cysteine protease with a single polypeptide chain (Mr = 30 000). The endopeptidase was also able to hydrolyze the bean seed lectin, phytohemagglutinin. Thus, this enzyme may play a general role in degrading cotyledon proteins of bean following seed germination. (AS (extract))

0459

29142 DIXON, R.A. 1986. The phytoalexin response: elicitation, signalling and control of host gene expression. Biological Reviews of the Cambridge Philosophical Society 61(3):239-291. En., Sum. En., 256 Ref., Il. [Dept. of Biochemistry, Royal Holloway & Bedford New College, Univ. of London, Egham Hill, Egham, Surrey, TW20 0 EX, England]

Phaseolus vulgaris. Phytoalexins. Proteins. Genes. United Kingdom.

The process of phytoalexin induction, at the molecular level, from the fungal elicitor to the early changes in host gene expression associated with its action was reviewed. A no. of microbial polysaccharides, glycoproteins, pectic enzymes, peptides and fatty acids have potent

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elicitor activity. The results of studies on the purification and characterization of microbial elicitors depend on the nature of the bioassay used. Methods for elicitor extraction may lead to artifacts or loss of race specificity. Elicitors isolated from plant pathogens may be race-specific or race-nonspecific. In cases where only race-nonspecific elicitors can be shown, race-specific induction of phytoalexins may result from the action of enhancer or suppressor molecules. Fungal glucans have been proposed as candidates to act in both these roles. Molecular genetic approaches to the identification of phytopathogenic bacterial avirulence genes may help to prove or disprove the role of elicitors of the phytoalexin response as agents responsible for the induction of host resistance. Similar analyses, involving genetic transformation, should soon be possible for phytopathogenic fungi. Phytoalexin accumulation may be accompanied by the rapid induction of ethylene biosynthesis and the expression of genes encoding activities involved in the synthesis of hydroxyproline-rich glycoproteins. Pectic endogenous elicitors of phytoalexin accumulation are also active as inducers of systemic proteinase inhibitor synthesis in some solanaceous species. Results of studies on the mechanisms of signal transmission and differential gene expression in relation to active defense reactions should be of relevance to many other aspects of the plant's response to environmental stimuli at the physiological, biochemical, and molecular genetical levels. (AS (extract))

0460

29794 HUSSAIN, A ; BUSHUK, W.; RAMIREZ, H.; ROCA, W.M. 1987. Polyacrylamide gel electrophoresis procedures for cultivar identification of field bean, cassava and pasture legumes. Cali, Colombia, Centro Internacional de Agricultura Tropical. Working Document no.22. 21p. En., Es., 6 Ref. [Food Science Dept., Univ. of Manitoba, Winnipeg, Canada, R3T 2N2]

Phaseolus vulgaris. Analysis. Proteins. Genes. Colombia.

The procedures for cv. identification of beans, cassava and pasture legumes by using polyacrylamide gel electrophoresis are described as a technique to determine cv. differences indirectly by comparing the products of gene activity, i.e., by using proteins as genotype markers. The corresponding procedure for bean cv. identification is described for sample preparation, gel preparation, electrophoresis per se, staining, and photography. (CIAT)

0461

30628 SAO JOSE, E.P. DE 1985. Caracteristicas do endurecimento do tegumento do feijao (Phaseolus vulgaris L.). (Characteristics of integument hardening in beans). Tese Mag Sc. Vicosa-MG, Brasil, Universidade Federal de Vicosa. 76p. Pt., Sum. Pt., 63 Ref., Il.

Phaseolus vulgaris. Seeds. Water absorption. Mineral content. Sugar content. Dry matter. Storage. Protein content. Fiber content. Carbohydrate content. Ash content. Ca. Mg. Na. P. Seed hardening. Brazil.

A study was conducted on the variations in the water absorption coefficient, the anatomic configuration, and the mineral content of samples of recently harvested bean var. Negrito 897, stored at 4 degrees Celsius and subjected to various treatments. Samples of recently harvested beans stored at environmental temp. differed in protein, ethereal extract, fiber, carbohydrates, and ash contents. An increase in sugar content and a reduction in the percentage of DM were observed in stored beans. A high coefficient of absorption was observed in recently harvested beans subjected to treatment with 0.1 molar potassium carbonate. Stored beans showed an absorption coefficient at the point of equilibrium comparable to that of recently harvested beans. This indicates that the increase in

cooking time is not related to the grain's water absorption. Analysis of the optical and electronic photomicrographies of integument cuts in the different treatments indicated that Ca and Mg are possibly involved in integument hardening. Greater anatomic modifications were observed in samples presenting a high Na content in the integument. (CIAT)

0462

31487 TAYLOR, A.G.; DICKSON, M.P. 1987. Seed coat permeability in semi-hard snap bean seeds: its influence on imbibitional chilling injury. Journal of Horticultural Science 62(2):183-189. En., Sum. En., 18 Ref., Il. [Dept. of Horticultural Sciences, New York State Agricultural Experiment Station, Geneva, NY 14456, USA]

Phaseolus vulgaris. Snap beans. Seeds. Cultivars. Seed hardening. Water content. Germination. Emergence. Seed coat. USA.

The susceptibility of a snap bean breeding line, NY5345, with the semihard seed (SHS) characteristic to imbibitional chilling injury was studied. SHS with greater than 10 percent initial MC imbibed water readily; however, at 6 and 8 percent moisture levels, 18 and 6 days were required for full imbibition, resp. Seed coat permeability of SHS was readily reversible and was moderated by the seed storage RH. Seeds of cv. Bush Blue Lake 47 and Burly and SHS were adjusted to 12 percent moisture and found to be tolerant to imbibitional chilling injury. At 8 percent moisture only SHS was not susceptible to chilling and this was attributed to slow hydration rates. Mechanical damage of SHS with 8 percent moisture resulted in increased hydration rates, solute leakage, and chilling injury. An improvement in field seedling emergence was measured for SHS compared with the Bush Blue Lake 47 and Burly. SHS exhibited good field emergence at both 8 and 12 percent moisture. (AS) See also 0434 0441 0442 0444 0447 0480 0566 0589 0598 0607 0609 0614 0639

D00 AGRONOMY

0463

31077 HORNY, P. 1987. Research projects at the Saginaw Valley bean and beet research farm in 1987. Michigan Dry Bean Digest 11(3):6. En., Il.

Phaseolus vulgaris. Agricultural projects. Cultivation. USA.

A list of the bean and beet research projects and the names of the resp. responsible researchers at the Saginaw Valley Bean and Beet Research Farm (USA) in 1987 is presented. Bean projects include standard dry bean var. trials; preplant, preemergence and postemergence herbicide screening; studies on tillage, row spacing, date of planting, and cropping systems, N additions and rotation with legumes. (CIAT) See also 0427 0622

D01 Soil, Water, Climate and Fertilization

0464

30729 ANDERSEN, A.L. 1955. Dry bean production in the Eastern States. Washington, D.C., United States Department of Agriculture. Farmers' Bulletin no.2083. 28p. En., Il.

Phaseolus vulgaris. Seed. Cultivars. Rotational crops. Land preparation. Fertilizers. Planting. Harvesting. Symptomatology. Disease control. Insect control. Colletotrichum lindemuthianum. Xanthomonas campestris pv.

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phaseoli. Bean common mosaic virus. Whetzelinia sclerotiorum. Fusarium. Uromyces phaseoli. Erysiphe polygoni. Epilachna varivestis. Empoasca. Stored grain pests. USA.

Different aspects of bean production in the Eastern States of USA are reviewed. Topics covered include an overview of limiting factors in the region, the importance of using good seed, and available seed sources. A list of bean types and var. with notes on origin and description is given including Cranberry, Marrow, Navy, Red Kidney, White Kidney, Yellow Eye, Black Turtle Soup, and Jacobs Cattle. Aspects on bean production reviewed include soil types, crop rotations, land preparation, fertilization, inoculation with Rhizobium, planting, cultivation, harvesting, use of straw, marketing, cleaning, and grading. The cause, symptoms and control of major diseases (Colletotrichum lindemuthianum, Xanthomonas phaseoli, BCMV, Sclerotinia sclerotiorum, Fusarium spp., Erysiphe polygoni, Uromyces phaseoli) and pests (Epilachna varivestis, seed corn maggot, Empoasca spp., and bean weevils) are described. (CIAT)

0465

31420 ARARIPE, P.A.P. 1984. Efeito do estresse hídrico em dois cultivares de feijoeiro (Phaseolus vulgaris L.). (Effect of water stress on two bean cultivars). Tese Mestrado. Piracicaba-SP, Brasil, Escola Superior de Agricultura Luiz de Queiroz da Universidade de Sao Paulo. 99p. Pt., Sum. Pt., En., 40 Ref., Il.

Phaseolus vulgaris. Drought. Cultivars. Resistance. Soil moisture. Irrigation. Water stress. Yields. Yield components. Dry matter. Brazil.

An expt. was conducted under greenhouse conditions to study the drought tolerance of bean cv. IPA 7419 and Mulatinho Vagem Roxa combined with 4 levels of soil water (0.007, 0.035, 0.061, and 0.101 MPa) after the beginning of flowering. Pod no., grain no., total DM, grain wt., and HI showed significant differences (P = 0.01) among soil water levels. Grain yield reductions of 42.8 percent and 51.1 percent were observed for cv. IPA 7419 and Mulatinho Vagem Roxa, resp., between levels 0.007 and 0.101 MPa. According to results showed by linear regressions among the parameters observed and values of soil water potential after irrigations, cv. IPA 7419 was found to be more stable than cv. Mulatinho Vagem Roxa to the effects of water stress. (AS (extract))

0466

31419 AZEVEDO, H.J. DE 1984. Efeito de diferentes láminas de agua e doses de adubacao nitrogenada na cultura do feijoeiro (Phaseolus vulgaris L.). (Effect of different water regimes and rates of nitrogen fertilization on the bean crop). Tese Mestrado. Piracicaba-SP, Brasil, Escola Superior de Agricultura Luiz de Queiroz da Universidade de Sao Paulo. 99p. Pt., Sum. Pt., En., 56 Ref., Il.

Phaseolus vulgaris. Soil moisture. Irrigation. Fertilizers. N. Yields. Yield components. Water stress. Water absorption. Brazil.

A trial was conducted at the Escola Superior de Agricultura Luiz de Queiroz, Brazil, to study the effect of different water levels at several rates of N fertilization on bean yield and yield components. The treatments were the total water levels of 320 (A0), 342 (A1), 364 (A2), 392 (A3), 417 (A4), and 431 (A5) mm, and the subtreatments were the dosages of N fertilization of 0 (N1), 30 (N2), 60 (N3), and 90 (N4) kg/ha. Irrigations were uniform up to 30 days and from then on to the end of the crop cycle water was applied using the line source sprinkler system. Irrigations were controlled through the N2A4 plot which was irrigated when the soil water matrix potential reached -0.05 MPa until it returned to -0.01 MPa.

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Irrigation time was defined using tensiometers at 15 cm depth. To determine the bean crop's water consumption, a water balance was carried out in 2 subtreatments (N2A4 and N4A2) during 60 days of the cycle. The hidrological equation was used and av. evapotranspiration intensities of 3.17 and 3.84 mm/day were obtained in subtreatments N4A2 and N2A4, resp. Analysis of the results indicated that irrigation increased yield as compared with the nonirrigated treatment, and that the distribution of the data followed the quadratic relationship, presenting a max. bean productivity of 905 kg/ha for a water level of 394 mm. Grain wt./pod was influenced by the water deficit which occurred during the flowering and pod formation period, and the interaction water level x N dosages showed a significant effect. The pod no./plant was influenced by N dosages, and the data showed a quadratic relationship. The grain no./plant presented a significant effect as related to water level and the results presented a quadratic relationship. (AS)

0467

31745 CABALLERO, S.U.; STEFANELLI, D.; OLIVEIRA, C.D.; VIDAL, R. 1987. Necessidades de nutrientes e calagem na producao de matéria seca do feijoeiro num Latossolo Vermelho-Amarelo da regiao de Barretos, Sao Paulo. (Nutrient and liming requirements for bean dry matter production in a yellow-red Latosol in the Barretos region, Sao Paulo). Pesquisa Agropecuaria Brasileira 22(4):387-391. Pt., Sum. Pt., En., 17 Ref. [IICA/EMBRAPA/UAPNPBS, Caixa Postal 23851, Seropédica-RJ, Brasil]

Phaseolus vulgaris. Nutritional requirements. Fertilizers. N. P. K. S. B. Cu. Mo. Zn. Agricultural lime. Dry matter. Yields. Growth. Brazil.

The nutrient requirements of beans necessary to optimize productivity were studied in the greenhouse using samples of the surface layer (0-20 cm) of a Yellow-Red Latosol, sandy phase, profile from Barretos (Sao Paulo, Brazil). The crop grew in pots with 2.0 kg of soil, fertilized with N, NP, NPK, NPKS, NPK + micronutrients and without fertilizer. The nutrient levels applied were 100 ppm (mg/kg) of N, P, and K, 135 mg S/kg soil, and 1.0, 2.0, 0.5, and 5.0 ppm of B, Cu, Mo, and Zn, resp. The soil samples of all these treatments received 2 meq $CaCO_3$/100 g. One treatment with N, P, and K, without liming, was also studied. The DM yield of the branches + leaves, roots, pods, and grains was determined. Results indicated that P significantly increased the yield of all bean plant parts and doubled grain yield. The treatment with N, P, K, liming, and micronutrients produced the highest yields of all bean plants parts and increased grain yield/4-fold. The addition of K and Ca to treatments with NP and NPK, resp., increased pod and grain yields without affecting the vegetative plant growth. Higher grain yield was not associated with higher vegetative growth. (AS)

0468

33130 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1987. Agroecological studies. In Centro Internacional de Agricultura Tropical. Bean Program. Annual Report 1987. Cali, Colombia, Working Document no.39. pp.23-32. En., Il.

Phaseolus vulgaris. Soils. Climatic requirements. Cultivation systems. Socioeconomic aspects. Statistical data. Production. Soil fertility. Maps. Latin America.

The aim of the Agroecological Studies Unit is to collect, manage, and analyze information on soils, climate, cropping systems, and socioeconomic factors of CIAT commodities. For each Latin American country, information on the area of production of Phaseolus beans was extracted from national agricultural census, agricultural production statistics, regional extension publications, and information provided by CIAT and national program

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scientists. Some preliminary results of the characteristics of Latin American soils are presented. Graphs showing the distribution of bean areas classified by certain soil properties (available K, N, P, and OM, CEC, base saturation, and pH) are included. The total distribution of Latin American beans is shown in a map. (CIAT)

0469

33136 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1987. Character improvement: developing solutions to major problems. 1. Soil/nutritional constraints. b. Low soil phosphorus and acid soils. In Centro Internacional de Agricultura Tropical. Bean Program. Annual Report 1987. Cali, Colombia, Working Document no.39. pp.72-76. En.

Phaseolus vulgaris. Soil fertility. Mineral deficiencies. P. Cultivars. Adaptation. Soils. pH. Plant habit. Colombia. Brazil.

Low soil P is probably the most widespread limitation of bean crop production in the tropics. Cv. adopted from those utilized in Brazil, particularly Carioca and Rio Tibagi, were relatively tolerant to low soil P, in a screening carried out at CIAT's research station in Santander de Quilichao (Colombia). Genotypes of growth habits II and III, superior to the resp. check var. Rio Tibagi and Carioca under P stress conditions, are included. An International P yield trial was established, including the best genotypes from the Colombian- and Brazilian-based programs. Tolerance to acid soil toxicity (particularly Al) continues being evaluated. (CIAT)

0470

33152 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1987. On-farm agronomy. 3. Irrigated systems-Brazil. In Centro Internacional de Agricultura Tropical. Bean Program. Annual Report 1987. Cali, Colombia, Working Document no.39. pp.208-225. En., Il.

Phaseolus vulgaris. Irrigation. Growth. Yields. Soil moisture. Yield components. Brazil.

To understand the effect of excess water on the bean plant, a series of expt. was conducted at the Centro Nacional de Pesquisa em Arroz e Feijao (Brazil). The objectives of the studies were to (a) determine the critical period of the cycle when the plant is most affected by excess water; (b) measure the effect of the duration of inundation on yield; (c) determine the optimum water table depth; and (d) look for Phaseolus vulgaris lines with tolerance to excess water. Bean yield was reduced by application for 48 h of excess water at all stages of growth except for the 3rd trifoliate stage. Irrigation should be performed before flowering starts; after flowering, irrigation should be carefully performed since excess water significantly reduces yield. Bean yield was reduced by different durations of inundation and different water table depths. Yield analysis showed that pod no. was significantly affected by water table depths whereas other yield parameters did not significantly change. (CIAT)

0471

31075 CHRISTENSON, D.R. 1987. Fertilizer needs for erect dry beans. Michigan Dry Bean Digest 11(4):4,9. En., Sum. En., Il. [Dept. of Crop & Soil Sciences, Michigan State Univ., East Lansing, MI 48824, USA]

Phaseolus vulgaris. Cultivars. Plant habit. Fertilizers. N. P. USA.

Several trials were conducted over a period of several years at the Saginaw Valley Research Farm (Michigan, USA) to evaluate the N and P needs of erect dry bean var. Black Magic, Swan Valley, and Neptune, and to determine the efficiency of broadcast and banded application methods. Erect dry beans

grown in narrow rows (35.56-50.80 cm) require 67.20 kg N/ha. Present P recommendations (from 112 to 0 kg/ha for soil P levels of 11.20-67.20 kg/ha) for conventional dry bean production are adequate for dry beans grown in narrow rows (76.20 cm). There is an advantage to banded fertilizer for dry beans; however, with drills that do not have fertilizer attachments, the grower will have to broadcast fertilizer. (CIAT)

0472

30798 COFFEY, D.L.; BROWN, J.F.; COBDREY, T.D.; MULLINS, C.A. 1980. Vegetable response to annual fertilization. Tennessee Farm and Home Science no.116:7-9. En., Sum. En., 11.

Phaseolus vulgaris. Snap beans. Fertilizers. N. P. K. Yields. USA.

Vegetable fertilization tests were conducted annually for 5 yr. at 3 locations in Tennessee, USA. Yield responses to fertilization were small in the early years of the test but increased as the test progressed. The highest yields of tomato and cabbage were obtained from annual applications of 134.40 kg/ha each of N, P, and K, while highest yields of lima and snap beans were obtained with 67.20 kg/ha of each of these nutrients. Overall yields from all crops on the Hartsells soils at the Plateau Expt. Station were consistently lower than those from the more fertile soils at the Main Expt. Station, Knoxville, and the West Tennessee Expt. Station. Results of these studies further substantiate the fact that fertility requirements for vegetable crops vary considerably among species and soils. These findings also indicate that consistently high yields of certain vegetables are difficult or impossible to maintain even with high levels of fertilization. Crop rotations and other soil- improving practices such as green manure crops, together with proper fertilization practices, appear necessary to maintain high yields under Tennessee conditions. (AS)

0473

30630 COSTA, A. 1985. Calagem e adubacao fosfatada da cultura do feijao (Phaseolus vulgaris L.): efeito sobre cultivares e sobre a absorcao e utilizacao de fósforo. (Liming and phosphorus fertilization of beans: effect on cultivars and on phosphorus absorption and utilization). Tese Mag.Sc. Vicosa-MG, Brasil, Universidade Federal de Vicosa. 99p. Pt., Sum. Pt., 85 Ref.

Phaseolus vulgaris. Cultivars. Agricultural lime. Fertilizers. P. Nutrient uptake. Yields. Yield components. Dry matter. Brazil.

The effect of 2 liming levels (application or no of 3700 kg/ha) and 3 doses of P (25, 150, and 275 ppm) on the uptake efficiency and use of P in 15 bean var. (Manteigao Fosec 11, Caraota 260, 37-R, Negrito 897, Costa Rica 1031, Milionario 1732, Roxinho 1803, Ricopardo 896, Carioca, Rio Piquiri, Rio Vermelho, Catu, Rio Tibagi, Rio Ivaí, and Rio Negro) were evaluated under greenhouse conditions in Brazil. Liming increased yield, mainly by increasing the no. of grains/pod. Var. Caraota 260, Rio Piquiri, Rio Tibagi, Negrito 897, Milionario 1732, Ricopardo 896, and Rio Ivaí were the most efficient in P uptake and accumulation. The most yield efficient var. in terms of P utilization were Rio Ivaí, Carioca, Rio Vermelho, Milionario 1732, Roxinho 1803, Rio Negro, Rio Tibagi, and Negrito 897. (AS (extract)-CIAT)

0474

31728 LERNER, B.R.; UTZINGER, J.D. 1986. Wood ash as soil liming material. HortScience 21(1):76-78. En., Sum. En., 11 Ref., Il. [Dept. of Horticulture, Purdue Univ., West Lafayette, IN 47907, USA]

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Phaseolus vulgaris. Snap beans. pH. Green manure. Growth. Agricultural lime. Yields. USA.

The chemical composition and total neutralization power of wood ash (black cherry, common hackberry, red oak, and white oak) plus a mixture of species containing pine, spruce, and apple were determined, and the effect of this wood ash on soil pH and snap bean growth under field conditions was also documented. Ash from the 4 species averaged 26 percent Ca, 7 percent K, 1 percent P, and smaller amounts of Mg, Mn, Fe, B, Cu, Zn, Pb, Cd, Ni, Cr, Al, and Na. The species mixture was lower in Ca and K but higher in most of the other elements. The effective calcium carbonate equivalent (total neutralizing power) of the wood ash ranged from 83 (mixed species) to 116 (red oak) percent. Increased rates of application of wood ash increased soil pH. No significant effects of wood ash applied to soil were found on germination, leaf area, leaf no., plant height, fresh and dry wt., yield, or leaf tissue elemental analysis of snap bean at 2400-9700 kg/ha. (AS)

0475

29651 LIMA, C.A. DE S. 1985. Efeito de seis profundidades do lencol freatico sobre o comportamento da cultura do feijao (Phaseolus vulgaris L.). (Effect of six water table depths on bean performance). Tese Mag.Sc. Vicosa-MG, Brasil, Universidade Federal de Vicosa. 55p. Pt., Sum. Pt., 57 Ref., Il.

Phaseolus vulgaris. Soil moisture. Yields. Yield components. Rooting. Brazil.

In the exptl. farm of the Empresa de Pesquisa Agropecuaria de Minas Gerais (Brazil), the effects of 6 water table depths (55-60, 61-66, 67-72, 73-78, 79-84, and 85-90 cm) were studied in the field in terms of yield, no. of pods/plant, no. of grains/pod, and depth of the bean root system. Depth levels of the water table were maintained mainly by water recondition in the soil, carried out by rainfall and irrigation channel of flowing water. Yield and its components did not show significant differences for the 55-84-cm water table depths. Yield and its components for the 85-90-cm water table were reduced compared with the highest levels. Water tables over 84 cm resulted in the lowest plant development. (AS (extract)-CIAT)

0476

29678 MASUMBA, B.A.N. 1984. Physiological measurement for ranking bean cultivars with respect to relative drought and heat resistance. East African Agricultural and Forestry 44(Special issue):290-296. En., Sum. En., 17 Ref., Il.

Phaseolus vulgaris. Irrigation. Flowering. Podding. Stomata. Transpiration. Cultivars. Resistance. Drought. Water stress. Yields. Water requirements. Kenya.

In Kibobo, Kenya, the comparative levels of stomatal conductance, leaf transpiration rate, leaf water potential, and the differential in leaf-air temp. of 3 early-maturing bean cv. with high yield potential, Pinto and Mwezi Moja (Phaseolus vulgaris) and Tepary (P. acutifolius), were determined at low, medium, and high irrigation levels during the reproductive growth period from early flowering to pod filling. The feasibility of ranking the bean cv. for drought and heat resistance according to the above parameters was determined and the ranking was verified by comparison with yield performance. At all irrigation levels Tepary bean had the highest grain yield, Mwezi Moja lower, and Pinto lowest. Despite its high yield, Tepary required only 70 days to mature, while Mwezi Moja and Pinto required 80 days. The short maturity period of Tepary resulted in a lower water requirement than that of the other 2 cv.

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At all irrigation levels Tepary consistently showed the lowest values of stomatal conductance and transpiration rate. Pinto was next and Mwezi Moj highest. Tepary also showed fairly consistently the greatest differential between leaf and air temp., with Mwezi Moja next and Pinto least. The cv. could not be differentiated on the basis of leaf water potential. Althoug the comparative differentials between leaf and air temp. occurred in the same order as grain yields, the differences between cv. were too small to serve as an index of drought and heat resistance. The results, however, show that a leaf-air temp. differential in a bean plot exceeding 1.8 degrees Celsius signals that the plants are experiencing water stress. (AS (extract))

0477

30731 MULLINS, C.A. 1987. Effects of nitrogen fertilization level on yield and pod quality of mechanically harvested snap beans. Tennessee Farm and Home Science no.141:6-11. En., 10 Ref.

Phaseolus vulgaris. Snap beans. Cultivars. Fertilizers. N. Yields. Pod characters. USA.

The effects of N fertilization (16.8 and 67.2 kg/ha) on yield and pod quality of 9 mechanically harvested snap bean cv. (BBL 92, BBL 47, Labrador, Strike, Sprite, Atlantic, Peak, Flo, and Eagle), were studied at the Plateau Expt. Station, Crossville (USA) in 1984 and 1985. The high N level resulted in highly undesirable characteristics like more plant lodging in both yr. and more pods with rotten ends in 1984. N levels had very little effect on any other characteristic studied. BBL 92 (av. yield, 1.5 t/ha) showed excessive lodging and thus was unacceptable. Labrador (av. yield, 1.9 t/ha) had very rough curved pods with too much seed for a BBL-type cv., while BBL 47 was the best BBL-type cv. (av. yield, 1.8 t/ha). Strike showed high trash levels in harvested pods and Atlantic had a high percentage of seed in pods, but both cv. were highly acceptable for fresh market use (av. yields, 1.3 and 1.5 t/ha). Sprite showed very low yields (av. 1.1 t/ha) but acceptable plant and pod characteristics. Peak, Flo (av. yields, 1.6 and 1.3 t/ha) and Eagle performed well, but Flo had a poor growth habit and excessive lodging in 1985. Eagle gave high yields (av. 1.8 t/ha) and had a very upright plant, regardless of N level, performing very well in the trials. (CIAT)

0478

31418 PARADA, A. 1984. Efeito do fósforo e de micorriza vesículo-arbuscular. (Effect of phosphorus and vesicular-arbuscular mycorrhizae on bean). Tese Mestrado. Piracicaba-SP, Brasil, Escola Superior de Agricultura Luiz de Queiroz da Universidade de Sao Paulo. 152p. Pt., Sum. Pt., En., 144 Ref., Il.

Phaseolus vulgaris. Fertilizers. P. Mycorrhizae. Soils. Harvesting. Timing. Rhizobium phaseoli. Cultivars. Growth. Yields. Nutrient uptake. Nodulation. Brazil.

Two greenhouse expt. were conducted with sterilized soil to observe the effect of P fertilization and vesicular-arbuscular mycorrhizae on Rhizobium-bean symbiosis and to study the efficiency of vesicular-arbuscular mycorrhizal fungi in different soil-plant systems, aiming at finding an adequate soil x plant x vesicular-arbuscular fungus interaction. In the 1st expt. 3 P doses (5, 16, and 27 ppm) were applied to the soil (Quartz Sand) and bean cv. Carioca was used. Plants were harvested at 3 periods during the plant cycle (30, 50, and 70 days after sowing) and were cultivated in the presence and absence of Glomus macrocarpum. Rhizobium phaseoli was used in all treatments. The 2nd expt. consisted of 3 bean cv.

(Carioca, Goiano Precoce, and Black Turtle Soup), cultivated in 3 soil types (Quartz Sand (Entisol), Terra Roxa Estruturada (Oxissol), and Dark Red Latosol (Alfissol)), infected with 4 vesicular-arbuscular fungi (Glomus leptotichum and G. macrocarpum; and Gigaspora margarita and G. heterogama), keeping a control treatment (without vesicular-arbuscular fungus). All treatments were inoculated with Rhizobium phaseoli. G. macrocarpum in the presence of R. phaseoli increased all analyzed parameters. At the highest P dosage, plant growth, grain yield, nutrient absorption, and nodulation were increased the most; the highest infection rates of the roots and spore production also occurred. The interactions of the soil x plant x fungus system are extremely complex and the modification of any 1 of its components may alter the efficiency of the system. G. leptotichum was found to be the most effective endophyte when several fungi were tested. It was also observed that Black Turtle Soup was the most productive cv. and the soil in which the plants present better development was the Dark Red Latosol. (AS)

0479

30629 PINTO, J.M. 1985. Efeito de diferentes regimes hídricos no solo sobre a producao e os componentes da producao do feijoeiro (Phaseolus vulgaris L.). (Effect of different soil water regimes on bean yield and its components). Tese Mag.Sc. Vicosa-MG, Brasil, Universidade Federal de Vicosa. 65p. Pt., Sum. Pt., 52 Ref., Il.

Phaseolus vulgaris. Irrigation. Soil moisture. Rooting. Yields. Yield components. Brazil.

A set of transparent columns covered with transparent polyethylene was used to determine water uptake and quantify bean yield and its components under field conditions in Vicosa (Minas Gerais, Brazil). The columns were enriched with mineral soil and, during the entire cropping cycle, water tables 25, 40, 55, and 80 cm deep were maintained with and without surface irrigation; a treatment without water table and without irrigation was also included. Greater water uptake was observed in treatments with and without surface irrigation, when the water table remained closer to the soil surface. The different treatments influenced depth and distribution of the root system. Except for plant height, bean yield and its components were not affected by the water table depth. (AS (extract)-CIAT)

0480

31480 SAWAZAKI, H.E.; TEIXEIRA, J.P.F.; BULISANI, E.A. 1985. Temperatura, umidade relativa e disponibilidade de água no acumulo de prolina em cultivares de feijoeiro. (Temperature, relative humidity, and water availability on proline accumulation dry bean cultivars). Bragantia 44(2):569-577. Pt., Sum. Pt., En., 15 Ref. [Secao de Fitoquímica, Inst. Agronómico (IAC), Caixa Postal 28, 13.100 Campinas-SP, Brasil]

Phaseolus vulgaris. Cultivars. Water stress. Temperature. Relative humidity. Proline. Leaves. Water content. Selection. Resistance. Brazil.

Four expt. were performed in growth chamber and greenhouse in Campinas, Brazil, in 1982, to study the relations of dry bean cv. submitted to a period of water and temp. stress. Adaptation of plants to stress conditions was measured through proline accumulation and water potential in leaves. In all tested cv. proline content showed a negative correlation with leaf water potential. Cv. P-511 and Curitibano showed lower proline content and higher water potential than the other cv., confirming the hypothesis that it is possible to identify materials genetically resistant to water stress by selection of plants or lines with low proline content. (AS)

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0481

31828 TAMA S., J.M. 1985. Estudio de fertilidad en los suelos de Santander de Quilichao, Departamento del Cauca, para producción de frijol (Phaseolus vulgaris L.). (Fertility study in soils from Santander de Quilichao (Cauca) for bean (Phaseolus vulgaris L.) production). Tesis Ing.Agr. Palmira, Colombia, Universidad Nacional de Colombia. 166p. Es., Sum. Es., En., 40 Ref., Il.

Phaseolus vulgaris. Soil fertility. Growth. Yields. Fertilizers. N. K. B. Zn. Mg. S. Ca. P. Mineral deficiencies. Statistical analysis. Colombia.

A field expt. was carried out in virgin soil at the CIAT Sub-station in Santander de Quilichao (Colombia) to evaluate the effect of nutrient deficiencies on the growth and yield of 2 bean var. (Calima and Carioca) and to corroborate the interactions between the soil chemical factors and the plant nutrient uptake by using the path coefficient analysis. The missing element technique was used, with 9 combinations of treatments with fertilizers: (1) Complete treatment minus N (C-N), (2) C-P, (3) C-K, (4) C-Ca, (5) C-S, (6) C-B, (7) C-Zn, (8) C-Mg, and (9) check treatment. For Carioca, the best treatments in decreasing order were, C-S, C-Zn, C-B, C-Mg, while the worst were C-P, C-Ca, and C-K. For Calima, C-Zn, C-S, C-B, C-Mg were the best treatments, while those showing the lowest yields were C-P, C-Ca, C-N, and C-K. The treatments showing the lowest yields in the 2 var. were those in which no major elements (P, Ca, N, and K) were applied, while the treatments without minor elements (S, B, and Zn) were the ones showing the highest yields, indicating the best response of the var. to the application of major elements. Similar tendencies were observed in the second harvest. Yields decreased in all treatments except for C-P and C-N which increased yields. This is explained by the beneficial effect of liming upon the soil microorganisms and their effect upon DM decomposition. Path coefficient analysis is an effective method for diagnosing some fertility problems since interactions between soil factors influence the plant uptake of nutrients, growth, and yield. (AS (extract)) See also 0438 0482 0494 0501 0517 0573 0578 0579 0584

D02 Cultivation Practices: Planting, Weed Control and Harvesting

0482

31421 CAMPOS DE JESUS, S. 1982. Efecto de la captación de lluvia, estiércol y rastrojo sobre la humedad del suelo y producción de la asociación maíz-frijol. Tesis Mag.Sc. Chapingo, Mexico, Colegio de Postgraduados. 194p. Es., Sum. Es., 65 Ref., Il.

Phaseolus vulgaris. Spacing. Planting. Dung. Green manures. Soil moisture. Evapotranspiration. Yields. Income. Mexico.

A study was conducted under rainfed conditions in Chapingo (Mexico), using 3 row spacings (90, 110, and 130 cm), 3 compost levels (0, 5, and 10 t/ha), 2 stubble levels (0 and 5 t/ha), and 2 densities for beans in association with maize H-30. By means of weekly gravimetric samplings, soil moisture was determined and from there, the actual evapotranspiration was calculated using the water balance equation. The use of small watersheds (110 and 130 cm) resulted in 113 and 126 mm of additional waterbearing stratum due to in situ run-off. These spacings showed greater yields of maize and bean seed/plant, string beans, and DM than the traditional furrowing at 90 cm. However, this yield is lower when transformed in yield/area due to the 15-26 percent reduction in plant population/ha when using the 110 and 130 cm spacings between rows. The reduction was 250 and 600 kg/ha for the 90-cm

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furrowing. The use of stubble mulching did not significantly affect the grain yield of the association. However, it maintained moisture levels of 34-81 percent available during the entire harvesting cycle. Compost addition produced a negative effect on bean yield and development. However, it increased moisture availability from 16.4 to 20.0 percent of moisture content at field capacity. The economic analysis found the best treatment to be the one using 110-cm spacings between rows, no application of compost or stubble, a planting density of 38,800 plants/ha (25,900 and 12,900 plants of maize and beans, resp.). (AS (extract)-CIAT)

0483

31011 CARRERA G., F. 1987. El cultivo de la habichuela. (Snap bean cultivation). Revista Esso Agrícola 34(2):18-20. Es., 5 Ref., Il.

Phaseolus vulgaris. Snap beans. Cultivars. Cultivation. Injurious insects. Mycoses. Colombia.

Different aspects and recommendations for snap bean cultivation in Colombia are briefly presented. Topics covered include botanical description, soils, climate, soil preparation, planting, fertilization, and staking. Other topics cover weed control, pests (Empoasca kraemeri, mites, aphids, Heliothis spp., Maruca testulalis), and diseases (Uromyces phaseoli, Colletotrichum lindemuthianum). Information is also presented on var. (Respin, Blue Lake, ICATO), harvesting, packing, storing, production costs, and credit availability. (CIAT)

0484

33133 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1987. Improving yield potential. 1. Yield physiology. In Centro Internacional de Agricultura Tropical. Bean Program. Annual Report 1987. Cali, Colombia, Working Document no.39. pp.48-50. En.

Phaseolus vulgaris. Genotypes. Plant architecture. Spacing. Planting. Leaf area. Lodging. Yields. Colombia.

Research on increasing yield potential was directed towards studies on genotypes with erect architecture combined with intensive agronomic management including the use of narrow row spacings. With intensive management, bean crops developed excessive LAI. Evaluation of LAI in 2 trials showed max. LAIs of 4.7-7.5 at 0.3-m row spacings. Lodging was also suspected to contribute to poor yield performance since previous studies suggested lodging could cause 20 percent yield reduction. However, in a 1st attempt to quantify the effects of lodging, no difference was found between the control plot with natural lodging and plots where lodging was prevented. The relations between seed size and yield, efficiency of pollination, and strategies for increasing yields of early maturing cv. are being studied. (CIAT)

0485

30661 FIGULS C., R.A. 1980. La contaminación fluvial en la producción de hortalizas. Efecto sobre el cultivo de la vainica (Phaseolus vulgaris L.). (Fluvial contamination in vegetable production. Effect on the snap bean crop). Tesis Ing.Agr. San José, Universidad de Costa Rica. 104p. Es., Sum. Es., 12 Ref., Il.

Phaseolus vulgaris. Snap beans. Irrigation. Yields. Socioeconomic aspects. Costa Rica.

A trial was carried out in the farm El Nacimiento (San Antonio de Belén, Costa Rica) to 1) assess the effect of contaminated water on the snap bean crop regarding yield and several economic considerations; 2) detect the

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degree of water contamination in the stream; and 3) determine through a microbiological analysis, the pathogenic content of both snap beans and water whose residual effects affect consumers. Twelve plots were irrigated with clean water and 12 with contaminated water. The germination and yield of plots irrigated with contaminated water were 32.7 and 47 percent resp. lower compared with those where clean water was used. The microbiological analysis indicated that people's health may be affected by using the stream water and also by consuming the fresh products irrigated with it. (AS (extract)-CIAT)

0486

31716 GILBERTSON, R.L.; RUPPEL, E.G.; SCHWEIZER, E.E. 1987. Effects of herbicides on root rot of pinto bean, weeds, and two soilborne fungi. Plant Science 71(7):627-628. En., Sum. En., 17 Ref. [U.S. Dept. of Agriculture, Agricultural Research Service, Crops Research Laboratory, Colorado State Univ., Fort Collins 80523, USA]

Phaseolus vulgaris. Fusarium solani phaseoli. Rhizoctonia solani. Herbicides. Weeding. Yields. USA.

Under low and moderate disease severity in the field (Colorado, USA), herbicides did not significantly increase or decrease pinto bean root rot caused by Fusarium solani f. sp. phaseoli and Rhizoctonia solani. Treatments that included min. (EPTC), moderate (EPTC plus trifluralin), and intensive (alachlor, EPTC, and trifluralin) levels of herbicides generally decreased weed populations in proportion to herbicide level but had no effect on soil population densities of F. solani or R. solani and little effect on bean yields. (AS)

0487

30631 HERRERA M., F.A. 1981. Combate químico de Rottboellia exaltata L. y otras malezas, en el cultivo del frijol (Phaseolus vulgaris L.) en Upala. (Chemical control of Rottboellia exaltata and other weeds in beans in Upala). Tesis Ing.Agr. San José, Universidad de Costa Rica. 89p. Es., Sum. Es., 44 Ref., Il.

Phaseolus vulgaris. Herbicides. Weeding. Toxicity. Yields. Yield components. Costa Rica.

Two trials with herbicides were conducted on beans in the Canton of Upala (Province of Alajuela, Costa Rica). The 1st trial with 21 treatments, evaluated pendimethalin, dinitramine, and trifluralin incorporated before planting, and oryzalin applied during preemergence, in doses of 0, 0.75, and 1.50 kg/ha each. Mixtures of these 4 herbicides with dinoseb or metabenzatiazuron were also tested and in addition to a free-of-weed competition treatment during the cropping cycle. None of these treatments was toxic to beans; no significant differences were found among treatments in the control of Rottboellia exaltata. Dinitramine at 1.5 kg/ha alone, or at 1.0 kg/ha combined with dinoseb at 2.0 kg/ha or with metabenzatiazuron at 1.0 kg/ha, exercised the greatest control of thin-leaf weeds; on the other hand, oryzaline in the same doses and combinations had the best effect against broad-leaf weeds. Yield components (no. of pods in 10 plants, no. of grains/pod, and no. of harvested plants) and yield were not affected by the herbicides alone. The free-of-weeds treatment during the entire cycle yielded 112.6 percent more than the free-of-competition treatment. The 2nd trial with 23 treatments, evaluated diphenopenthen, dalapon, and bentazon, applied in 3 doses each, 10 and 20 days after planting. In addition, mixtures of diphenopenthen and dalapon with bentazon were applied in the same periods. All treatments including dalapon, applied 10 and 20 days after planting, negatively affected bean plant height, wt./plant, and no. of plants at harvest; none of the plants

treated produced grains. Toxicity symptoms were observed in plants treated with diphenopenthen and bentazon, but the plants managed to recover, except when bentazon was applied 10 days after planting; bentazon application slightly decreased height, wt., no. of bean plants, and yield. In the 2nd trial the free-of-weeds treatment produced 34.4 percent more than the check treatment without weeding. (AS (extract)-CIAT)

0488

29797 INSTITUTO DE MERCADEO AGROPECUARIO. COLOMBIA. 1986. Guía para la cosecha y almacenamiento del frijol. (Guide for bean harvesting and storage). Bogotá, Colombia, 38p. Es., 8 Ref., Il.

Phaseolus vulgaris. Cultivation. Harvesting. Storage. Colombia.

A simple, caricatured guide of recommendations for producing, harvesting, and storing beans is presented. It covers aspects such as bean colors, shapes, and sizes of common beans in Colombia; the importance of using improved seed; planting systems, dates, and distances; weed control; fertilization; and important insect pests and diseases. Aspects on harvesting and postharvesting tasks such as cleaning, solar and artificial drying (recommended moisture contents for storage) are also included. Information on storage insect pests (Zabrotes subfasciatus and Acanthoscelides obtectus) and their household control using vegetable oils, cooling, or ashes is presented along with recommendations for storage in commercial warehouses. Other topics covered are grain hardening, packing, storage insect control at a commercial level, grain quality standards, transportation, and commercialization. (CIAT)

0489

31792 MULLINS, C.A.; COFFEY, D.L. 1987. Effect of harvest date on yield and quality of several snap bean cultivars. Bean Improvement Cooperative. Annual Report 30:65-66. En. [Univ. of Tennessee, Dept. of Plant & Soil Science, Plateau Experiment Station, Rt. 9, Box 363, Crossville, TN 38555, USA]

Phaseolus vulgaris. Snap beans. Harvesting. Timing. Cultivars. Pod characters. Yield components. Yields. USA.

A study was conducted at the U. of Tennessee Plateau Expt. Station (USA) in 1986 to determine the effects of 4 harvest dates at 2-day intervals (50, 52, 54, and 56) on the yield and pod quality of 7 snap bean cv. (Podsquad, Sentry, BBL 47, Strike, Bronco, Eagle, and Atlantic). Pod firmness was lowest (497.14 kg) on the 1st harvest date and highest (637.30 kg) on the last harvest date. The percentage of seed in pods and the seed length of 10 seeds selected at random increased with each harvest date; the same occurred with the percentage of no. 5 sieve pods. Yields of the machine-harvested pods increased with harvest date for the 1st harvest (5667, 6004, and 7001 kg/ha), but decreased on the last harvest (6413 kg/ha). (CIAT)

0490

31793 MULLINS, C.A.; COFFEY, D.L. 1987. Effects of tillage and spacing on snap bean production. Bean Improvement Cooperative. Annual Report 30:64-65. En. [Univ. of Tennessee, Dept. of Plant & Soil Science, Plateau Experiment Station, Rt. 9, Box 363, Crossville, TN 38555, USA]

Phaseolus vulgaris. Snap beans. Tillage. Spacing. Yields. Lodging. Weeding. USA.

A study was conducted in 1986 at the U. of Tennessee Plateau Expt. Station to compare the snap bean response to 3 tillage methods (conventional,

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rotary tillage, and zero tillage) and 2 row spacings (45-72 and 91-44 cm). Yields, plant stand, pod clusterings, percentage lodging, broken pods, rotten pods, and broadleaf weed control were lower in zero tillage than in the other 2 methods. Total yields and pod tip rot were higher at the 45.72-cm row spacing than at the 91.44-cm row spacing (11,020 and 5.2 vs. 7090 and 2.9, resp.). (CIAT)

0491

31703 RAMOS N., G. 1950. Apuntes sobre el frijol en Colombia (Phaseolus vulgaris L.). (Notes on beans in Colombia). Agricultura Tropical 6:9-31. Es., 5 Ref., Il.

Phaseolus vulgaris. Cultivation. Plant habit. Diseases and pathogens. Disease control. Colombia.

Some aspects related to bean cultivation in Colombia are described. They include importance, area planted, height (m.a.s.l.) at which it is cultivated, var. used in different climates, and production/department. Data on the plant habit, growth cycle, and mean temp. of the crop are presented for 67 var. Different cultivation practices are also described such as soil types and soil preparation, seeds, planting and planting dates, fertilization, weed control, av. yields/ha, harvest, and crop rotation. Information on main diseases and pests is included along with suggested control methods. (CIAT)

0492

31069 RENNER, K.A. 1987. 1987 weed control in dry edible beans. Michigan Dry Bean Digest 11(3):10-11. En., Il. [Michigan State Univ., Soil Sciences, East Lansing, MI 48824, USA]

Phaseolus vulgaris. Herbicides. Weeding. Weeds. USA.

The 1987 weed control guide for beans in Michigan (USA) is included as a reference table in which recommendations are given for herbicide use in preplant, preplant followed by pre-emergence, pre-emergence and post-emergence, herbicide and mixtures, formulations, rates, types of weeds controlled, remarks, and limitations. (CIAT)

0493

31490 VALENZUELA L., J. 1985. Parámetros de estabilidad para el rendimiento de variedades de frijol Phaseolus vulgaris L. en cuatro fechas de siembra. (Yield stability parameters of French bean varieties planted at four dates). Agricultura Técnica en México 11(2):185-200. Es., Sum. Es., 5 Ref. [Campo Agricola Experimental CIANO-INIA, Valle del Mayo, Sonora, México]

Phaseolus vulgaris. Cultivars. Planting. Timing. Yields. Mexico.

The performance of bean var. Canario 78, Canario 72, Canario 101, Azufrado Pimono 78, Azufrado 100, Sataya 425, Jamapa, and Pinto Americano 114 was studied in 4 planting dates (Sept. 20, Oct. 5 and 20, and Nov. 1) in Valle del Mayo (Sonora, Mexico) in 1982-83. Their yield stability and consistency in different environmental conditions were also determined. It was concluded that Canario 78, Canario 72, and Azufrado Pimono 78 had greater yields, statistically different in all environments. Var. Canario 78 and Jamapa were generally stable and consistent. Var. Azufrado 100 adapted well to unfavorable conditions showing a regression coefficient lower than 1. Var. Azufrado Pimono 78 responded well to favorable conditions especially later planting. (CIAT) See also 0464 0477 0496 0501 0517 0535 0619

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0494

31030 ALBREGTS, E.E.; HOWARD, C.M. 1985. Double cropping strawberries with vegetables. Proceedings of the Florida State Horticultural Society 98:299-301. En., Sum. En., 3 Ref. [IFAS, Univ. of Florida, Agricultural Research & Education Center, Rt. 2, Box 157 Dover, FL 33527, USA]

Phaseolus vulgaris. Intercropping. Snap beans. Zea mays. Cucumis sativus. Cucurbita pepo. Mulching. Fertilizers. N. P. K. Yields. USA.

Sweet corn, squash, cucumber, and snap bean were double cropped on strawberry beds immediately after fruit harvest ceased. Paraquat was applied to beds to destroy all vegetation prior to planting the 2nd crop each season. In 1981, mulch remained on beds and fertilizer was applied at either 0, 33.60, 14.56, 28.00, or 67.20, 29.12, 56.00 kg NPK/ha. In 1982, polyethylene mulch was removed from half of the plots. Snap beans received 33.60, 13.44, and 28.00 kg NPK/ha. In 1983, all mulch was removed from beds, and crops were seeded at 2 densities. The initial level of soluble salts at saturation in ppm were 550 in 1983, 3300 in 1982, and 1700 in 1981, except for cucumber beds which had 2400. Yields increased linearly with fertilizer rates in all crops except cucumber in 1981. Fertilizer rates in 1982 did not affect yields, (probably as a result of the high fertilizer carryover). All crop yields were in the range of state av. Soil soluble salt concn. were generally positively correlated with fertilization rates only early in the season. In 1982, beds covered with mulch maintained higher levels of soil soluble salts during the whole season in comparison with unmulched beds. (AS (extract))

0495

31656 CAETANO, L.F.; SILVEIRA, A.J. DA; VIEIRA, C.; CARDOSO, A.A.; TELES, F.F.F. 1984. Comportamento de cultivares de mandioca e de feijao em plantio consorciado. (Performance of cassava and bean cultivars in associated cropping). Revista Ceres 31(174):120-135. Pt., Sum. Pt., En., 15 Ref., Il. [Central de Experimentacao e Pesquisas de Linhares, 29.900 Linhares-ES, Brasil]

Phaseolus vulgaris. Intercropping. Manihot esculenta. Cultivars. Yields. Brazil.

A cassava/bean associated cropping trial was carried out in Coimbra (Minas Gerais, Brazil) using a (3 x 2 x 2) + 2 factorial: 1, 2, and 3 rows of beans planted between the cassava rows; 2 bean cv. (Negrito 897 and Preto Sessenta Dias 53), and 2 cassava cv. (Branca de Santa Catarina and Iracema) were used in addition to 2 treatments (both cassava and bean were planted cv. in sole cropping; bean cv. were planted in separate plots). Cassava was spaced at 1.40 m between rows and 0.40 between plants within the rows. Bean planting density was 15 seeds/m. Bean cv. Preto Sessenta Dias 53 was harvested 65 days after planting whereas cv. Negrito 897 at 90 days and cassava at 9 mo. The reduction of cassava root production caused by bean cv. av. 25.1, 35.6, and 48.2 percent with 1, 2, and 3 bean rows, resp. Bean yield increased from 17.3 to 37.9 percent with increasing no. of rows, resp. Cv. Preto Sessenta Dias 53 yielded less and competed less with cassava, possibly due to its early maturity and low plant height. The cassava/beans associated crop was efficient, giving LERs above unity. (AS)

0496

29736 FAUGHT, W.A.; NADAR, H.M.; WAWERU, S. 1984. Verification trials: a means of measuring applicability and economic feasibility of experimental

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results. East African Agricultural and Forestry Journal 44(Special issue):190-197. En., Sum. En., 6 Ref., Il.

Phaseolus vulgaris. Intercropping. Zea mays. Spacing. Planting. Technology evaluation. Transfer of technology. Yields. Kenya.

A series of on-farm trials was initiated in 1981 in Machakos District, Kenya, to verify some of the more promising findings of the Dryland Cropping Systems Research Project. Twelve farmers--3 in each of 4 clusters--cooperated. Maize cv. Katumani Composite B or local cv. were grown at densities of 20,000 or 60,000-70,000 plants/ha with beans, according to traditional methods or in the same row at twice the local rates. Crops were fertilized or not with 55 kg N and 20 kg P/ha for maize and 20 kg P for monocropped beans. Researchers presented recommendations to the farmers, assisted them in making the fertilizer applications, and collected information on labor inputs and yields. All other activities were carried out by the farmers in accordance with their normal schedules. Extremely dry weather during the 1st season and unforeseen events during the 2nd restricted the usefulness of the data for evaluating the approach or establishing the relationship of exptl. and farm-based findings. Successful trials, however, were completed in the 3rd season. Findings indicated responses to fertilizer that were similar to, although lower than, those found in the expt. and clearly showed that such treatments are economically feasible if the operator has access to the required capital. Use of improved breeder seed increased yields and net returns. Bean seed yields increased from 0.16 to 0.63 t/ha when intercropped with maize vs. traditional culture. An alternative rate and pattern of planting a maize/bean intercrop was found to provide substantially higher yields and net returns than the method normally followed by farmers. (AS (extract))

0497

31626 HOLGUIN A., G.; LOPEZ G., D.L. 1987. Selección simultánea para rendimiento en maíz (Zea mays) y frijol (Phaseolus vulgaris) en generaciones segregantes F5. (Simultaneous selection for maize and bean yield in F5 segregating generations). Tesis Ing.Agr. Palmira, Colombia, Universidad Nacional de Colombia. 123p. Es., Sum. Es., En., 30 Ref., Il.

Phaseolus vulgaris. Intercropping. Zea mays. Plant habit. Inheritance. Yields. Selection. Colombia.

At CIAT (Palmira, Colombia) a trial on simultaneous selection of materials for yield in bean-maize associated crops in F5 segregating generations was carried out to: (1) determine the degree of interaction between the maize and bean yield system; (2) correlate some quantitative characteristics of selected plants with yield/plot in the different cropping systems and growth habits; (3) determine yield and architecture heritability between F5 and F4 generations/system and growth habits; and (4) on the basis of the above, look for a combination between maize var. and bean lines (in F5 generation) with a good associating capacity. One hundred fifty bean materials corresponding to habits I, II, III, and IV distributed in 4 systems were planted (monoculture and 3 associations with maize). A high degree of association between the yield of the bean and maize genotypes(-0.6925) was found. In general, the variables measured in the selected plants showed a high correlation with yield, being significant in the no. of nodes in the main stem for both systems and habits. Heritability decreased from habit I to habit IV. It was also greater in association than in monoculture, indicating that it is easier to select in association. The best association was obtained for bean with materials of voluble growth habit (IV) and for maize with medium-height var. Suwan-1. (AS (extract))

0498

31722 HORTON, D.R.; CAPINERA, J.L. 1987. Effects of plant diversity, host density, and host size on population ecology of the Colorado potato beetle (Coleoptera:Chrysomelidae). Environmental Entomology 16(4):1019-1026. En., Sum. En., 31 Ref., Il. [Dept. of Entomology, Colorado State Univ., Fort Collins, CO 80523, USA]

Phaseolus vulgaris. Intercropping. Solanum tuberosum. Leptinotarsa decemlineata. Weeds. Spacing. Insect biology. USA.

Effects of host density and plant species diversity on populations of Leptinotarsa decemlineata, were studied in exptl. field plots located in Fort Collins (Colorado, USA). Hosts were grown at 2 densities and 4 levels of plant diversity: potato monoculture, potato/bean biculture, potato/bean/weed (Chenopodium album) triculture, and potatoes grown in fallow plots. All life stages of the L. decemlineata were affected by both host density and plant diversity. No. of L. decemlineata/plant were highest in low-diversity cultures of low host density; higher host density or plant diversity was accompanied by a reduction in no. of L. decemlineata/plant. Differences in host plant size among treatments were partially responsible for these trends. When L. decemlineata densities were expressed as no./unit leaf area, treatment effects were lessened or lost. Changes in L. decemlineata density among treatments were accompanied by differences in fecundity among treatments, but not by differences in survival. Fecundity, calculated as no. of eggs deposited/adult, was lower in high-diversity than in low-diversity plots. Survival rates (egg to late instar) and predation on eggs were not affected by plant species diversity. (AS)

0499

31784 MERWARTU, T.; RANGAPPA, M.; BERRFAL, P.S. 1987. Effect of polyculture system on Mexican bean beetle leafhopper and corn earworm populations. Bean Improvement Cooperative. Annual Report 30:10-12. En., 2 Ref., Il. [Virginia State Univ., Petersburg, VA 23803, USA]

Phaseolus vulgaris. Intercropping. Zea mays. Abelmoschus esculentus. Cucurbita maxima. Epilachna varivestis. Heliothis zea. Empoasca fabae. Cultivars. Plant injuries. USA.

In 1986 an expt. was carried out at the Virginia State U. research station (USA) to evaluate the effect of multiple cropping on Epilachna varivestis, Empoasca fabae and Heliothis zea populations in beans. Treatments were: 2 planting dates (June 12 and 26), 4 bean cv. (Contender, Bush Blue Lake, Bountiful, and Top Crop), and beans intercropped with maize, okra, or squash. Significant differences in E. varivestis leaf damage rating were observed among bean cv. Cv. Bush Blue Lake had significantly lower mean E. varivestis leaf damage rating (2.60) than cv. Contender (3.38). Bean intercropped with okra and squash had significantly lower mean E. varivestis leaf damage rating (2.32 and 2.70) than beans intercropped with maize and sole cropped (3.92 and 3.39). No significant differences, however, were observed for mean E. fabae no. among beans intercropped with the companion crops used. (CIAT)

0500

29734 NADAR, H.M.; FAUGHT, W.A. 1984. Effect of legumes on the yield of associated and subsequent maize in intercropping and rotation systems without nitrogen fertilizer. East African Agricultural and Forestry Journal 44(Special issue):127-136. En., Sum. En., 16 Ref., Il.

Phaseolus vulgaris. Intercropping. Rotational crops. Vigna unguiculata. Phaseolus acutifolius. Cajanus cajan. Yields. Rainfall. Kenya.

A study was undertaken for 3 seasons without N fertilizer on a typical Oxic Paleustalf soil in Machakos District, eastern Kenya, to determine the possibility of using the grain legumes beans, cowpeas, tepary beans, and pigeon peas in either rotation or intercrop systems with maize, as alternatives to commercial N fertilizers. Sixteen maize-legume cropping systems were compared with continuous solecrop maize and with each other. Yields of maize following cowpeas and beans were significantly higher than those of the continuous sole crop. The legume contributions to the rotation systems were estimated to be equal to 12.5 kg N/ha for cowpeas and 80 kg N/ha for beans. When rainfall conditions were more favorable during the short rains of 1982-83, LERs and gross values of all cropping systems were higher than those of the continuous sole-crop maize, except in the case of sole-crop beans, which was 4 percent lower. Legume contributions to sole-crop rotation systems were found to range between 8 kg N/ha for tepary beans and 44 kg N/ha for beans. In the intercrop systems, pigeon peas were the highest contributors (15 kg N/ha). From these results it can be concluded that under favorable rainfall conditions, the legumes studied have a beneficial effect on yields and returns of both associated and subsequent maize. Under less-than-adequate rainfall, the beneficial effect of legumes can only be observed in the sole-crop maize-legume rotation systems. (AS (extract))

0501

30790 VILLAR G., B. 1984. Generación de recomendaciones sobre prácticas de producción en el patrón anual de cultivo maíz de temporal con frijol de relevo en la región de La Frayleseca, Chiapas. (Definition of production pract. es for the annual pattern of rainfed maize/bean relay cropping in La Frayleseca, Chiapas). Tesis Mag.Sc. Chapingo, Mexico, Universidad Autónoma de Chapingo. Colegio de Postgraduados. 225p. Es., Sum. Es., 48 Ref., Il.

Phaseolus vulgaris. Fertilizers. N. P. Spacing. Planting. Germplasm. Relay crops. Yields. Mexico.

A study was conducted in La Frayleseca (Chiapas, Mexico) to generate production technology involving recommendations on N and P doses, population density, genetic material, and crop management, for the annual pattern of rainfed maize with beans in relay planting. During 1980-83, eight field expt. were carried out on hillside lands and 6 field expt. on fertile, swampy lowlands during 1980-82. On hillside lands, factors such as site, years, sites within years, small plot, N, and population density influenced the overall productivity of the cropping pattern. On swampy lowlands, and the site, years, and sites within years affected both species, and the overall cropping pattern. The effect of fertilization on beans was reflected on the cropping pattern and on a significant interaction of growth habit/yr. Production recommendations are presented including N and P doses, population density, var., and crop management for both agrosystems. (AS (extract)-CIAT)

0502

31653 ZAFFARONI, E.; DINIZ, M. DE S.; SANTOS, F.B. DOS 1987. Yield stability of sole and intercropping systems in the Northeast of Brazil. Pesquisa Agropecuaria Brasileira 22(4):393-399. En., Sum. En., It., 9 Ref., Il. [Univ. Federal da Paraiba, Centro de Ciencias Agrarias, Depto. de Fitotecnia, Caixa Postal 58397, Areia-PB, Brasil]

Phaseolus vulgaris. Intercropping. Zea mays. Manihot esculenta. Gossypium hirsutum. Yields. Statistical analysis. Brazil.

Yield stability was analyzed by computing the coefficients of variation and using the regression technique (an adaptation of the procedure frequently used to examine the stability of individual genotypes over a range of

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conditions). These procedures were used to analyze the yield stability of cassava, maize, cotton, and dry beans under sole and intercropping systems in the state of Paraíba, in NE Brazil. The C.V. were always higher in monocropping than in intercropping for the 4 crops. Maize and dry beans had the same slopes, while the coefficients of regression in cassava and cotton were higher than 1 for sole crops and statistically different from intercropping systems which had b values lower than 1 and hence were considered more stable. The advantage of intercropping in improving yield stability was more striking when the yields were negatively affected by the intercropping. (AS) See also 0464

D04 Seed Production

0503

31839 FERNANDEZ DE SOTO M., J.A.; SANCLEMENTE V., J.F. 1986. Evaluación de la mesa de fricción en la separación de terrones en lotes de frijol (Phaseolus vulgaris) y soya (Glycine max). Tesis Ing.Agr. Cali, Colombia, Universidad del Valle. Universidad Nacional de Colombia. 85p. Es., Sum. Es., En., 30 Ref., Il.

Phaseolus vulgaris. Seed. Agricultural equipment. Seed production. Colombia.

During the 1st semester of 1986, at the CIAT Seed Unit, the capacity and efficiency of a friction separator designed at Oregon State U. was evaluated, in the separation of soil clods present in common bean and soybean seed lots. Five feeding rates between 41 and 285 kg/h/bar, 5 belt speeds between 0.67 and 1.62 m/s and 3 vertical angles of bar separation (0, 10, and 20 degrees) were used. The initial soil clod content was 1.5 percent (in wt.) for beans and 3.5 percent for soybeans. When the belt speed was 1.27 m/s, the feeding rate 233.3 kg/h/bar, and the angle 10 degrees, the machine removed 98.6 percent of the contaminant in beans. In soybeans, 99.4 percent of the clods were removed when the belt speed was 1.44 m/s, the feeding rate 81.4 kg/h/bar, and the angle 10 degrees. In general the percentage of removal increased in beans when the feeding rate was larger, and decreased when it increased in soybeans. (AS)

0504

30724 WILSON JUNIOR, D.O. 1986. Threshing injury and mathematical modeling of storage deterioration in field bean seed (Phaseolus vulgaris L.). Ph.D. Thesis. Columbus, Ohio State University. 262p. En., 143 Ref., Il.

Phaseolus vulgaris. Cultivars. Threshing. Emergence. Storage. Germination. Seed production. Colombia.

Studies were conducted at CIAT on the production and storage of field bean seed by small farmers. Two studies are reported, one on threshing injury and the other concerning the deterioration of bean seed during storage. Eight bean cv. at 2 ranges of seed moisture, 8-10 and 11-15 percent, were threshed by hand shelling, flail threshing inside sacks, open flail threshing on concrete and soil surfaces, and 2 mechanical systems (an Almaco small plot thresher and an Allesdrescher K thresher). Sack threshing recovered the most seed while open flail methods recovered 91-96 percent of the sack yield and mechanical methods 81-84 percent. The Almaco and Allesdrescher machines cracked 17 and 27 percent of the testas while the sack, concrete, and soil flail methods cracked 6, 2, and 1 percent of the testas. reap. Under representative field conditions, mechanically threshed samples averaged 69-70 percent emergence while flail and hand shelled

treatments averaged 77-79 percent. Though not different in susceptibility to threshing injury, hand-shelled white-seeded lines averaged 63 percent emergence in the field under favorable conditions vs. 89 percent for colored lines. (CIAT) See also 0464

D05 Varietal Trials

0505

28946 ACOSTA G., J.A.; SANCHEZ V., J. 1985. Adaptación y estabilidad de diferentes materiales de frijol Phaseolus vulgaris L. en la región temporalera del norte centro de México. (Adaptation and stability of different bean materials in the rainfed cultivation region in north-central Mexico). Agricultura Técnica en México 11(2):105-119. Es., Sum. Es., 15 Ref., Il. [Campo Agrícola Experimental Valle del Guadiana, Inst. Nacional de Investigaciones Agrícolas 06600 México, D.F. México]

Phaseolus vulgaris. Cultivars. Adaptation. Yields. Mexico.

In 1978-80 10 bean genotypes were evaluated for adaptation and stability in a wide range of environments in the temperate and semiarid zones of the states of Guanajuato, Aguascalientes, Zacatecas, Durango, part of Chihuahua, and San Luis Potosi (Mexico). The results of the combined variance analysis showed highly significant differences among sites and var. x site interaction. The mean square value of the effect of sites was 20 times higher than that of the interaction, indicating large differences between sites. Genotypes Bayo Zacatecas, Bayo los Llanos and Bayo Durango showed general adaptability. Only this latter var. gave an unstable response to changes in site. Additionally, it produced the highest yields in unfavorable environments. Var. Ojo de Cabra showed adaptation in critical environments and stability in its response. Ten is the min. no. of sites to establish an annual adaptation trial in temperate and semiarid zones; it is also necessary to assign sites with contrasting characteristics, particularly regarding the amount and distribution of rainfall. (AS-CIAT)

0506

30660 SOUZA FILHO, B.F. DE 1985. Indicacao de novas cultivares de feijao para o Estado do Rio de Janeiro. (Release of new bean cultivars for the state of Rio de Janeiro). Campos-RJ, Brasil. Empresa de Pesquisa Agropecuaria do Estado do Rio de Janeiro. Estacao Experimental de Campos. Comunicado Técnico no.146. 4p. Pt. [PESAGRO RIO/Estacao Experimental de Campos, Av. Francisco Largo, 134, 28.100 Campos-RJ, Brasil]

Phaseolus vulgaris. Germplasm. Cultivars. Adaptation. Yields. Selection. Brazil.

In 1981-84, 2 preliminary trials on yield and adaptation of bean germplasm were carried out for cv. BAT 58, BAT 1060, Porrillo Sintetico, BAT 906, BAT 304, BAT 873, ICTA Tamazulapa, BAT 804, Jamapa, BAT 527, BAT 25, BAT 832 and the checks Moruna and Rio Tibagi at the exptl. station Campos de la Empresa de Pesquisa Agropecuaria do Estado do Rio de Janeiro, Brazil. Cv. BAT 58, BAT 1060, Porrillo Sintetico, BAT 906, BAT 304, and BAT 873 were selected for outyielding the checks. In 1982-84, 10 trials were carried out in Campos, Itaocara, Natividade and Cordeiro in which materials BAT 58, BAT 873 and BAT 906 were selected for outyielding the checks. These materials were released in the Rio de Janeiro state under the names of BR1.Xodo, BR2-Grande Rio, and BR3-Ipanema. (CIAT)

280

0507

29649 DEL ZAN, F.; FADDA, A.; PASINI, P.; DAL RE, L.; MINGUZZI, A.; MURGUT, G.; TONETTI, I.; ALLAVENA, A. 1986. Costituzione di varieta di fagiolo nano a seme screziato resistenti al virus del mosaico comune e tolleranti a Pseudomonas phaseolicola: prove comparative. (Breeding dwarf bean varieties with mottled seeds for resistance to common mosaic virus and tolerance to Pseudomonas phaseolicola: comparative trials). Informatore Agrario 42(11):45-46,49-56. It., Sum. It., 10 Ref., Il.

Phaseolus vulgaris. Cultivars. Resistance. Bean common mosaic virus. Pseudomonas syringae pv. phaseolicola. Yields. Adaptation. Seed characters. Yield components. Italia.

Data are analyzed and presented on seed yield/ha from 13 bean lines improved for resistance to BCMV and tolerance to Pseudomonas syringae pv. phaseolicola in 14 sites in Montanaso, Ravenna, Pilastro, Udine, and Turriaco, NE Italy. Some lines gave high yields and good quality seed for either fresh consumption or processing. Data on crop growth cycle, plant height, no. of pods/plant, pod length, no. of seeds/pod, seed shape and color, and wt. of 1000 seeds are also given for the best 25 lines and var. (CIAT) See also 0571 0587

E00 PLANT PATHOLOGY

See 0427 0464

E02 Bacterioses

0508

25388 ANDERSON, D.M.; MILLS, D. 1985. The use of transposon mutagenesis in the isolation of nutritional and virulence mutants in two pathovars of Pseudomonas syringae. Phytopathology 75(1):104-108. En., Sum. En., 29 Ref., Il. [Dept. of Botany & Plant Pathology, Oregon State Univ., Corvallis, OR 97331, USA]

Phaseolus vulgaris. Pseudomonas syringae pv. syringae. Races. Pseudomonas syringae pv. phaseolicola. DNA. Isolation. Pathogenicity. USA.

Transposon Tn5, which confers kanamycin resistance, was introduced into the genomes of Pseudomonas syringae pv. syringae PS9020 and P. syringae pv. phaseolicola PP7010 by conjugation with Escherichia coli SM10 containing the suicide plasmid vector pSUP1011. Approx. 0.5-0.6 percent of over 4000 kanamycing-resistant (Kmr) colonies that were analyzed mutated to auxotrophy. Most auxotrophs reverted at low frequencies (less than 10(-8), and most prototrophic revertants were kanamycin-sensitive. Of approx. 2400 Kmr colonies assayed on leaves of Phaseolus vulgaris, 0.3-0.4 percent had partially or completely lost the ability to induce wild-type virulence symptoms. Blot hybridization analysis of EcoRI-digested total DNA from these strains revealed insertion of Tn5 at unique sites. The identification of avirulent mutants that resulted from transposition of Tn5 provides a mechanism for cloning and characterizing virulence determinants in these strains. (AS)

0509

31734 ATKINSON, M.M.; BAKER, C.J. 1987. Association of host plasma membrane K(+)/H(+) exchange with multiplication of Pseudomonas syringae pv. syringae in Phaseolus vulgaris. Phytopathology 77(9):1273-1279. En., Sum.

En., 26 Ref., Il. [USDA-ARS, Microbiology & Plant Pathology Laboratory, Beltsville, MD 20705, USA]

Phaseolus vulgaris. Pseudomonas syringae pv. syringae. Disease physiology and biochemistry. USA.

Pseudomonas syringae pv. syringae, a bean pathogen, induced plasma membrane K(+) efflux/net H(+) in flux exchange and multiplied rapidly in bean leaf tissue. Nine bacterial mutants previously selected for impaired ability to induce a hypersensitive response and the K(+)H(+) response in tobacco were also examined. Mutants unable to induce K(+)H(+) exchange in bean did not multiply within this host, whereas weak, moderate, and strong inductions were associated with slow, moderate, and rapid population growth, resp. Time-course expt. indicated that induction of K(+)H(+) exchange preceded the onset of bacterial population growth. Continued operation of the exchange increased host intercellular fluid pH from approx. 5.5 to 7.5. Infiltration of host intercellular spaces with pH 7.0-8.0 buffers promoted growth of a nonpathogenic bacterial mutant, whereas pH 6.0 buffer inhibited growth of the wild-type strain. These results suggest that increased pH of host intercellular fluids resulting from K(+)H(+) exchange promotes bacterial multiplication. In view of the role of H(+) gradients in active transport of sucrose, amino acids, and inorganic ions across the plasmalemma, it was hypothesized that increased intercellular pH leads to increased nutrient levels in intercellular spaces where bacteria reside. (AS)

0510

31829 CHAVARRO C., A.; LOPEZ G., C.A. 1984. Estudios de las características y patogenicidad de Corynebacterium flaccumfaciens (Hedges) Dows. agente causal del marchitamiento bacteriano de Zornia spp. y su efecto en el rendimiento en Zornia glabra CIAT 7847 y Phaseolus vulgaris. (Studies on the characteristics and pathogenicity of Corynebacterium flaccumfaciens causal agent of bacterial wilt in Zornia spp. and its effect on Zornia glabra CIAT 7847 and Phaseolus vulgaris yield). Tesis Ing.Agr. Palmira, Colombia, Universidad Nacional de Colombia. 110p. Es., Sum. Es., En., 37 Ref., Il.

Phaseolus vulgaris. Cultivars. Isolation. Corynebacterium flaccumfaciens. Pathogenicity. Dry matter. Yields. Colombia.

At CIAT, under glass house conditions, cross-inoculation studies were carried out with 3 ecotypes of Zornia spp., and 7 bean var. with 3 isolates of Corynebacterium flaccumfaciens ob[illegible]ted from diseased plants of Zornia spp and 1 isolate from P. vulgaris. [illegible] bacterial isolates produced chlorosis, and later necrosis, atrophy, [illegible]d wilt when they were inoculated in the main stem by the injection method. It was registered that the Zornia spp. isolates were pathogenic to beans and that the isolate from P. vulgaris was pathogenic to Zornia spp. There were significant differences in pathogenicity among isolates. At the CIAT Exptl. Station in Santander de Quilichao, (Colombia) the incidence and severity of bacterial wilt was studied in 3 bean var. and 1 ecotype of Zornia glabra. The bacterial isolates produced chlorosis, necrosis, atrophy, wilt, and death of parts or all the plant. Corynebacterium flaccumfaciens was more pathogenic to Zornia glabra CIAT 7847, possibly due to the presence of specialized pathogenic isolates to this forage legume. At the same time, considerable DM losses of 81.4 percent in Z. glabra and 41.2 and 37.1 percent in the var. PI 136677 and Porrillo Sintético, resp. Although var. Porrillo Sintético was only moderately affected by C. flaccumfaciens, results from the trial suggest that moderate levels of infection cause significant losses in DM (37 1 percent) and in production (mean 71.3 percent). Levels of infection up to 83 percent were registered in bean seeds. The

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correlation coefficient between the percentage of bacterial infection and the percentage of germination in vitro was -0.83. Levels of infection up to 52.5 and 88.8 percent were registered in bean seeds and Zornia, resp. The correlation coefficient between the percentage of bacterial infection and the percentage of germination was -0.87. (AS (extract))

0511

31463 CONTRERAS DE VELASQUEZ, N.; TRUJILLO, G. 1984. Comparación de metodologías para la detección de la infección de semillas de caraota (Phaselus vulgaris L.) con la bacteria Xanthomonas campestris pv. phaseoli (Smith) Dye. (Comparison of methodologies for detecting bean seed infection with Xanthomonas campestris pv. Phaseoli bacteria). Agronomía Tropical 34(1-3):29-41. Es., Sum. Es., En., 32 Ref., Il. [FONAIAP, Estación Experimental Barinas, Barinas 5201, Venezuela]

Phaseolus vulgaris. Seeds. Xanthomonas campestris pv. phaseoli. Seed transmission. Disease transmission. Venezuela.

Four methods were compared to detect the internal and external infection of 34 lots of bean seeds by Xanthomonas campestris pv. phaseoli: (1) seedling injection with liquid obtained from seeds incubated during 24 h on enriched media (3 g yeast extract/liter of sterile water); (2) seedling injection using bacterial suspension of seeds incubated on semi-selective media (1.0 g yeast extract, 25 mg cycloheximide, 2 mg nitrofurantoin and 1.0 mg nalidixic acid in 1000 ml 0.01 M phosphate buffer pH 7.2) during 48 h, sedimented by centrifugation and resuspended on buffer-saline; (3) Ouchterlony test with liquid incubated on enriched media (procedure 1), whose bacteria were sedimented by centrifugation, resuspended and steamed; (4) Ouchterlony test combined with semi-selective media (procedure 2). Results suggest that the use of semi-selective media combined with immunodiffusion in agar, results in a highly reliable procedure for detection of X. campestris pv. phaseoli in bean seed, which compared to other procedures, detected infection in 100 percent of the samples. Detection with SSM was 23 percent highest than with the seedling injection method and 47 percent higher than with the serological test when semi-selective media was not used. (AS)

0512

29619 EL KADY, S.; SOMLYAI, G.; HEVESI, M.; ELEMENT, Z. 1986. Differences in antigenic structure between the wild type and non-pathogenic mutants of Pseudomonas syringae pv. phaseolicola induced by Tn5 transposon insertions. Physiological and Molecular Plant Pathology 29(3):381-392. En., Sum. En., 10 Ref., Il. [Plant Protection Inst., Hungarian Academy of Sciences, H-1525 Budapest, P.O. Box 102, Hungary]

Phaseolus vulgaris. Pseudomonas syringae pv. phaseolicola. Analysis. Antisera. Hungary.

Crossed immunoelectrophoresis was used to serologically compare a wild type strain of Pseudomonas syringae pv. phaseolicola (S21) with a no. of Tn5-containing derivatives. Two new antigens were detected in the Tn5-containing strains, one of which was also present in Escherichia coli strain SM10 which harbors the plasmid pSUP1011 thus indicating that it is coded for by Tn5. Four prototrophic mutants which have lost the ability to elicit a hypersensitive reaction (HRi(-)) in tobacco were compared with the wild type. One of them, S21-509, which had reduced virulence (Vir(-)), was deficient in antigen A. Another antigen, B, was missing from the mutant S21-533, while both antigens A and B appear to be absent from the mutant S21-1650. Those mutant strains which had lost the B, or both A and B antigens, were nonpathogenic to Phaseolus vulgaris. The mutant S21-989, which had lost 4 different antigens (C, D, E, F), was also nonpathogenic

to P. vulgaris. The antigenic differences between the wild type and the mutants verified that those genes which were mutagenized in the HRi(-) strains were expressed in the wild type during in vitro growth with the gene products present in relatively high amounts in the cells because it was possible to vizualize them by the electrophoresis technique. The antigens were thermolabile, indicating that they are proteins. A pathogenic revertant of S21-989 had lost its Tn5 and, showed no differences in antigenic structure from the wild type. No antigenic differences from the wild type were noted in 3 Tn5 mutants that had retained their pathogenicity. (AS)

0513

25690 LAHMAN, L.K.; SCHAAD, N.W. 1985. Evaluation of the dome test as a reliable assay for seedborne bacterial blight pathogens of beans. Plant Disease 69(8):680-683. En., Sum. En., 27 Ref. [Monsanto Corp., 800 N. Lindberg, St. Louis, MO 63167, USA]

Phaseolus vulgaris. Pseudomonas syringae. Pseudomonas phaseolicola. Xanthomonas phaseoli. Xanthomonas phaseoli var. fuscans. Virulence. Disease transmission. Seed transmission. USA.

Samples of 15 bean seed lots were assayed by dome test procedures for Pseudomonas syringae pv. syringae, P. syringae pv. phaseolicola, Xanthomonas campestris pv. phaseoli pv. phaseoli), and X. campestris pv. phaseoli var. fuscans. Some seed lots were chosen because they were positive in dome tests elsewhere. Bacteria were isolated from lesions of bean seedlings in a dome test. Bacteria producing a white, flat, nonmucoid fluorescent colony or yellow-mucoid colony on King et al's medium B and yeast extract-dextrose-calcium carbonate agars, resp., were purified. Identities of possible pseudomonad blight pathogens were verified by utilization of manitol, sorbitol, and lactate, levan formation, oxidase reaction, and pathogenicity. Possible xanthomonads were verified by pathogenicity tests. Thirty-one fluorescent colonies and 66 yellow-pigmented colonies were isolated from 11 and 8 of the 15 seed lots, resp. Neither P. phaseolicola nor X. phaseoli were identified in the 15 seed lots, and P. syringae was identified in only 1 of the 15 seed lots. However, 6 pseudomonads that failed standard pathogenicity tests produced water-soaking when injected into seedlings kept under dome test conditions. These results suggest that the dome test is not a reliable assay procedure for issuing phytosanitary certificates. (AS)

0514

31712 REYNOLDS, K.L.; ZANELLI, M.; LAURENCE, J.A. 1987. Effects of sulfur dioxide exposure on the development of common blight in field-grown red kidney beans. Phytopathology 77(2):331-334. En., Sum. En., 10 Ref., Il. [Boyce Thompson Inst. for Plant Research, Cornell Univ., Ithaca, NY 14853-1801, USA]

Phaseolus vulgaris. SO2. Xanthomonas campestris pv. phaseoli. Plant injuries. Disease control. USA.

Field grown red kidney beans cv. California Light Red Kidney were exposed, using an open air fumigation system, to 0-1 ppm SO2 (2650 micrograms/cubic meter at standard temp. and pressure) for 3 h 2 or 3 times/w. between 10 July and 6 Sept. 1982. Plants were inoculated at the beginning of the exposure period by spray application of a suspension of Xanthomonas campestris pv. phaseoli in sterile water. Lesions were counted at 2- to 3-day intervals throughout the exposure period. Increasing cumulative SO2 concn. resulted in a significant decrease in the rate of lesion appearance. The rate of this response remained constant over the course of the exposure period. Increasing cumulative SO2 concn. also led to a reduction in yield

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of noninfected plants; however, there was no apparent reduction in yield of infected plants. Exposure to SO2 effectively inhibited disease development but also reduced yield. (AS) See also 0528 0572 0575 0582 0583 0601

E03 Mycoses

0515

31736 BELL, D.K.; SUMNER, D.R. 1987. Survival of Rhizoctonia solani and other soilborne basidiomycetes in fallow soil. Plant Disease 71(10):911-915. En., Sum. En., 21 Ref. [Dept. of Plant Pathology, Coastal Plain Experiment Station, Tifton, GA 31793-0748, USA]

Phaseolus vulgaris. Isolation. Rhizoctonia solani. Snap beans. Pathogenicity. USA.

Soil in 6581-cubic centimeter clay pots was infested with isolates of Rhizoctonia solani in AG-1--AG-4, binucleate Rhizoctonia-like fungi in CAG-2-CAG-5, R. zeae, and Laetisaria arvalis and buried to within 5 cm of the pot rim for almost 40 wk. of incubation in the field. Soil was sampled at infestation and 86, 211, and 283 days after infestation and placed on a medium selective for soil-borne basidiomycetes. One of 4 isolates of AG-1, 1 of 6 AG-2-2, 1 of 3 AG-2-1, 8 of 14 of AG-4, and 1 of 2 isolates of CAG-3 were recovered from fallow soil after 283 days. Snap bean and maize were planted in each pot of fallow infested soil and a pot of fallow control soil after 283 days. Isolates of AG-4 and AG-2-2 and 1 isolate of CAG-3 caused root and hypocotyl rot in snap bean. Surviving isolates of other fungi were not pathogenic on snap bean or maize, except for 1 isolate of AG-2-1 that was weakly virulent on snap bean. (AS (extract))

0516

31417 BOLAND, G.J. 1984. Epidemiology and management of diseases caused by Sclerotinia sclerotiorum in white bean and soybean. Ph.D. Thesis. Ontario, Canada, University of Guelph. 268p. En., Sum. En., 153 Ref., Il.

Phaseolus vulgaris. Whetzelinia sclerotiorum. Epidemiology. Temperature. Rainfall. Resistance. USA.

The epidemiology of diseases caused by Sclerotinia sclerotiorum in white bean and soybean was investigated and compared. In addition, resistance was evaluated in growth room and field conditions for 58 and 53 soybean cv., resp. The epidemiology of the 2 diseases was similar and the initial appearance of disease was associated with extended periods of plant surface wetness lasting 39-112 h after development of a crop canopy and after crop flowering was initiated. Mean daily air temp. at or below 14 degree Celsius were associated with increases of disease incidence in soybean, but not in white bean. Apothecia were observed 2-5 days after rainfall had increased the soil water potential to -5 bars and higher, but only after the crop canopies had enclosed the rows. The presence of a crop canopy increased the frequency of days with high soil moisture and decreased the mean daily soil temp. under the crop. Final disease incidence in white bean av. 87.4 percent and in soybean av. 31.6 percent during the 2 yr that disease occurred. The spatial distribution of apothecia and disease was aggregated within both crops; areas with high and low no. of apothecia coincided with areas of high and low incidence within areas of 3.6 x 10.0 m and 10.0 x 10.5 m, but not in 2-m sections of row. The aggregated distribution of apothecia and disease was most consistently described by the negative binomial distribution. The aggregated distributions within areas of 3.6 x 10.0 m allowed for the estimation of the no. of apothecia

associated with 75 percent disease incidence (ED75) in white bean and with 40 percent disease incidence (ED40) in soybean. In white bean, the ED75 values in 1981 and 1982 were 3.6 and 35.0 apothecia square meter, resp. In soybean, the ED40 values in 1981 and 1982 were 6.7 and 56.0 apothecia/square meter. Differences in environmental variables between years and differences in resistance between crops were associated with the varying ED values. (AS (extract))

0517

29651 CARDOSO, J.E.; NEWMAN L., E.D.M. 1981. Avanços na pesquisa sobre a mela do feijoeiro no Estado do Acre. (Research progress on web blight of beans in the state of Acre). Rio Branco-AC, Brasil, Empresa Brasileira de Pesquisa Agropecuária. Unidade de Extensão de Pesquisa de Ambito Estadual. Boletim de Pesquisa no.01. 29p. Pt., Sum. Pt., En., 72 Ref., Il.

Phaseolus vulgaris. Rhizoctonia solani. Etiology. Disease control. Planting. Timing. Yields. Land preparation. Spacing. Fertilizers. Fungicides. Brazil.

The present level of knowledge on web-blight of beans, a major phytopathological problem in the Amazon Region, is summarized. Emphasis is placed on research carried out in the state of Acre, Brazil, during 3 yr (1978, 1979 and 1980-81). Several aspects of initiation disease, progress, and economic importance are discussed. Taxonomic, physiological, and ecological characters of the fungus Thanatephorus cucumeris are also given. Disease control and future research trends are discussed. (AS)

0518

29799 CERVONE, F.; COUTTS, R.H.A. 1982. Absorption of polygalacturonase from Colletotrichum lindemuthianum by French bean tissue and protoplasts. In Wood, R.K.S., ed. NATO Advanced Study Institute on Active Dyense Mechanisms in Plants, Cape Sounion, Greece, 1980. Proceedings. New York, USA, Plenum Press. NATO Advanced Study Institutes Series. Series A, Life Science v.37. pp.320-321. En.

Phaseolus vulgaris. Snap beans. Colletotrichum lindemuthianum. Enzymes. United Kingdom.

The hypothesis that polygalacturonase (PG) may have a role in the specifity of plant diseases and that a site of action for PG may exist in the plant cell membrane was tested. Results showed that PG from Colletotrichum lindemuthianum was absorbed by french bean plant tissue but not by tissue from other non-host plants. PG from fungi not pathogenic to beans were slightly affected by bean tissue. The permeability of bean cells was increased by PG from C. lindemuthianum but not by other PG. Enzyme absorption was much faster in incompatible combinations of french beans cv. and C. lindemuthianum races than in compatible ones. The site of enzyme absorption was found to be the protoplast. The function of PG is not only to macerate plant tissue and eliminate plant cells. If enzyme absorption before maceration is a critical step in pathogenesis, PG also plays a role in recognizing the tissue to be attacked. A binding site for PG may well be present in the plant cell membranes where binding proteins for specific sugars are present. A PG localized on the membrane would be well placed to affect both cell wall and protoplast. (CIAT)

0519

31825 COBO S., F. 1986. Variación patogénica y fuentes de resistencia a Colletotrichum lindemuthianum (Sacc & Magn) Scrib., patógeno de la antracnosis del frijol, en Colombia. (Pathogenic variation and sources of resistance to Colletotrichum lindemuthianum, the anthracnose bean pathogen

80

in Colombia). Tesis Ing.Agr. Palmira, Colombia, Universidad Nacional de Colombia. 101p. Es., Sum. Es., En., 72 Ref., Il.

Phaseolus vulgaris. Isolation. Colletotrichum lindemuthianum. Cultivars. Resistance. Pathogenicity. Colombia.

Pathogenic variation studies with Colombian isolates of Colletotrichum lindemuthianum the anthracnose bean pathogen, were conducted under lab. and greenhouse conditions at CIAT (Colombia). Colombian bean germplasm with commercial grain color was evaluated to find resistant var. and sources of resistance to the existing variation. Seventeen isolates of C. lindemuthianum collected at the main Colombian bean zones (Antioquia, Huila, Nariño, Valle del Cauca, Santander and Risaralda) were inoculated on 21 American and European differential bean var. Two European races, Alfa and Kappa, were used as checks. Results from the pathogenic variation studies confirm the wide variation of the anthracnose bean pathogen in Colombia and indicate that none of the known European races is present in the Colombian isolates of C. lindemuthianum. The Colombian isolates analized have similar reaction to those reported for Brazilian and Mexican races with predominance of those belonging to the Delta, Mexican II, Alfa or Brazilian II and Beta groups. The race B.A.-1C, from the Delta group, was determined as the most predominant of the Colombian isolates of C. lindemuthianum. Based on the amount of var. attacked by each isolate, a descending pathogenicity order to each collecting zone was established: Antioquia greater than Nariño approx. equal to Cauca approx. equal to Risaralda equal to Santander greater than Valle del Cauca greater than Huila. Afterwards, 69 Colombian bean lines with commercial grain color were evaluated for their reaction to mixtures of representative isolates from each Colombian bean zone. Five accessions identified as ICA Guali, PVAD 782, PVAD 1261, V 8036 and ZAV 83071 had either resistant or intermediate reactions to all mixtures of isolates evaluated. This allows them to be used in the future as commercial var. or as new sources of resistance to the disease. (AS (extract))

0520

25325 CRAMER, C.L.; RYDER, T.B.; BELL, J.N.; LAMB, C.J. 1985. Rapid switching of plant gene expression induced by fungal elicitor. Science 227(4691):1240-1243. En., Sum. En., 25 Ref., Il. [Plant Biology Lab., Salk Inst. for Biological Studies, San Diego, CA 92138, USA]

Phaseolus vulgaris. Colletotrichum lindemuthianum. Enzymes. Genes. Resistance. Disease physiology and biochemistry. USA.

The pattern of RNA synthesis in suspension cultured bean cells was analyzed by blot hybridization and in vitro translation of newly synthesized m-RNA. The RNA was separated from preexisting RNA by organomercurial affinity chromatography after in vivo labelling with 4-thiouridine. The fungal elicitor prepared from Colletotrichum lindemuthianum induced the synthesis of m-RNA encoding phenylalanine ammonia-lyase, chalcone synthase, and chalcone isomerase, 3 enzymes of phenylpropanoid metabolism involved in the synthesis of isoflavonoid derived phytoalexins. This is part of a rapid and extensive change in the pattern of m-RNA synthesis directing production of a set of proteins associated with expression of disease resistance. (AS)

0521

30745 EPSTEIN, L.; LACCETTI, L.B.; STAPLES, R.C. 1987. Cell-substratum adhesive protein involved in surface contact responses of the bean rust fungus. Physiological and Molecular Plant Pathology 30(3):373-388. En., Sum. En., 55 Ref., Il. [Dept. of Plant Pathology, Univ. of California at Berkeley, Berkeley, CA 94720, USA]

281

Phaseolus vulgaris. Uromyces phaseoli. Enzymes. Proteins. Analysis.

Further evidence is provided that extracellular adhesive protein(s) are involved in thigmodifferentiation as well as in oriented growth. Extracellular proteins which might be involved in adhesion of bean rust uredospore germlings are also partially characterized. Uredospore germlings of Uromyces appendiculatus displayed 2 contact-sensitive responses on leaves or certain synthetic surfaces: a specific orientation of germ tubes and an induction of appressoria at leaf stomates or scratched surfaces. Germ tube orientation, nuclear division (used as a marker for appressorium formation), and germling adhesion on scratched "Parafilm" was reduced by the proteolytic enzyme, pronase E, but not by the heat denatured proteolytic enzyme. Forty micrograms of pronase E/ml significantly reduced nuclear division of germlings incubated on either a hydrophilic or a hydrophobic surface. Pronase E reduced adhesion regardless of whether the enzyme was applied during growth or after attachment had occurred, although higher conc. were required after attachment had occurred. The data suggest that extracellular protein is required for germling adhesion to a substratum and that adhesion is required for germ tube orientation and thigmodifferentiation. The composition of the bean rust extracellular material was partially characterized and analyzed for proteins on SDS-polyacrylamide gels. Intact germlings have 6 predominant extracellular peptides detected by (125)I labelling. (AS extract))

0522

29984 GRIFFITHS, H.M.; ANDERSON, A.J. 1987. Response of Phaseolus vulgaris protoplasts to chemical components of fungal origin. Canadian Journal of Botany 65(1):63-68. En., Sum. En., Fr., 26 Ref. [Tissue Culture Research, NPI, 417 Wakara Way, Univ. of Utah Research Park, Salt Lake City, UT, USA 84108]

Phaseolus vulgaris. Snap beans. Colletotrichum lindemuthianum. Races. Inoculation. Isolation. Pathogenicity. USA.

The alpha and beta races of Colletotrichum lindemuthianum were used with French bean cv. Great Northern to determine the effect of elicitors from culture filtrates and cell walls of C. lindemuthianum on protoplasts from P. vulgaris tissue. Whole plants inoculated with the alpha race developed brown lesions on the hypocotyls (susceptible response). The beta race caused small limited lesions, indicating a more resistant interaction. Extracellular products and cell wall materials were isolated from beta race cultures and extracellular products from alpha race cultures. The extracts were size fractionated. By using a cotyledon bioassay, elicitor activity was demonstrated on Dark Red Kidney within fractions from the alpha race. Fractions from the beta race had little activity on Dark Red Kidney or Great Northern cotyledons. Protoplasts were isolated from Great Northern bean hypocotyl tissue and incubated with the fungal fractions. Even at low concn. (0.01 micrograms glucose equivalent/ml), the beta race culture filtrate rapidly killed a greater percentage of protoplasts (30 percent) than the alpha race (15 percent). The beta race wall extract had little effect on protoplast viability. The proportion of nonviable protoplasts depended on the incubation period and the concn. of the fungal material. Heat treatment of the culture filtrates and wall extract did not decrease their lethal effects. The results suggest that protoplasts may be valuable in examining the nature of certain plant x pathogen interactions. (AS)

0523

31767 HALL, R.; McFADDEN, W. 1987. Determining the bean root rot potential of fields in Ontario. Bean Improvement Cooperative. Annual Report 30:22-23. En. [Dept. of Environmental Biology, Univ. of Guelph, Ontario, Canada]

Phaseolus vulgaris. Fusarium solani phaseoli. Canada.

A reliable method is presented to determine the disease potential for Fusarium solani sp. phaseoli in bean crops in fields of Ontario, Canada. Disease severity was classified (0-5) according to hypocotyl characteristics and roots of plants growing in pots. A root rot index was established on the basis of classification of disease severity, no. of plants affected, and total no. of plants. (CIAT)

0524

31768 HALL, R.; MWIINDILILA, C. 1987. Prediction of white mold in white beans in Ontario. Bean Improvement Cooperative Annual Report 30:24:25. En. [Dept. of Environmental Biology, Univ. of Guelph, Ontario, Canada]

Phaseolus vulgaris. Whetzelinia sclerotiorum. Spacing. Rainfall. Canopy. Canada.

Results from research to examine the effects of cultivation, environmental conditions, and the fungus Sclerotinia sclerotiorum on the incidence of the white mold in white bean cv. in Ontario, Canada, are summarized. No. of apothecia/10 m row, total rainfall, and av. canopy density were regressed against max. disease. Greater incidence of disease was observed, in narrow rows (18-36 cm) than in wide rows (70-76 cm), although in the latter, factors such as greater canopy density and rainfall increased apothecia no. (CIAT)

0525

31723 HOCH, H.C.; STAPLES, R.C.; FOURETT, T. 1987. Chemotaxis induced appressoria in Uromyces appendiculatus are formed aerially, apart from the substrate. Mycologia 79(3):418-424. En., Sum. En., 15 Ref., Il. [Dept. of Plant Pathology, New York State Agricultural Experiment Station, Cornell Univ., Geneva, NY 14456, USA]

Phaseolus vulgaris. Uromyces phaseoli. Culture media. Disease physiology and Biochemistry. USA.

Uredospore germlings of Uromyces appendiculatus, the bean rust pathogen, were induced by K(+), Ca(+), or sucrose in order to form appressoria chemotropically to determine more clearly the mode of differentiation. Differentiation occurred only when the germlings grew aerially, away from the solutions or agar media containing KCl, CaCl2, or sucrose. Germlings submerged in these solutions differential only when a topographically inductive surface was provided. The microtubule cytoskeleton was symmetrically arranged in germlings grown aerially and asymmetrically in germlings grown on a firm substrate. (AS)

0526

30747 IACOBELLIS, N.S.; DeVAY, J.E. 1987. Studies on pathogenesis of Rhizoctonia solani in beans: an evaluation of the possible roles of phenylacetic acid and its hydroxy derivatives as phytotoxins. Physiological and Molecular Plant Pathology 30(3):421-432. En., Sum. En., 25 Ref., Il. [Instituto Tossine e Micotossine da Parassiti Vegetali, C.N.R., Via G Amendola, 197/F, 70126 Bari, Italy]

Phaseolus vulgaris. Rhizoctonia solani. Isolation. Pathogenicity. Analysis. USA.

A study was conducted to verify the ability of Rhizoctonia solani to produce phenylacetic acid derivatives in vitro; to assess the phytotoxicity of phenylacetic acid derivates and their role in pathogenesis of R. solani on bean; and to examine the possible relationship between

virulence and production of phenylacetic acid derivatives in vitro in selected strains of R. solani isolated from different hosts. All isolates of R. solani used, when grown in Weinhold medium supplemented with phenylalanine, accumulated phenylacetic acid (PAA) and its ortho-, meta-, and para-hydroxy derivatives in culture. Major metabolites which accumulated were PAA and m-hydroxy-phenylacetic acid (m-OH-PAA); however, the in vitro accumulation of total phenylacetic acid derivatives by isolates of R. solani was not related to their pathogenicity and/or virulence. On the contrary, the nonpathogenic and weakly virulent isolates of R. solani produced the highest quantities of PAA-derivatives/unit wt. of mycelium compared with the highly virulent isolates. The phenylacetic acid derivatives used, when bioassayed at high concn., caused inhibition of growth of tomato and bean seedlings. The most active compounds were PAA and DL-alfa-methoxy-phenylacetic acid (MeO-PAA); however, when m-OH-PAA was assayed at low concn. there was a stimulation of seedling growth. In addition, when m-OH-PAA solutions were injected into bean hypocotyls or into tobacco leaves they never caused necrotic lesions or symptoms resembling those caused by R. solani on beans. These results indicate that PAA-derivatives are not directly involved in pathogenesis of R. solani in beans. (AS)

0527

31781 LINDGREN, D.T.; STEADMAN, J.R. 1987. Evaluation of a new fungicide for control of bean rust. Bean Improvement Cooperative. Annual Report 30:48-49. En. [Institute of Agriculture & Natural Resources, Univ. of Nebraska, Lincoln, NE, USA]

Phaseolus vulgaris. Uromyces phaseoli. Disease control. Fungicides. USA.

In 1985 and 1986, a new exptl. fungicide RH3866 was compared with a dithiocarbamate (and S in 1985) for controlling rust on pinto bean cv. UI 114, RH3866 was applied at much lower rates than the standard fungicides. Rust severity was higher in 1985 than in 1986. RH3866 provided adequate control when applied at the 1st sign of rust in 1986. However, when applications were delayed until 2-3 wk. after the 1st rust pustules were observed, rust severity was comparable to that of unsprayed plots and yields were similarly low. (CIAT)

0528

29798 ORELLANA A., H.; PADILLA B., F. 1985. Principales enfermedades del frijol en la Sierra Ecuatoriana. (Major bean diseases in the Ecuadorian sierra). Quito, Ecuador, Instituto Nacional de Investigaciones Agropecuarias. Estación Experimental Santa Catarina. Comisión para la Protección Integrada de Cultivos. 32p. Es., Il.

Phaseolus vulgaris. Symptomatology. Disease control. Cercospora vanderystii. Uromyces phaseoli. Colletotrichum lindemuthianum. Oidium balsamii. Ascochyta phaseolorum. Whetzelinia sclerotiorum. Isariopsis griseola. Fusarium solani phaseoli. Fusarium oxysporum. Rhizoctonia solani. Sclerotium rolfsii. Xanthomonas campestris pv. phaseoli. Pseudomonas syringae pv. phaseolicola. Bean common mosaic virus. Bean rugose mosaic virus. Meloidogyne incognita. Meloidogyne hapla. Ecuador.

An illustrated guide of major bean diseases found in the Ecuadorian sierra is presented. Brief descriptions and color pictures are given for disease symptoms, dissemination and control measures for diseases caused by Cercospora vanderystii, Uromyces phaseoli, Colletotrichum lindemuthianum, Oidium balsamii, Ascochyta phaseolorum, Isariopsis griseola, Sclerotinia sclerotiorum, Fusarium solani f. sp. phaseoli, F. oxysporum f. sp. phaseoli, Rhizoctonia solani, Sclerotium rolfsii, Xanthomonas campestris

pv. phaseoli, Pseudomonas syringae pv. phaseolicola, BCMV, BRMV, Meloidogyne incognita, and M. hapla. (CIAT)

0529

31715 POHRONEZNY, K.; FRANCIS, J.; FONG, W.G. 1987. Strategies for chemical control of snap bean rust in Florida and their compatibility with Canadian residue tolerances. Plant Disease 71(7):639-642. En., Sum. En., 13 Ref. [Univ. of Florida, Tropical Research & Education Center, Homestead FLA 33031, USA]

Phaseolus vulgaris. Snap beans. Uromyces phaseoli. Disease control. Chemical control. Phenology. Yields. USA.

Chemical control of snap bean rust (Uromyces phaseoli) using crop phenology as a basis for spray application was equivalent to the standard practice of full-season use of ethylene bisdithiocarbamate (EBDC) fungicide (maneb or mancozeb) + S. A maneb or mancozeb + S tank mix applied weekly until flowering was followed by 2 or 3 applications of chlorothalonil. EBDC residues in the crop phenology system were less than 0.1 ppm, whereas full-season use of EBDC + S in 1 of the 2 years of testing resulted in residues 5 times larger than the 0.1 ppm Canadian tolerance. Spray programs using the crop phenology method or full-season use of 1.17 kg a.i. chlorothalonil/ha also were found to be cost-effective means for snap bean rust control while maintaining fungicide residues within limits established by the Canadian government. Bitertanol, a currently unregistered fungicide, provided outstanding rust control when used as a routine spray or when weekly sprays were initiated after rust appearance. (AS)

0530

31041 RAJNAUTH, G. 1987. Web blight, an important disease of bean and pack-choi in Trinidad. Tropical Agriculture (Trinidad) 64(4):356-358. En., Sum. En., 16 Ref., Il. [Dept. of Plant Pathology, Central Experiment Station, Ministry of Agriculture, Lands & Food Production, Centeno, Via Arima PO, Trinidad and Tobago]

Phaseolus vulgaris. Rhizoctonia solani. Epidemiology. Symptomatology. Etiology. Plant injuries. Trinidad and Tobago.

In 1981-85, research was carried out in Rio Claro and Coryal (Trinidad) to evaluate the etiology, symptomatology, distribution, and severity of a disease with similar symptoms to web blight observed on bean and Chinese cabbage. The existence of bean web blight was confirmed. Field surveys indicated that web blight is widespread on both crops, induces severe foliar damage during the rainy season, and is associated with yield losses of 25-100 percent. (CIAT)

0531

31038 SANCHO, H.M.; ALFARO M., R.; MORALES G., A.; MORA B., B.; GALVEZ E., G. 1987. Manejo integrado de mustia hilachosa causada por Thanatephorus cucumeris (Frank) Donk en frijol común. (Integrated management of web blight caused by Thanatephorus cucumeris in common beans). Manejo Integrado de Plagas no.4:39-46. Es., Sum. Es., 22 Ref. [Dirección General de Investigación y Extensión Agrícola, Ministerio de Agricultura y Ganadería, Apartado 10094, San José, Costa Rica]

Phaseolus vulgaris. Rhizoctonia solani. Disease control. Herbicides. Fungicides. Integrated control. Cultivars. Yield components. Yields. Tillage. Costa Rica.

An expt. was established in Esparza (Costa Rica), on the integrated management of web blight (Thanatephorus cucumeris) in common beans under

the min. tillage system. Var. Porrillo 70 (intermediate resistance) and ICA Pijao (susceptible) were used. Herbicides gliphosate and paraquat (1.0 kg/ha) of each, were applied 5 days before planting. A mixture of fluazifop-butyl + bentazon at 0.75 + 1.0 kg/ha, resp., was applied 21 days after planting. Doses of 1.2 g/liter of benomyl were applied at 20, 30, and 45 days after planting. Two absolute control treatments were added; both cv. were maintained free of weeds during the cropping cycle. Var. Porrillo 70 was superior to var. ICA Pijao in yield and its components. The combined analysis of the treatments showed that var. Porrillo 70 with both preemergent and foliar application of benomyl resulted in greatest yields and least severity of the disease. Postemergent applications of the same treatments did not improve coverage or yield; instead, the overdosification of bentazon had a phytotoxic effect on the crop. (AS (extract)-CIAT)

0532

31047 SEPULVEDA R., P.; PIÑA G., M.C. 1987. Marchitamiento y pudrición en porotos causado por Sclerotium rolfsii. (Bean wilting and rottening caused by Sclerotium rolfsii). Investigación y Progreso Agropecuario La Platina no.43:12-13. Es., Il.

Phaseolus vulgaris. Sclerotium rolfsii. Symptomatology. Disease control. Cultural control. Chile.

The 1st. report on the incidence of Sclerotium rolfsii in beans in Chile is presented. The pathogenic fungus was observed for the 1st. time attacking beans in several bean fields of var. Fleetwood at Nogales (Chile) during the 1986-87 cropping season. Symptomatology, dissemination, and control measures available are briefly indicated. Crop rotation with cereals and avoiding contamination with S. rolfsii from introduction of plant material, and irrigation with contaminated water and tools, are the main control measures listed. (CIAT)

0533

31485 TARIQ, V.N.; JEFFRIES, P. 1987. Cytochemical localization of lipolytic enzyme activity during penetration of host tissues by Sclerotinia sclerotiorum. Physiological and Molecular Plant Pathology 30(1):77-91. En., Sum. En., 40 Ref., Il. [Botany Dept., Queen's Univ., Belfast BT7 1NN, Northern Ireland]

Phaseolus vulgaris. Whetzelinia sclerotiorum. Enzymes. Disease physiology and biochemistry. United Kingdom.

Using an ultracytochemical technique, lipolytic enzyme activity was localized during the penetration of Phaseolus vulgaris cv. The Prince and P. coccineus leaf tissues by Sclerotinia sclerotiorum. Enzyme activity was initially observed at sites where an appressorium appeared in close contact with the host surface; electron opaque deposits were formed in the region directly below a vesicular region and an extraplasmalemmal zone present in the fungal cytoplasm, and appeared to be restricted to the region between the plasmalemma of the fungus and the host cuticle. The electron-opaque deposition was observed only at the site of host penetration or in later stages of infection in the vicinity of the penetration pore. There was no association of electron-opaque deposits with organelles or membrane systems in either the fungal or host cells. Lipolytic activity was not detected cytochemically during invasion of stem tissues. (AS)

0534

31486 TARIQ, V.N.; JEFFRIES, P. 1986. Ultrastructure of penetration of Phaseolus spp. by Sclerotinia sclerotiorum. Canadian Journal of Botany

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64(12):2909-2915. En., Sum. En., Fr., 31 Ref., Il. [Botany Dept., Queen's University of Belfast, Belfast, BT7 1NN, Northern Ireland]

Phaseolus vulgaris. Whetzelinia sclerotiorum. Analysis. Electron microscopy. United Kingdom.

The infection of leaf and stem tissues of Phaseolus vulgaris and P. coccineus by Sclerotinia sclerotiorum was studied by electron microscopy. Direct entry of the intact plant surface was achieved by hyphae from simple or compound appressoria. A closely appressed hyphal tip developed an electron-lucent region at the apex, in which a plasmalemmal invagination formed. This invagination surrounded a region of extracytoplasmic vesicular material which penetrated the cuticle during invasion. Penetration occurred by a narrow infection peg which passed through the cuticle via a narrow pore and caused little change in cuticle integrity. Once the cuticle was breached, a walled subcuticular vesicle developed from which infection hyphae spread laterally. Destruction of the epidermal cell walls was both rapid and extensive. Leaf and stem colonization occurred by intercellular growth of undifferentiated hyphae accompanied by cellular necrosis in advance of the mycelial front. (AS)

0535

30601 VAN BRUGGEN, A.H.C. 1985. The effects of Rhizoctonia solani Kuehn on emergence, growth and yield of dry beans. Ph.D. Thesis. Ithaca, New York, Cornell University. 320p. En., Sum. En., 228 Ref., Il.

Phaseolus vulgaris. Rhizoctonia solani. Emergence. Growth. Yields. Spacing. Planting. Statistical analysis. Mathematical model. USA.

The role of Rhizoctonia solani in a root rot complex of dry beans was investigated to design an integrated pest management program in New York, USA. Out of 13 substrates tested for the production of sclerotia of R. solani, autoclaved green bean pods were the most efficient. In field microplots, R. solani decreased stand significantly but did not affect yield. Delay in emergence and futher development of dry beans by R. solani increased linearly with inoculum level. Disease incidence and severity increased at a decreasing rate with higher inoculum levels. Path coefficient analysis that indicated increases in other yield components compensated for a reduction in plant stand by R. solani. In incubator and growth chamber, expt., the rates of germination, emergence, and initial seedling growth of red kidney beans were determined in response to various conditions of temp., soil moisture and light, in the presence and absence of R. solani. In incubators the pathogen delayed emergence and further development and reduced the growth rate. The proportion of plants infected depended only on temp., and lesion size was primarily determined by soil moisture in growth chamber expt., light increased plant growth rates and restricted infection by R. solani but only slightly affected seedling development high RH promoted both seedling development and infection by R. solani. A model designed to simulate the emergence of dry beans consisted of 2 submodels: (1) development and growth of an av. seedling, simulating imbibition, activation of reserves, and conversion of reserves into roots, stems, and primary leaves, and (2) establishment of a population of seedlings. Good agreement between simulated and observed seedling growth was obtained in the absence of R. solani. (AS (extract))

0536

31500 ZAMBOLIM, L.; RODRIGUES, C.H.; MARTINS, M.C.D.P. 1987. Controle químico da ferrugem-do-feijoeiro. (Chemical control of bean rust). Pesquisa Agropecuaria Brasileira 22(2):179-186. Pt., Sum. En., 18 Ref., Il. [Univ. FEDERAL DE VICOSA, 36.570 Vicosa-MG, Brasil]

253

Phaseolus vulgaris. Uromyces phaseoli. Fungicides. Disease control. Brazil.

Under greenhouse conditions the fungicides (ppm a.i.) chlorothalonil (1125), mancozeb (1200), bitertanol (125), methyl thiophanate x thiram (400), triadimefon (125), triforine (100), and oxycarboxin (375) proved to be good protective fungicides sprayed 15 days before inoculation of bean cv. Rio Tibagi with uredospores of Uromyces phaseoli var. typica. Oxycarboxin and triforine showed curative effect when sprayed till 6 days, and bitertanol and tridimefon till 3 days after inoculation. Under field conditions the best results were obtained with oxycarboxin (0.5 kg/ha), bitertanol (0.5 kg/ha), and triforine (0.5 liter/ha). (AS) See also 0483 0560 0569 0572 0574 0582 0583 0586 0599 0603 0605 0606

E04 Viroses

0537

31725 CHALA, V.H.; HARRISON, C.W.; HALLIWELL, R.S. 1987. Identification of two distinct strains of watermelon mosaic virus 2 affecting cucurbits in Texas. (Identifacación de dos cepas distintas del virus 2 del mosaico de la sandía que afecta cucurbitáceas en Texas). Plant Disease 71(8):750-752. En., Sum. En., 9 Ref., Il. [Estación Napo, Apartado 2600, Quito, Ecuador]

Phaseolus vulgaris. Isolation. Watermelon mosaic virus 2. Pathogenicity. Serology. Disease transmission. Symptomatology. USA.

Two distinct strains of watermelon mosaic virus 2 (WMV-2) were isolated in Texas, USA. One strain, designated isolate M, was obtained from the wild cucurbit Melothria pendula, and the other, isolate S, was isolated from zucchini squash (Cucurbita pepo). Isolate S caused a systemic infection on Phaseolus vulgaris cv. Black Turtle 2, whereas isolate M. did not, thus distinguishing them from each other. Isolates S and M were characteristic of WMV-2 in that they both produced typical cytoplasmic inclusions, had modal lengths of 755 and 775 nm. resp., and protein capsid subunits of 32,000 daltons. (AS (extract))

0538

21359 COSTA, A.S.; GASPAR, J.O.; VEGA, J. 1983. Mosaic angular do feijoeiro Jalo causado por um carlavirus transmitido pela mosca branca Bemisia tabaci. (Angular mosaic of Jalo bean induced by a carlavirus transmitted by Bemisia tabaci). Fitopatologia Brasileira 8:325-337. En., Sum. Pt., En., 19 Ref., Il. [Secao de Virologia, Inst. Agronómico, Caixa Postal 28, 13,100 Campinas-SP, Brasil]

Phaseolus vulgaris. Bemisia tabaci. Disease transmission. Viroses. Isolation. Pathogenicity. Vectors. Brazil.

A whitefly-transmitted carlavirus that induces a characteristic angular yellow mosaic in bean cv. Jalo has been recorded in Brazil since 1979. The virus is rod-shaped, 650 x 13 nm, and occurs in the cytoplasm of infected parenchyma cells as individual particles or in bundless, these often with a falcate, loose end. It infected all bean and soybean cv. with which it was inoculated, inducing in most mild mottle symptoms. It is mostly a legume virus but it can infect plants from other families. Losses induced are generally insignificant. It has not been seed-transmitted in beans and soybeans; it is probably carried over in susceptible species of the natural vegetation and its occurrence so far has been restricted to areas of high populations of the vector, Bemisia tabaci. The virus is easily transmitted by mechanical inoculation and its relationship to the vector is of the noncirculative type, being lost by viruliferous insects after 4 h feeding

on healthy plants. It is not efficiently transmitted by the vector. Individual B. tabaci fed on diseased sources transmit the virus to less than 10% of the plants; no difference in transmission efficiency was found between female and male insects. (AS (extract))

0539

20888 EL-ATTAR, S.; SABET, K.; NOUR-EL-DIN, F. 1967. Studies on common bean mosaic diseases in U.A.R. A. Properties of the causal virus. Agricultural Research Review (Egypt) 45(1):122-135. En., Sum. En., 13 Ref., Il.

Phaseolus vulgaris. Cultivars. Resistance. Disease transmission. Bean common mosaic virus. Etiology. Egypt.

Studies were carried out in Egypt to evaluate the BCMV transmission and bean var. susceptibility BCMV was found to be experimentally transmitted by: sap inoculation, grafting, seeds from infected bean plants, and the aphid Myzus persicae. Susceptible bean plants, infected at an early stage of growth, produced as high as 50 percent infected seeds. A low percentage of seed transmission (5.3 percent) took place from plants infected during flowering stage. There is no relation between seed infection and position of the seeds in the pod. Bean var. Suisse Blanc, Monte Calm, and Stringless Green Refugee were susceptible to BCMV. Var. Idaho Refugee, Contender, Seminole, Michelite, Toporop, and Tenderlong were resistant. Under certain conditions, some of these resistant var. reacted to infection with BCMV. Idaho Refugee seedlings collapsed when approach-grafted to infected seedlings of Stringless Green Refugee var. Detached primary leaves of var. Tenderlong and Toporop developed local lesions when inoculated with the virus and incubated in darkness at 34 degrees Celsius. BCMV had a thermal inactivation point between 57-58 degrees Celsius and a dilution end point above 1:1000. The virus resisted ageing for 24-34 h at room temp. The purified preparation of BCMV remained infective for 35 days when stored at 5 degrees Celsius. Infectivity of the virus was checked at pH 4.5 but did not seem to be affected at pH value ranging from 5.0 to 7.8. (AS (extract))

0540

31773 KYLE, M.M.; PROVVIDENTI, R. 1987. A severe isolate of bean common mosaic virus NY 15. Bean Improvement Cooperative. Annual Report 30:87-88. En., 6 Ref. [New York State Agricultural Experiment Station, Cornell Univ., Geneva, NY 14456, USA]

Phaseolus vulgaris. Bean common mosaic virus. Isolate. Cultivars. Genes. Resistance.

The characterization of a BCMV isolate (NY 68-95), that produces more severe symptoms than the NY 15 type strain but corresponds exactly in host differential specificity is reported. The BCMV isolate NY 68-95 was obtained from naturally infected Red Kidney in 1968. Since the responses of 10 different groups of host lines evaluated with both virus types were similar, NY 68-95 and NY 15 must be considered isolates of the same pathotype. (CIAT)

0541

28696 MONIS, J.; SCOTT, H.A.; GERGERICH, R.C. 1986. Effect of beetle regurgitant on plant virus transmission using the gross wounding technique. Phytopathology 76(8):808-811. En., Sum. En., 14 Ref., Il. [Dept. of Plant Pathology, Univ. of Arkansas, Fayetteville, AR, 72701, USA]

Phaseolus vulgaris. Disease transmission. Vectors. Cerotoma trifurcata. Epilachna varivestis. Viroses. USA.

Regurgitant from Mexican bean beetles and bean leaf beetles inhibited the transmission of zucchini yellow mosaic virus (ZYMV) not transmissible by beetles and common tobacco mosaic virus, and had little or no effect on beetle-transmissible squash mosaic virus when mixed with purified virus preparations and inoculated to systemic hosts using the gross wounding technique. Transmission of the beetle-transmissible cowpea severe mosaic virus (CSMV) was unaffected by regurgitant when cowpea was used as the test plant. No transmission occurred, however, when bean was inoculated with a mixture of regurgitant and CSMV using the gross wounding technique. Two members of the bromovirus group, which are inefficiently transmitted by beetles, behaved differently when mixed with regurgitant and inoculated using the gross wounding technique. Brome mosaic virus was not inhibited whereas cowpea chlorotic mottle virus (CCMV) showed the same pattern of inhibition as a virus not transmissible by beetles. Recovery of CCMV and ZYMV from virus:regurgitant mixtures by fractionation in CsCl gradients resulted in virus preparations that were infectious when inoculated to plants using the gross wounding technique. This demonstrates that viruses not transmissible by beetles and the inefficiently transmitted CCMV are not inactivated by beetle regurgitant. (AS)

0542

29940 NARDO, E.A.B. DE; COSTA, A.S. 1986. Diferenciacao de isolados do complexo brasileiro do vírus do mosaico dourado do feijoeiro. (Differentiation of isolates of the Brazilian bean golden mosaic virus complex). Fitopatologia Brasileira 11(3):655-666. Pt., Sum. Pt., En., 11 Ref., Il. [Centro Nacional de Pesquisa de Defesa da Agricultura-EMBRAPA, 13.820 Jaguariúna-SP, Brasil]

Phaseolus vulgaris. Isolation. Bean golden mosaic virus. Races. Pathogenicity. Disease transmission. Cultivars. Vectors. Bemisia tabaci. Symptomatology. Resistance. Brazil.

Five isolates of the Brazilian BGMV complex, probably resulting from natural segregation, were selected on the basis of symptoms and studied comparatively in tests with the whitefly vector, Bemisia tabaci. Three of the strains studied (FR-1, FR-2, and FR-p1) induced milder symptoms on bean var. than those induced by the normal complex (CN-1); 1 strain (MO-1) induced moderate symptoms, and a 5th (FO-1), more severe symptoms than normal. The relative intensity of the symptoms induced by the 5 different strains remained constant in successive insect transmission tests from beans to beans, or when they were passed through other susceptible species of Phaseolus and back to beans. No change of symptoms was also noticed when 2 of the strains (FR-1 and FO-1) and the normal complex (CN-1) were inoculated on tolerant bean var. and then transmitted back from these onto var. Preto. Symptoms induced on the tolerant var. were relatively milder than those on sensitive ones. Attempts were made to transmit the different strains by routine methods of mechanical inoculation, extracting the inoculum in presence of 0.002 molar phosphate buffer and sodium sulfite at the same conen. Out of 300 test plants that were inoculated, none gave positive results, thus indicating that the segregated isolates do not behave differently from the normal complex. (AS (extract))

0543

31807 PROVVIDENTI, R. 1987. List of genes in Phaseolus vulgaris for resistance to viruses. Bean Improvement Cooperative. Annual Report 30:1-4. En., 18 Ref. [New York State Agricultural Experiment Station, Cornell Univ., Geneva, NY 14456, USA]

Phaseolus vulgaris. Genes. Resistance. Viroses.

The 26 single genes known for resistance to 16 viruses affecting Phaseolus vulgaris are tabulated; relevant references are included. (CIAT)

0544

22523 ROBERTS, D.A. 1984. Comparison of lesion size and number as criteria of virus-induced systemic acquired resistance in hypersensitive plants. Phytopathologische Zeitschrift 110(3):272-276. En., Sum. En., Germ., 14 Ref. [Dept. of Plant Pathology, Univ. of Florida, Gainesville, FL 32611, USA]

Phaseolus vulgaris. Tobacco necrosis virus. Resistance. USA.

Lesion size and no. were both significantly reduced in leaves of hypersensitive test plants inoculated after they had acquired systemic virus-induced resistance. Lesion diameter was reduced more than lesion no. in tobacco cv. Samsun NN with TMV and in Phaseolus vulgaris cv. Bountiful with tobacco necrosis virus. Reduced diameter was never correlated with reduced no. of lesions. Reduced size of lesions was the more constant criterion of induced resistance; coefficients of variability for diameter (10-29 percent) were always less than those for no. (34-70 percent). Measurement of both criteria is still advised. (AS)

0545

31022 SEPULVEDA R., P.; HERRERA G., G.; PIÑA G., C. 1987. Mosaico amarillo del frejol; puede disminuir el rendimiento hasta en un 70 por ciento por planta. (Bean yellow mosaic virus; it can reduce yields up to 70 percent per plant). Investigación y Progreso Agropecuario La Platina no.39:27-28. Es., Il.

Phaseolus vulgaris. Bean yellow mosaic virus. Yields. Chile.

The effect of BYMV on bean (cv. Orfeo INIA) yield was studied at La Platina and Los Andes (Chile) in 1984 and 1986 resp. Diseased plants yielded 60 percent less than BYMV-free plants. Yield reductions of a bean crop depend on the no. of plants attacked by the virus and can be up to 60-70 percent when the whole crop is affected. (CIAT)

0546

30652 ZAMBOLIM, E.M. 1984. Purificacao do virus do mosaico comum do feijoeiro e sua deteccao em semente pelo teste de imunoadsorcao com enzima ligada ao anticorpo ("Elisa"). (Purification of the bean common mosaic virus and its detection in seeds by the enzyme-linked immunosorbent assay (ELISA)). Tese Mag.Sc. Vicosa-MG, Brasil, Universidade Federal de Vicosa. 62p. Pt., Sum. Pt., En., 45 Ref., Il.

Phaseolus vulgaris. Bean common mosaic virus. Isolation. Analysis. Cultivars. Resistance. Brazil.

BCMV, a potyvirus, was purified by borate buffer at moderately high pH, in the extraction, and thereafter in the presence of 0.5 molar urea and 2-mercaptoethanol to prevent aggregation of the particles. Only 1 cycle of differential centrifugation was performed before the final isopycnic centrifugation. Just after juice extraction the particles were precipitated with polyethylene glycol. The stabilization of virus particles was not necessary before the isopycnic centrifugation. Yield of purified BCMV was about 3 mg/kg leaves, which was considered acceptable in view of the high degree of purity of the final preparation. The antisera thus obtained with the purified BCMV did not react at all with the controls. The titer 1:512 was found satisfactory to set up the ELISA. The purified virus could be detected with ELISA at concn. as low as 6 and 12 ng/ml in separate tests. ELISA was also used to compare 5 bean cv. in

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their ability to multiply the virus in primary leaves. Results suggest that Red Kidney, Santana and Bountiful can be advantagously employed. Rico 23 was not a good host for BCMV multiplication and Carioca was found resistant to the virus. BCMV could be detected easily by ELISA in embryos of infected seeds. In the tests carried out, the virus was detected in 90 percent of Santana seeds and in 80 percent of Rico 23 seeds. (AS) See also 0528 0576 0594 0600

E05 Nematodes

0547

31021 GARRIDO J., L.R.; BELLIARD A., L. 1986. Situación nematológica del cultivo de habichuela en las zonas de Azua, San José de Ocoa, San Juan de la Maguana y Constanza de la República Dominicana. (Nematode infestation status of snap bean crops in Azua, San Jose de Ocoa, San Juan de La Maguana and Constanza in Dominican Republic). Revista de la Facultad de Ciencias Agronómicas y Veterinarias 1(1):81-91. Es., Sum. Es., 11 Ref., Il.

Phaseolus vulgaris. Snap beans. Nematodes. Dominican Republic.

Five hundred and twenty soil and root samples taken at a 20-cm depth in Azua, San Jose de Ocoa, San Juan de La Maguana and Constanza, the major snap bean producing areas in Dominican Republic, were collected to determine the degree of nematode infestation and their frequency of appearance in this crop. In the case of soils, nematode genera most frequently infestating snap bean crops of the sampled areas were, in descending order, Helicotylenchus sp., Pratylenchus sp. and Criconemoides sp. In roots, the most frequent were Pratylenchus sp., Meloidogyne sp. and Rotylenchus sp. (CIAT)

0548

31724 MELAKEBERHAN, H.; WEBSTER, J.M.; BROOKE, R.C.; D'AURIA, J.M.; CACKETTE, M. 1987. Effect of Meloidogyne incognita on plant nutrient concentration and its influence on the physiology of beans. Journal of Nematology 19(3):324-330. En., Sum. En., 29 Ref., Il. [Dept. of Biological Sciences, Simon Fraser Univ., Burnaby, Vancouver, British Columbia, Canada V5A1S6]

Phaseolus vulgaris. Meloidogyne incognita. Photosynthesis. Mineral content. Mn. Cu. Fe. K. Ca. Zn. Mineral nutrition. Canada.

Bean plants, 3, 8, 11, and 13 days old, were inoculated with 0, 2000, 4000, or 8000 2nd-stage Meloidogyne incognita larvae and maintained under controlled conditions. The photosynthetic rate and the shoot and root concn. of K, Ca, Mn, Fe, Cu, and Zn were determined by destructive assay at 1, 3, 8, 15, 22, or 27 days after inoculation and by nondestructive assay of leaves, stems, and roots at 27 or 28 days after inoculation. In the destructive assay, the concn. of the elements in the plant tissues did not change until 1 wk. after inoculation. Thereafter, the trend was mostly decreasing for shoot K and Fe and increasing in the root, whereas Ca had the opposite trend in the shoots. Mn, Cu, and Fe showed variable trends. Generally, the concn. of K and Mn increased, whereas Ca and Fe decreased, with duration of infection in all treatments. Zn and Cu decreased in the highest nematode treatments. The overall elemental content generally decreased with level of infection from 1 wk. after inoculation. Photosynthetic rate based on shoot K concn. significantly decreased with level of infection. In most of the nondestructive assays, the concn. of shoot K, Zn, and Mn decreased, whereas Ca increased with increasing

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nematode treatment. One of the 1st effects of the nematode on host physiology appears to be a change in concn. of nutrient elements in the host plant. (AS)

0549

31477 REDDY, P.P. 1986. Analysis of crop losses in certain vegetables due to Meloidogyne incognita. International Nematology Network Newsletter 3(4):3-5. En., 4 Ref. [Indian Inst., of Horticultural Research Bangalores-560 089, India]

Phaseolus vulgaris. Snap beans. Meloidogyne incognita. Nematode control. Chemical control. Yields. Crop losses. India.

Trials were conducted at the Expt. Station of the Indian Institute of Horticultural Research in Hessaraghatta (Bangalore, India) on red sandy loam soil, naturally infested with Meloidogyne incognita, to estimate yield losses in okra, eggplant, French bean cv. Burpee's Stringless, and cowpea due to the nematode. Each crop received 2 treatments: with or without nematicide. The yield of nematicide-treated French bean plots was significantly higher (7.542 kg) than in untreated plots (4.263 kg). The percent loss in yield of French bean was 43.38. (CIAT)

0550

31720 SASSER, J.N.; HARTMAN, K.M.; CARTER, C.C. 1987. Summary of preliminary crop germplasm evaluation for resistance to root-knot nematodes. In Sasser, J.N.; Hartman, K.M.; Carter, C.C. Summary of preliminary crop germplasm evaluations for resistance to root-knot nematodes. Raleigh, Department of Plant Pathology at North Carolina State University. pp.1-6,9,15-19. En., 4 Ref. [Dept. of Plant Pathology, North Carolina State Univ., Raleigh, NC, USA]

Phaseolus vulgaris. Meloidogyne incognita. Meloidogyne arenaria. Meloidogyne javanica. Meloidogyne hapla. Cultivars. Resistance. USA.

The International Meloidogyne Project was funded at the Dept. of Plant Pathology at North Carolina State U. (USA in 1975 to conduct research on integrated crop protection systems to protect economic food crops in developing nations from damage by root-knot nematodes. A screening program was implemented as a result of an agreement between several International Agricultural Research Centers and other germplasm centers. The following crops were evaluated: barley, bean, cabbage, chikpea, maize, durum wheat, peanut, pigeon pea, potato, rice, sweet potato, tomato, and some species of Desmodium. From the 89 bean accessions from CIAT that were evaluated for resistance to 8 nematode populations, 2 were resistant to 5 of these populations. (CIAT) See also 0528

E06 Physiological Disorders

0551

31048 MAAS, F.M.; DE KOK, L.J.; PETERS, J.L.; KUIPER, P.J.C. 1987. A comparative study on the effects of H2S and SO2 fumigation on the growth and accumulation of sulphate and sulphydryl compounds in Trifolium pratense L., Glycine max Merr. and Phaseolus vulgaris L. Journal of Experimental Botany 38(194):1459-1469. En., Su,. En., 39 Ref., Il. [Centre for Agrobiological Research, P.O. Box 14, 6700 AA Wageningen, The Netherlands]

Phaseolus vulgaris. Shoots. SO2. Growth. Mineral content. S. Yields. Transpiration. Air pollution. Netherlands.

299

The effects of 0.25 H_2S and SO_2 cubic millimeter/cubic decimeter on growth and S content of shoots of Trifolium pratense, Glycine max, and Phaseolus vulgaris were studied. After 2 wk. of fumigation the yield of T. pratense was reduced by 32 percent by H_2S, but not affected by SO_2. Yield of G. max was not affected by H_2S, but reduced by 20 percent by SO_2, whereas that of P. vulgaris was increased by 11 percent by H_2S and not affected by SO_2. Increases in sulphydryl content were already observed after 24 h of exposure to H_2S and SO_2 in all plants. The increase was greatest in T. pratense and smallest in P. vulgaris and, except for T. pratense, always greater in the H_2S-exposed than the SO_2-exposed plants. One day of exposure resulted in an increase in sulphate content only in the SO_2-fumigated plants, with the highest accumulation in T. pratense and the lowest in P. vulgaris. After 2 wk. an increase in sulphate content was also observed in the H_2S-exposed plants. This increase was also highest in T. pratense and lowest in P. vulgaris. Transpiration rate was not affected by a 24 h exposure to H_2S or SO_2 and was highest in T. pratense, intermediate in G. max, and lowest in P. vulgaris. (AS (extract))

F00 PEST CONTROL AND ENTOMOLOGY

0552

30626 DE LA PAZ G., S. 1975. El rendimiento de frijol bajo condiciones de invernadero, en función del grado de daño de la conchuela (Epilachna varivestis Muls.) y la disposición espacial de ésta, bajo condiciones de campo. (Bean yield under greenhouse conditions as a function of the degree of damage by the Mexican bean beetle (Epilachna varivestis) and spatial arrangement under field conditions). Tesis Mag.Sc. Chapingo, México, Escuela Nacional de Agricultura. Colegio de Postgraduados. 157p. Es., Sum. Es., 72 Ref., Il.

Phaseolus vulgaris. Epilachna varivestis. Developmental stages. Yields. Mathematical model. Mexico.

Under greenhouse conditions, two expt. were carried out to describe the effect of damage caused by different populations of Mexican bean beetle larvae on the different developmental stages of bean plants. First-instar larvae of the Mexican bean beetle were infested under controlled conditions. The spatial arrangement of the different biological stages of the Mexican bean beetle under field conditions was described by adjusting several theoretical distributions to the data observed and by estimating the different aggregation indexes for these populations. The yield variance analysis showed highly significant differences among treatments demonstrating the marked effect of the infestation levels used and the different developmental stages of the infested crop. Yields tended to decrease as the no. of larvae/plant increased; this effect was more drastic in young infested plants. The regression model, describing consistently the relation among yield, no. of larvae, and age of the plant is included. (AS (extract)-CIAT)

0553

29479 GUTIERREZ, A.P.; SCHULTHESS, F.; WILSON, L.T.; VILLACORTA, A.M.; ELLIS, C.K.; BAUMGAERTNER, J.U. 1977. Energy acquisition and allocation in plants and insects: a hypothesis for the possible role of hormones in insect feeding patterns. Canadian Entomologist 119:109-129. En., Sum. En., Fr., 44 Ref., Il. [Division of Biological Control, Univ. of California, Berkeley, CA, USA]

Phaseolus vulgaris. Insect biology. Injurious insects. Plant physiology. Ecology. USA.

A distributed delay age structure model is presented for plants (among them beans) and species of insects (Acyrthosiphon pisi and Hippodamia convergens) that describes the dynamics of per capita energy (DM) acquisition and allocation patterns, and the within-organism subunit (e.g. leaves, fruit, ova) no. dynamics that occur during growth, reproduction, and development. A common acquisition (i.e. functional response) submodel is used to estimate the daily photosynthetic rates in plants and consumption rates in A. pisi and H. convergens. The focus of this work is to capture the essence of the common attributes between trophic levels across this wide range of taxa. The models are compared with field or lab. data. Bean appears to be the most efficient of the plants studied, assimilating about 47 percent of the energy produced. A hypothesis is proposed for the observed patterns of reproduction in A. pisi and in a H. convergens. (AS) See also 0427

F01 Injurious Insects, Mites and their Control

0554

31466 GATEHOUSE, A.M.R.; DOBIE, P.; HODGES, R.J.; MEIK, J.; PUSZTAI, A.; BOULTER, D. 1987. Role of carbohydrates in insect resistance in Phaseolus vulgaris. Journal of Insect Physiology 33(11):843-850. En., Sum. En., 37 Ref., Il. [Dept. of Botany, Univ. of Durham, South Road, Durham DH1 3LE, United Kingdom]

Phaseolus vulgaris. Cultivars. Resistance. Acanthoscelides obtectus. Zabrotes subfasciatus. United Kingdom.

Mature seeds from 7 resistant and susceptible bean lines were fractionated and tested in feeding trials in an attempt to elucidate the basis of resistance to Acanthoscelides obtectus and Zabrotes subfasciatus. The heteropolysaccharide fraction isolated from the resistant line and a susceptible line were each incorporated into artificial beans over a concn. range up to 10 percent dry wt. At a concn. of 4 percent, the approximate physiological concn. within the seed, the heteropolysaccharide fraction from the resistant line was very toxic resulting in 80-85 percent larval mortality of A. obtectus with an LC50 of 2.5 percent. Furthermore, surviving larvae showed a marked increase in their development period. The corresponding fraction from a susceptible line, on the other hand, even at twice the physiological concn., had a negligible effect upon larval development both in terms of adult emergence and development period. The effects of albumin proteins and globulin proteins on larval development of A. obtectus were also tested by incorporation into artificial beans at a range of concn. up to 10 percent. While those from the susceptible line had little effect upon development both the albumins and globulins from the resistant line were found to cause a slight decrease in adult emergence and a small increase in the median development period. It is concluded that this example of insect resistance in seeds of bean line G12953 is due, at least in part, to the presence of a heteropolysaccharide which has an unusually high arabinose and fucose content. Regarding seed resistance towards Z. subfasciatus, it is possible that alpha-amylase inhibitors may have a synergistic effect. (AS (extract))

0555

30645 GOIY, J. 1986. La bruche du haricot. (Bean bruchid). Phytoma no.382:48-49. Fr., Il.

Phaseolus vulgaris. Acanthoscelides obtectus. Symptomatology. Plant injuries. Insect biology. Insect control. Cultural control. Chemical control. Storage. Stored grain pests. France.

201

The symptoms, damage, biological cycle, and main cultural and chemical control measures of Acanthoscelides obtectus in both bean cultivation and storage conditions, are briefly analyzed. (CIAT)

0556

31050 LAMBDIN, P.; HORTON, J.; MUEGGE, M. 1987. Evaluation of selected insecticides for control of Mexican bean beetles and potato leafhoppers on snap beans and lima beans. Tennessee Farm and Home Science no.142:6-8. En., 7 Ref., Il.

Phaseolus vulgaris. Snap beans. Insecticides. Epilachna varivestis. Empoasca fabae. Insect control. Yields. USA.

The effectiveness of insecticides FMC 45806 (0.0336 and 0.0550 kg a.i./ha), permethrin (0.0550 and 0.112 kg a.i./ha), acephate (0.550 kg a.i./ha), and methomyl (0.2800 kg a.i./ha) for controlling Epilachna varivestis and Empoasca fabae in snapbeans cv. Bush Blue Lake and lima beans cv. Jackson Wonder planted in April 26, 1980 and April 16, 1981 resp., was studied at the U. of Tennessee Plant Science Field Station (Tennessee, USA). Pests populations were recorded 1, 4, 7, 14, and 21 days after spraying (approx. 2 mo. after planting). All compounds in both tests maintained E. varivestis populations at significantly lower levels, for 14 days after application, compared to the control, but no treatment differed significantly from the control after 21 days. Highest bean yields were obtained in plots treated with the lowest rates of FMC 45806 and permethrin, and in plots treated with acephate (2281.9, 2281.9 and 2418.9 kg/ha, resp.). Results regarding E. fabae control on lima beans showed similar trends but were inconclusive. (CIAT)

0557

30730 MESSINA, F.J.; BARMORE, J.L.; RENWICK, J.A.A. 1987. Host selection by ovipositing cowpea weevils: patterning of input from separate sense organs. Entomologia Experimentalis et Applicata 43(2):169-173. En., Sum. En., Fr., 24 Ref., Il. [Dept. of Biology, Utah State Univ., Logan, UT 84322-5305, USA]

Phaseolus vulgaris. Callosobruchus maculatus. Insect biology. Host range. USA.

Ablations were performed to identify the sense organs used in host selection by ovipositing cowpea weevils, Callosobruchus maculatus. Antennae, foretarsi, and palpi (maxillary + labial) were removed singly or in combination, and females were offered pairwise choices of 4 host species (seeds of cowpea, black bean, soybean, and chickpea). Removal of the palpi consistently had the greatest effect on host choice, whereas the relative importance of other organs depended on the pair of hosts tested. Different organs may provide conflicting input as to the preferred host; certain ablations led to a complete reversal in preference (as opposed to a simple loss of discrimination). Input from separate organs appeared to be received in a dominance hierarchy. (AS)

0558

31701 OSBORN, T.C.; ALEXANDER, D.C.; SUN, S.S.M.; CARDONA, C.; BLISS, F.A. 1989. Insecticidal activity and lectin homology of arcelin seed protein. Science 240:207-210. En., Sum. En., 27 Ref. [Dept. of Agronomy, Univ. of Wisconsin, Madison, WI 53706, USA]

Phaseolus vulgaris. Zabrotes subfasciatus. Proteins. Resistance. Genes. Phytohemagglutinins. USA.

70b

Arcelin, a major seed protein discovered in wild beans, has toxic effects on an important bean bruchid pest, Zabrotes subfasciatus. Transfer of the arcelin-1 allele to bean cv. and addition of purified arcelin to artificial seeds results in high levels of insect resistance. The nucleotide and derived amino acid sequences of the arcelin-1 cDNA are very similar to those of genes encoding the bean seed lectin, phytohemagglutinin. The gene or genes encoding arcelin may have evolved from a phytohemagglutinin gene or genes resulting in an effective mechanism for resistance to bean bruchids. (AS)

0559

31071 RUPPEL, R.F. 1987. Dry bean insecticides update, 1987. Michigan Dry Bean Digest 11(3):14,21. En. [Dept. of Entomology, Michigan State Univ., East Lansing, MI 48824, USA]

Phaseolus vulgaris. Injurious insects. Insecticides. Insect control. USA.

An updated list of 31 insecticides that are recommended, registered but not generally recommended, or that aid in controlling insect pests of beans in Michigan (USA), is given for 1987 with remarks on some of these products and the 17 pests they control. (CIAT)

0560

31078 VARNER, G.V. 1987. Research report. Michigan Dry Bean Digest 11(4):8. En.

Phaseolus vulgaris. Epilachna varivestis. Empoasca fabae. Whetzelinia sclerotiorum. Symptomatology. Fungicides. Disease control. USA.

Recommendations are given to face possible attacks of Epilachna varivestis, Empoasca fabae and white mold in the 1987 bean growing season in Michigan, USA. Insects, disease symptoms, and conditions that would favor their incidence are briefly described. (CIAT)

0561

31495 WEBB, D.R.; ECKENRODE, C.J.; DICKSON, M.H. 1987. Variation among green and wax beans in survival of larvae of a bivoltine-E race of the European corn borer (Lepidoptera: Pyralidae). Journal of Economic Entomology 80(2):521-524. En., Sum. En., 11 Ref. [Dept. of Entomology, New York State Agricultural Experiment Station, Geneva, NY 14456, USA]

Phaseolus vulgaris. Snap beans. Cultivars. Ostrinia nubilalis. USA.

Lines and cv. of green and wax beans were artificially infested with eggs fro a colony of Ostrinia nubilalis in both greenhouse and field (Geneva, New York, USA). The colony of O. nubilalis used in these studies exhibits bivoltine characteristics in the field and produces a blend of pheromone, common only in a few eastern states. Low larval survival on bean plants occurred in both greenhouse and field but lowest survival occurred in the field. Significant differences in larval survival were observed among lines and cv. but only 1, Volare, was completely free of larvae in a greenhouse test. (AS)

0562

31497 YOUNG, S.S.Y.; WRENSCH, D.L.; KONGCHUENSIN, M. 1986. Control of sex ratio by female spider mites. Entomologia Experimentalis et Applicata 40(1):53-60. En., Sum. En., 21 Ref., Il. [Dept. of Genetics, Ohio State Univ., Columbus, OH 43210, USA]

Phaseolus vulgaris. Tetranychus urticae. Oviposition. USA.

303

Control of sex ratio in the progenies of mated female spider mites was investigated in 2 lab. expt. In expt. I, a single strain of Tetranychus urticae was reared on 17 mm diameter kidney bean leaf discs on water-soaked cotton under constant illumination at 24 plus or minus 1 degree Celsius in 4 different environments: good (G) and poor (P) leaf qualities during parental development in combination with good (G') and poor (P') leaf qualities during oviposition and development of offspring. In expt. II, 4 different geographic strains of T. urticae were reared in a single environment. Spider mite females were able to control the sex ratio of their progeny at 2 levels: an initial control of mean population ratio according to ovipositional environment, and a secondary control which resulted in an approx. uniform daily ratio. Although each parental female produced a varying no. of eggs from day to day, a more or less constant fraction of those eggs were fertilized every day. It is concluded that both characteristics are probably important for the colonizing ability of the species. (AS) See also 0464 0483 0498 0499 0577 0585 0590 0595

G00 GENETICS AND PLANT BREEDING

0563

30765 ASHRAF, M.; BASSETT, M.J. 1987. Five primary trisomics from translocation heterozygote progenies in common bean, Phaseolus vulgaris L. Theoretical and Applied Genetics 74(3):346-360. En., Sum. En., 21 Ref., Il. [Dept. of Botany, Univ. of Florida, Gainesville, FL 32611, USA]

Phaseolus vulgaris. Chromosomes. Selfing. Chlorosis. Leaves. USA.

Twelve distinct phenotypic groups of bean plants were isolated from nondisjunction progenies of 11 translocation heterozigote stocks. All the plants in these phenotypic groups originated in the light wt. seed class. Five of the 12 phenotypic groups of plants have been verified as primary trisomics. They are all phenotypically distinguishable from each other and from disomics. One of the 5 primary trisomic groups, puckered leaf, was directly recovered as a primary trisomic from the original translocation heterozigote progenies. Three of the 5 trisomics (weak stem, dark green leaf, and convex leaf) originated 1st as tertiary trisomics. The related primary trisomics were isolated later from progenies of selfed tertiary trisomics. The 5th group, chlorotic leaf, originated at a low frequency among the progenies of 3 other trisomics: puckered leaf, convex leaf, and dark green leaf. The chlorotic leaf did not set seed under field conditions. The remaining 4 groups (puckered leaf, dark green leaf, convex leaf, and weak stem) are fertile, though sensitive to high temp. conditions. The transmission rate of the extra chromosome on selfing ranges from 28 to 41 percent. Physical identification of the extra chromosome has not been achieved for any of the 5 trisomic groups. Two trisomic groups, dark green leaf and convex leaf, have produced tetrasomics at low frequency. The phenotypes of these 2 tetrasomics are similar to the corresponding trisomics but more exagerated. (AS)

0564

33154 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1987. Collaborative activities in networks. A. Uniform nurseries. In Centro Internacional de Agricultura Tropical. Bean Program. Annual Report 1987. Cali, Colombia, Working Document no.39. pp.240-254. En.

Phaseolus vulgaris. Germplasm. Adaptation. Yields. Resistance. Xanthomonas campestris pv. phaseoli. Bean common mosaic virus. Isariopsis griseola. Colletotrichum lindemuthianum. Uromyces phaseoli. Colombia.

Germplasm flows from the CIAT Bean Program to (a) individual scientists for use in specific projects; (b) national programs of certain geographical areas coordinated by CIAT to complement the bean research carried out by those countries; and (c) to two or more natioanl programs or individual scientists to coordinate relationships among them. In order to guarantee that the germplasm distributed fulfills these requirements, the CIAT Bean Program uses a 3 stage evaluation system consisting of an equal no. of uniform nurseries known as the bean team nursery (VEF), preliminary yield trials (EP), and the International Bean Yield and Adaptation Nursery (YBIAN). Results confirm the increasing trend in the production of resistant bean lines to the 5 most common bean diseases (BCMV, common bacterial blight, angular leaf spot, anthracnose, and rust). Starting in 1988, all advanced lines to be included in the YBIAN should show resistance or intermediate reaction to common bacterial blight and anthracnose in VEF and EP evaluations and should be resistant to BCMV. (CIAT)

0565

33148 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1987. Improving other Phaseolus species. 1. P. coccineus. In Centro Internacional de Agricultura Tropical. Bean Program. Annual Report 1987. Cali, Colombia, Working Document no.39. pp.185-189. En.

Phaseolus vulgaris. Phaseolus coccineus. Phaseolus polyanthus. Germplasm. Resistance. Ascochyta. Plant breeding. Adaptation. Colombia.

In 1987, 103 accessions of Phaseolus coccineus and P. polyanthus were planted in Popayán (Colombia). In Rionegro, (Colombia), 120 accessions are currently being multiplied to obtain open pollinated seed for further evaluation and distribution. Accessions of both species were evaluated for Ascochyta resistance. P. polyanthus has very good resistance to Ascochyta sp., while P. coccineus exhibits different reactions. The main objective of the International Bean Yield and Adaptation Nursery is to promote the productivity of P. polyanthus and P. coccineus. Results of the trials carried out in this nursery are included. (CIAT)

0566

28980 CHEE, P.P.; KLASSY, R.C.; SLIGHTOM, J.L. 1986. Expression of a bean storage protein phaseolin minigene in foreign plant tissues. Gene 41(1):47-57. En., Sum. En., 44 Ref., Il. [Upjohn Company, 7242-267-5, Kalamazoo, MI 49001, USA]

Phaseolus vulgaris. Proteins. Phaseollin. Enzymes. Agrobacterium tumefaciens. Analysis. RNA. DNA. Genes. USA.

Using the phaseolin gene and its cDNA counterpart, a mutant phaseolin gene lacking the 5 introns but retaining its natural 5' and 3' plant-regulatory sequences was constructed. This mutant phaseolin gene (minigene) was inserted into the Ti-plasmid of Agrobacterium tumefaciens strain 15955 which allowed its transfer and integration into the tobacco genome. Full-length and correctly initiated phaseolin mRNA was found among the poly(A)(+)RNA isolated from plant callus transformed with the minigene construction by using RNA-DNA hybridization and S1 nuclease mapping techniques. The presence of phaseolin polypeptides in soluble protein extracts from transformed tobacco tissues was confirmed by immunological methods. These results demonstrate that phaseolin gene introns and intron splicing are not a necessary requirement for biogenesis of stable phaseolin mRNA and that no alternative splice site was introduced by the removal of 5 introns. (AS)

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0567

29708 GATEHOUSE, J.A.; EVANS, I.M.; CROY, R.R.D.; BOULTER, D. 1986. Differential expression of genes during legume seed development. Philosophical Transactions of the Royal Society of London 314(1166):367-384. En., Sum. En., 43 Ref., Il. [Dept. of Botany, Univ. of Durham, Science Laboratories, South Road, Durham DH1 3LE, U.K]

Phaseolus vulgaris. Seed. Genes. Proteins. United Kingdom.

Differential gene expression is defined, and a review on this topic is made, with particular reference to legumes, regarding (a) the accumulation of gene products in developing seeds, including information on genetic variability in seed protein accumulation in Phaseolus vulgaris; (b) investigation of the bases of differential gene expression (assays of protein synthesis and mRNA species, gene dosage assays, and assays of transcription from isolated nuclei in vitro); (c) the DNA sequence basis for control of differential gene expression; and (d) model for control of gene expression. The differential expression of seed protein genes is under the primary control of a genetic developmental program, which exerts its effects at the transcriptional level; expression can be modified by environmental factors, which operate mainly at post-transcriptional stages. (CIAT)

0568

31061 KELLY, J.D.; ADAMS, M.W.; VARNER, G.V. 1987. Yield stability of determinate and indeterminate dry bean cultivars. Theoretical and Applied Genetics 74(4):516-521. En., Sum. En., 13 Ref. [Dept. of Crop & Soil Sciences, Michigan State Univ., East Lansing, MI 48824, USA]

Phaseolus vulgaris. Cultivars. Determinate cultivars. Indeterminate cultivars. Yields. Statistical analysis. Seed color. USA.

Yield stability of determinate and indeterminate dry bean cv. was compared using regression of genotypic performance on environmental means. Yields of 28 dry bean cv. differing in plant growth habit and commercial class designation were obtained from 42 Michigan performance nurseries over the 6-yr. period (1980-85). The determinate type I large-seeded kidney and cranberry bean cv. had below-av. seed yield and large mean square deviations from regression. Lower yielding determinate small-seeded navy cv. had low deviation mean square values while higher yielding determinate navy cv. had correspondingly higher mean square deviations from regression. The erect, short vine type II indeterminate (archytypes) had greater than av. seed yields and min. deviations from regression. Compared with other plant types, the architype group showed a greater yield response to more productive environments, with regression coefficient values significantly greater than unity. The type II growth habit offers the breeder the best opportunity of obtaining greater seed yield without incurring loss of yield stability as occurs with the type I and type III growth habits. Regression analysis suggests that cv. from the predominant genetic center demonstrate more yield stability. A nonsignificant rank correlation coefficient between the combined and separate analyses for deviation mean square values of large-seeded cv. implies that commercial dry bean classes should be compared separately based on center of domestication. (AS)

0569

30657 RODRIGUEZ R., M. 1981. Evaluación de dos enfermedades foliares en las colecciones de frijol negro de la Estación Experimental Agrícola Fabio Baudrit Moreno. (Evaluation of two leaf diseases in the black bean

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collections of the Fabio Baudrit Moreno Agricultural Experimental Station). Tesis Ing.Agr. San José, Universidad de Costa Rica. 58p. Es., Sum. Es., 40 Ref., Il.

Phaseolus vulgaris. Germplasm. Cultivars. Resistance. Uromyces phaseoli. Isariopsis griseola. Costa Rica.

Black bean materials from the germplasm collection of the Fabio Baudrit Moreno Agricultural Exptl. Station (Costa Rica) were evaluated for performance under the attack of main fungal leaf diseases to collect information for future breeding programs. Plantings were done at the exptl. station during June-Nov. Cv. were subjected to natural inoculation. Only rust and angular leaf spot were evaluated. The 1st evaluation was done for rust (June-Aug. planting). considering infection intensity and pustule size. These criteria were then combined to define degrees of reaction of the cv. to the disease. The 2nd evaluation was done for angular leaf spot (Sept.-Nov. planting). The affected leaf area percentage was taken into account using a diagramatic scale. For rust, 18 cv. were found to be immune, 66 resistant, 174 with intermediate resistance, and 197 susceptible. For the angular leaf spot, 43 cv. were found resistant, 167 tolerant, and 219 susceptible. Several cv. were showed resistance to both angular leaf spot and rust. (AS-CIAT)

0570

31076 SILBERNAGEL, M.J. 1987. Survey of U.S. bean breeding priorities for the 1990's. Michigan Dry Bean Digest 11(4):5. En.

Phaseolus vulgaris. Snap beans. Survey. Germplasm. Plant breeding. USA.

The results of a mail survey of public and private US bean (common beans and snap beans) breeders conducted in early 1986 are reported. The survey intended to gather information on (1) germplasm resources used in the production of past and present cv.; (2) top priority needs for future cv.; and (3) the roles of private vs. public sectors in future bean research and development. As to breeding priorities and the need for expanding germplasm resources, a 0 = no need to 10 = urgent need scale was used. Some of the factors rated above 6 included no. of pods/plant, snap bean and dry seed quality, cooking and storage characteristics, drought resistance, heat tolerance in the vegetative and blooming stages; cold-wet emergence, cold growing season, cold during blooming, wide adaptation, lodging resistance, adaptation for direct harvest, high density culture; early maturity, resistance to BCMV, and diseases such as wilt, common blight, rust, grey mold, white mold, Fusarium, Pythium, Rhizoctonia, and Aphanomyces, among others. (CIAT)

0571

28253 TIGCHELAAR, E.C., ed. 1986. New vegetable variety list 22. Compiled by the Garden Seed Research Committee. American Seed Trade Association. HortScience 21(2):195-196. En. [Dept. of Horticulture, Purdue Univ., West Lafayette, IN 47907, USA]

Phaseolus vulgaris. Snap beans. Cultivars. Plant introductions. Selection. Resistance. Diseases and pathogens. Adaptation. USA.

Six dry bean cv. and 33 green bean cv., recently introduced into the USA are described as to exptl. designation, origin, introduction, parents, outstanding characteristics, resistance or tolerance to diseases, similarities or resemblances, selection, and adaptation. (CIAT) See also 0427 0448 0497 0620

301

0572

29992 BORGES F., O.L. 1987. Selección para resistencia a la quemazón bacteriana (Xantomonas campestris pv. phaseoli) y a la roya (Uromyces appendiculatus (Fers.) Unger) en caraota (Phaseolus vulgaris L.). Tesis Mag.Sc. Maracay, Universidad Central de Venezuela. 115p. Es., Sum. Es., 98 Ref., Il.

Phaseolus vulgaris. Hybridizing. Inheritance. Resistance. Xanthomonas campestris pv. phaseoli. Uromyces phaseoli. Adaptation. Yields. Venezuela.

Lines J.G. 6056 (resistant to Xanthomonas campestris pv. phaseoli) and J.G. 6002 (gene source for yield stability and adaptation) were hybridized to simultaneously recombine and select bean genotypes with good yield potential and resistant to X. campestris pv. phaseoli and to Uromyces phaseoli. Broadsense hereditability values for yield and reaction to Xanthomonas demonstrated that there was sufficient genetic variability between the F2 in F3 families studied to undertake simultaneous selection of both characteristics. Results indicated that it is feasible to start selection in early generations (F2 or F3). In the evaluation of the F3 in F4 families, a reaction to rust was observed under field conditions (Maracay, Venezuela). A considerable no. of lines was found to be more rust-resistant than both parents, indicating that these lines resulted from transgressive inheritance, which is possible assuming that both parents have different resistance genes. The effectiveness of selecting for resistance to rust and its stability in 3 environments was established in preliminary trials with F5 in F6 lines. This characteristic, combined with resistance to Xanthomonas, enabled the identification of a group of promising lines immediately available for use as sources of multiple resistance in other breeding programs. Their potential as improved var. must be determined in future regional trials. (AS (extract)-CIAT)

0573

33128 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1987. Bean Program. Annual Report 1987. Cali, Colombia, Working Document no.39. 355p. En., 93 Ref., Il.

Phaseolus vulgaris. Germplasm. Hybridizing. Plant breeding. Yields. Nitrogen fixation. Mineral deficiencies. P. Soils. pH. Resistance. Viroses. Mycoses. Bacterioses. Pests. Adaptation. Drought. Temperature. Photoperiod. Maturation. Plant architecture. Nutritive value. Seed color. Economics. Snap beans. On-farm research. Central America. Caribbean. Latin America. Africa. Europe. North America.

The activities carried out by the CIAT Bean Program in 1987 are reported. Research focused on germplasm resources, agroecological studies, and methods for germplasm utilization (biotechnology, and interspecific hybridization). Studies on improving yield potential dealt with yield physiology and breeding. In the area of character improvement, studies dealt with N fixation, low soil P and acid soils, resistance to fungal, bacterial and viral pathogens, invertebrate pests, adaptation (drought, temp./photoperiod, maturity, and plant architecture), nutritional quality, and character deployment by seed color. The economic potential and improvement of snap beans was also studied. Work was also done on improving Phaseolus coccineus and P. lunatus. On-farm agronomy studies are reported for Latin America, and more specifically for Central America and Brazil irrigation system, as well as on economics and social science in Latin America. Collaborative activities were carried out with Central America and the Caribbean, the Andean Zone, Brazil, and Africa (Great Lakes

Region, East and Southern Africa). Individual papers are recorded in this publication under the following consecutive no. 0468 0469 0470 0484 0564 0565 0574 0575 0576 0577 0578 0579 0580 0581 0582 0583 0584 0585 0586 0587 0588 0589 0590 0591 0592 0593 0609 0614 0620 0621 0622 0623 0624 0625. (CIAT)

0574

33137 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1987. Character improvement: developing solutions to major problems. 2. Fungal pathogens. In Centro Internacional de Agricultura Tropical. Bean Program. Annual Report 1987. Cali, Colombia, Working Document no.39. pp.77-96. En.

Phaseolus vulgaris. Plant breeding. Resistance. Isariopsis griseola. Colletotrichum lindemuthianum. Ascochyta phaseolorum. Rhizoctonia solani. Germplasm. Dwarf beans. Climbing beans. Colombia.

Pathological studies oriented to plant breeding for resistance to the most important bean fungal diseases (angular leaf spot, anthracnose, Ascochyta blight and web blight) are described. Although thousands of germplasm bank accessions have been screened for resistance to angular leaf spot, the no. of resistant accessions and the level of resistance are relatively low. All commercial bean types of small seeded cream, cream striped, medium seeded pinto, bayo, and ojo de cabra, developed at CIAT, currently carry resistance to anthracnose, under Popayán (Colombia) conditions. Among the bush bean lines in the International Ascochyta Blight Nursery, G 4603, BAT 1569, and G 17098 showed the highest level of resistance to Ascochyta blight. Among climbing beans, G 12582, G 10747, and VRA 81051 are the most resistant. The population and line yield already available in the Web Blight Nursery were measured. (CIAT)

0575

33138 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1987. Character improvement: developing solutions to major problems. 3. Bacterial pathogens. In Centro Internacional de Agricultura Tropical. Bean Program. Annual Report 1987. Cali, Colombia, Working Document no.39. pp.97-112. En.

Phaseolus vulgaris. Germplasm. Plant breeding. Resistance. Pseudomonas syringae pv. phaseolicola. Xanthomonas campestris pv. phaseoli. Inheritance. Genes. Selection. Africa. Latin America.

Pathological studies focused on plant breeding for resistance to the most important bean bacterial diseases (common bacterial and halo blight). Routine evaluations of CIAT uniform nurseries and pathology nurseries, under field conditions, permitted the selection of lines with common bacterial blight resistance. Studies were conducted at the National Vegetable Research Station (England) on the occurrence and distribution of pathogenic variants of Pseudomonas syringae pv. phaseolicola in Africa and Latin America. To date, approx. 700 isolates of Pseudomonas spp. have been obtained and 610 of these have been identified by bacteriophage and serological methods. In preliminary studies of resistance inheritance, it was shown that specific resistance to races 1 and 3 is controlled by different dominant genes. Race non-specific resistance is controlled by recessive genes or polygenes. (CIAT)

0576

33139 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1987. Character improvement: developing solutions to major problems. 4. Viral pathogens. In Centro Internacional de Agricultura Tropical. Bean Program. Annual Report 1987. Cali, Colombia, Working Document no.39. pp.113-130. En.

Phaseolus vulgaris. Bean golden mosaic virus. Bean common mosaic virus. Bean yellow mosaic virus. Bean dwarf mosaic virus. Etiology. Germplasm. Resistance. Epidemiology. Colombia.

In 1987, CIAT inaugurated one of the most modern plant virus lab. in Latin America, containing the necessary equipment to meet the Center's and the Bean Program's needs to (a) accurately detect and identify bean virus diseases; (b) produce diagnostic materials; (c) help identify resistant germplasm; and (d) monitor the distribution and epidemiology of the viruses affecting bean production in target areas. Due to the economic importance and epidemiologic potential of BGMV, BCMV, BYMV, and bean dwarf mosaic virus, the Bean Program decided to concentrate its research efforts on these 4 major viruses, emphasizing the development of resistant or tolerant germplasm. Results of these evaluations are included. (CIAT)

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33140 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1987. Character improvement: developing solutions to major problems. 5. Invertebrate pests. In Centro Internacional de Agricultura Tropical. Bean Program. Annual Report 1987. Cali, Colombia, Working Document no.39. pp.131-148. En., Il.

Phaseolus vulgaris. Plant breeding. Germplasm. Resistance. Empoasca kraemeri. Zabrotes subfasciatus. Acanthoscelides obtectus. Apion godmani. Insect biology. Bemisia tabaci. Colombia. Central America.

Breeding for resistance to Empoasca kraemeri, Zabrotes subfasciatus, Acanthoscelides obtectus, and Apion Godmani continued as the main priority of the Entomology Section in 1987. Studies continued on the biology, ecology, host-plant relationships, and possible var. preferences of Bemisia tabaci. Significant progress was made in the understanding of the mechanisms of resistance to A. obtectus and Z. subfasciatus, and on the techniques for selection of resistant materials in segregating populations. The Apion network in Central America was expanded and strengthened. For the 1st time, the mechanisms of resistance to A. godmani were studied. Progress in breeding for resistance to A. godmani was also made and several resistant and well adapted lines were identified. (CIAT)

0578

33141 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1987. Character improvement: developing solutions to major problems. 6. Adaptation. a. Drought. In Centro Internacional de Agricultura Tropical. Bean Program. Annual Report 1987. Cali, Colombia, Working Document no.39. pp.149-160. En., Il.

Phaseolus vulgaris. Plant breeding. Germplasm. Adaptation. Resistance. Drought. Water stress. Maturation. Soil moisture. Colombia.

Since over 60 percent of bean producing regions are affected by drought, and water stress is probably the largest individual factor causing low yields in beans, research at CIAT has focused on 3 types of mechanisms to obtain higher yields under drought: (1) drought escape through inherent earliness or a response of accelerated maturity; (2) drought avoidance based on greater soil moisture extraction, or moisture conservation; and (3) true drought tolerance, defined as the ability to withstand greater tissue water deficits. Evidence indicates that no single drought adaptation will prove useful across environments, and that desirable levels of earliness or root growth will vary with environment. This implies that breeding for drought tolerance should be directed to specific drought environments, and that there is a need for developing techniques to estimate the integrated effects of adaptation such as earliness and deep roots in relation to different climatic and edaphic conditions. (CIAT)

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0579

33142 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1987. Character improvement: developing solutions to major problems. 6. Adaptation. b. Temperature and photoperiod. In Centro Internacional de Agricultura Tropical. Bean Program. Annual Report 1987. Cali, Colombia, Working Document no.39. pp.161-162. En.

Phaseolus vulgaris. Plant breeding. Germplasm. Genotypes. Adaptation. Photoperiod. Temperature. Growth. Biomass production. Colombia. USA.

A study was undertaken to separate growth and developmental effects of a photoperiod-temp. regime. Sixty-four bean genotypes representing a full range of seed types, growth habits, and genetic origins were grown in Palmira, Popayán, Rionegro (Colombia) and California (USA). At each site, biomass and seed yield were determined. No significant interaction was observed between photoperiod response and biomass. This suggests that photoperiod response and initial growth are independent processes. At the high lat. site (California), photoperiod sensitive cv. yielded poorly, while at the Colombian sites, no photoperiod effect was noted. (CIAT)

0580

33143 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1987. Character improvement: developing solutions to major problems. 6. Adaptation. c. Maturity. In Centro Internacional de Agricultura Tropical. Bean Program. Annual Report 1987. Cali, Colombia, Working Document no.39. pp.163-164. En.

Phaseolus vulgaris. Flowering. Maturation. Genotypes. Yields. Leaf area. Plant habit. Selection. Plant breeding. Colombia.

Using parental material selected for long pod-filling period, on the basis of flowering and maturity data, a model for maximizing yield in early genotypes was evaluated. The model considers (1) attaining optimal LAI rapidly through, perhaps, larger seed size which might contribute to more rapid initial growth; (2) early flowering, to bring the vegetative period to a more rapid close; (3) an extended pod-filling period, to take better advantage of the leaf area produced. Large differences were found for yield/pod, with greater values being associated with type III parents. (CIAT)

0581

33144 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1987. Character improvement: developing solutions to major problems. 6. Adaptation. d. Plant architecture. In Centro Internacional de Agricultura Tropical. Bean Program. Annual Report 1987. Cali, Colombia, Working Document no.39. p.165. En.

Phaseolus vulgaris. Plant breeding. Plant architecture. Plant habit. Resistance. Lodging. Cultivars. Yields. Selection. Colombia.

The breeding objective is to develop a type of bean plant architecture suitable for withstanding or facilitating mechanized farming. Plant types best suited for mechanization are upright determinate type I and indeterminate type II. In addition to good lodging resistance, these types provide synchronous maturity, are shatter-resistant, and have a min. of 10-15 cm clearance from the lower pod tips to the ground. The 1st cycle of architecture breeding developed type I lines (A 57, A 124, and A 132) and type II (A 25, A 54, A 55, A 155, A 170, and A 240) lines. These upright types were lower yielding than traditional cv. of similar growth habit (Brazil 2, ICA Pijao, Rio Tibagi, and NEP 2). (CIAT)

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0582

33146 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1987. Character improvement: developing solutions to major problems. 8. Character deployment. In Centro Internacional de Agricultura Tropical. Bean Program. Annual Report 1987. Cali, Colombia, Working Document no.39. pp.175-177. En.

Phaseolus vulgaris. Plant breeding. Seed color. Resistance. Xanthomonas campestris pv. phaseoli. Bean common mosaic virus. Germplasm. Crossbreeding. Mexico. Colombia.

The single most significant advance in the black bean breeding program in 1987 was the development of more alternative sources of resistance to common bacterial blight. In small red beans the most significant advance was the purification of dominant BCMV resistance in a no. of Central American landraces, and the subsequent utilization of these in crosses delivered to national program breeders in several countries. The segregation of commercial types in crosses among BGMV-resistant parents was also carried out. Beginning breeding strategies for white beans were directed towards large cylindrical and large kidney-shaped beans. Recently, breeding has been initiated for small navy, medium flat Great Northern, and medium and large round types. Seventy-three medium and large cylindrical, and 200 white kidney and other lines have been developed, all with resistance to BCMV. Very little active work is carried out at CIAT on the selection of the yellow and beige classes, since the correlation with principal target areas is poor, and since the local selection programs in each area are capable, and active in genetic improvement. In the 1st cycle of breeding, 1 cv. each of cream (A295 as EMGOPA Ouro) and cream striped (A 247 as Rio Doce) seed type were released in Brazil. In the 2nd cycle, approx. 1000 crosses were made; over 300 of them were planned jointly by national program breeders. In addition to the problem of lack of adaptation of Mexican germplasm (medium seeded bayo beans) under Colombian environments, it has been also difficult to recover suitable commercial seed type characteristics (size, color, and brilliance) in this group. (CIAT)

0583

33156 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1987. Collaborative activities in networks. B. Latin America. 2. Andean Zone. In Centro Internacional de Agricultura Tropical. Bean Program. Annual Report 1987. Cali, Colombia, Working Document no.39. pp.259-266. En.

Phaseolus vulgaris. Plant breeding. Crossbreeding. Germplasm. Plant habit. Resistance. Colletotrichum lindemuthianum. Ascochyta. Pseudomonas syringae pv. syringae. On-farm research. Cultivars. Colombia. Ecuador. Peru.

Cv. improvement for the Andean zone continued in collaboration with the national programs of Colombia, Ecuador, and Peru. A total of 572 crosses were made among beans of bush and climbing growth habits for the 3 countries. The main objective of these breeding programs is to combine disease resistance with commercially acceptable grain types. At ICA-La Selva, the collaborative breeding program focused on improving climbing beans grown in relay with maize. In high yielding commercially acceptable grain types, 151 crosses were made to combine resistance to anthracnose and Ascochyta. At ICA-Obonuco, the emphasis of the collaborative ICA-CIAT breeding program is the improvement of climbing beans grown in association with maize for high elevations and cold temp. One-hundred two crosses were made to combine resistance to anthracnose, Ascochyta and halo blight into commercially acceptable cv. F2 segregating populations and advanced lines from CIAT were sent for screening to the Instituto Nacional de Investigaciones Agropecuarias (Ecuador). On-farm var. yield trials were

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conducted in Cajamarca (Peru) in association with maize. Gloriabamba, the climbing bean var. released in 1985, continues to give high yield. (CIAT)

0584

33157 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1987. Collaborative activities in networks. B. Latin America. 3. Brazil. In Centro Internacional de Agricultura Tropical. Bean Program. Annual Report 1987. Cali, Colombia, Working Document no.39. pp.267-297. En.

Phaseolus vulgaris. Germplasm. Cultivars. Seed color. Yields. Selection. Irrigation. P. Mineral deficiencies. Brazil. Colombia.

The participation of CIAT lines in preliminary yield trials (EPR) in Brazil has decreased over the years since the capability of the Brazilian breeders to produce their own advanced breeding lines has increased. Partial EPR results are included. AN 512573-0, AN 51574-0, 84 VAN-18, AN 512646-0, and W 22-24 were the black lines that most frequently appeared among the best 10. The most frequent cream lines appearing among the best 10 were AN 512579-0, AN 512648-0, AN 512650-0, BZ 2231-7, and BZ 2231-11. ESAL 522, ESAL 514, and ESAL 511 carioca lines were oustanding in Cerrado soil conditions whereas AN 512537-0, AN 512558-0, AN 512561-1, AN 512678-0, AN 511661-0, and ESAL 522 were always outstanding in all locations. Purple lines AN 512737-0, AN 512852, TY 3361-1, TY 3364-15, and AN 511637-0 were outstanding and outyielded the elite check, LM 10348, in many locations. In the winter of 1987, 401 bean lines were yield-tested under a central pivot irrigation system. In general, yields were lower than expected because during flowering, the most critical period for bean production, the irrigation system broke down. A total of 244 lines were evaluated for low soil P efficiency. In general, yield of var. under P stress conditions was lower than that of the checks. (CIAT)

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33158 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1987. Collaborative activities in networks. C. Africa. In Centro Internacional de Agricultura Tropical. Bean Program. Annual Report 1987. Cali, Colombia, Working Document no.39. pp.298-303. En.

Phaseolus vulgaris. Transfer of technology. Germplasm. Resistance. Ophiomyia phaseoli. Ootheca bennigsenni. Elsinoe phaseoli. Technology evaluation. Africa.

The Great Lakes, the Southern, and the Eastern Africa projects are being implemented by CIAT taking advantage of a decentralized staffing pattern while maintaining interdisciplinary team work among a critical group of scientists. Each regional project provides technical support for collaborative research subprojects that focus on bean diseases and encourage regional cooperation through national specialization. In 1983, with the arrival of the CIAT staff in the Great Lakes Region, larger no. of breeding materials (advanced lines and segregating populations) began to be delivered to Africa bean national programs to provide them with germplasm containing sources of resistance or tolerance to major diseases and other production constraining factors. Novel insect species and pathogens (Ophiomyia sp., Ootheca bennigsenni, and Elsinoe phaseoli), not present in Latin America, have been found in Africa. (CIAT)

0586

33159 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1987. Collaborative activities in networks. C. Africa. 3. Great Lakes Regional Project. In Centro Internacional de Agricultura Tropical. Bean Program. Annual Report 1987. Cali, Colombia, Working Document no.39. pp.304-310. En.

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Phaseolus vulgaris. Germplasm. Crossbreeding. Plant breeding. Resistance. Isariopsis griseola. Colletotrichum lindemuthianum. Ascochyta. On-farm research. Marketing. Burundi. Zaire. Rwanda.

The Great Lakes Regional Bean Project serves the Central African area comprised by Burundi, Rwanda, and Zaire. Var. development continues at the Institut des Sciences Agronomiques du Burundi (ISABU), the Institut des Sciences Agronomiques du Rwanda (ISAR), and the Zaire's Programme National Legumineuses (PNL)-Mulungu. Each has a complete var. development program including the management of segregating populations from crosses made either at CIAT or by the programs themselves. Promising var. from ISAR multilocation bush bean trials are RWR 221, RWR 222, Kinyugwe, Amashongoshwa, Kibuya, and PVA 1438, all of which outyield the standard var. (Rubona 5). High levels of resistance to angular leaf spot and anthracnose have been identified. An international Ascochyta nursery has been established with the best materials from Africa and America; these materials have also been distributed. A small set of on-farm artesanal seed production research trials were established near Rubona. A case study of 15 bean farmers, on the relationship between bean marketing and bean production techniques, was carried out in the Kigali Prefecture, in collaboration with the Agricultural Statistical Services of Rwanda. In comparison with net bean sellers, net bean purcharsers tend to cultivate a smaller, more productive, and labor-intensive bean surface area. Nutritional and bean quality studies were carried out by the Burundi and Zaire national programs. (CIAT)

0587

33160 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1987. Collaborative activities in networks. C. Africa. 4. East Africa Regional Project. In Centro Internacional de Agricultura Tropical. Bean Program. Annual Report 1987. Cali, Colombia, Working Document no.39. pp.311-325. En.

Phaseolus vulgaris. Germplasm. Rhizoctonia solani. Xanthomonas campestris pv. phaseoli. Uromyces phaseoli. Drought. Isariopsis griseola. Adaptation. Ethiopia. Somalia. Uganda. Kenya.

The Eastern Africa region comprises Ethiopia, Somalia, Uganda, and Kenya. A germplasm set of over 1200 accessions representing the total range of variability of the CIAT collection was grown in ecologically diverse locations in Ethiopia. The main problems were web blight, common bacterial blight, rust, root rot, drought, and angular and floury leaf spots. In Uganda, a yield trial was carried out in 1986 to compare the 7 most promising introductions from the CIAT bean team nurseries with 2 landraces and 2 released var. All introductions significantly outyielded the local materials. Ethiopia's system, faced with extreme ecological variation, used 19 locations for its final stage of on-station evaluation, with materials being grouped in 3 trial series by grain size and color. In the smaller grain legume program of Somalia, a much smaller set of materials, about 100, has been introduced using the primary criteria of appropiate grain color and adaptation to other hot, dry regions of the world. The 2 main objectives of on-farm research in East Africa have been to understand the principal bean production systems, identifying research opportunities to raise bean productivity, and to evaluate innovations under realistic conditions. Research on cropping and management practices for bean production continues to be given greater attention in Ethiopia. The African Bean Yield and Adaptation Nursery has been established. (CIAT)

0588

33161 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1987. Collaborative activities in networks. C. Africa. 5. Southern Africa Regional Project. In

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Centro Internacional de Agricultura Tropical. Bean Program. Annual Report 1987. Cali, Colombia, Working Document no.39. pp.326-331. En.

Phaseolus vulgaris. Germplasm. Yields. Dwarf beans. Adaptation. Genotypes. Plant introductions. Angola. Botswana. Lesotho. Malawi. Mozambique. Swaziland. Zambia. Zimbabwe.

The Southern Africa Regional Bean Project supports research in national programs in Angola, Botswana, Lesotho, Malawi, Mozambique, Swaziland, Zambia, and Zimbabwe. Data from the 1987 Tanzanian Phaseolus Bean Preliminary Yield Trial show that the top 15 of the 64 entries outyielded the best check var. Lyamungu 85 in both Selian and Lambo. Results from the Zambia National Dwarf Bean Variety Trial carried out in 6 locations during the 1986-87 season, demonstrate the superiority of PAT-10, PAI-78, PAT-12, and A-429 over the Carioca var. PAT-10 gave yields higher than 1000 kg/ha at all sites. Yield data from testing 190 genotypes in preliminary var. trials, at 2 sites in Zimbabwe in the 1986-87 season, reveal that a high proportion of them outyielded the widely grown check var. Natal Sugar. Genotypes RAB 263, RAB 296, and RAB 290 were significantly superior at both sites. Results from bean var. trials conducted at 2 sites in the lowlands of Lesotho have demonstrated the superiority of Pinto NW 590 over the local control var. Bonus. Results from CIAT-IBYAN at 2 sites in Swaziland have identified various genotypes as substantially superior to the local check Bonus. Evaluation of local germplasm and introduced materials at 2 contrasting sites under irrigation and rainfed conditions has led to the identification of a Manteiga type (INIA 10) and a Brazilian material (HF 465-63-1), which are being considered for release. (CIAT)

0589

33131 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1987. Developing methods for utilizing germplasm. 1. Biotechnology. In Centro Internacional de Agricultura Tropical. Bean Program. Annual Report 1987. Cali, Colombia, Working Document no.39. pp.33-41. En., Il.

Phaseolus vulgaris. Plant breeding. Analysis. Germplasm. Seed characters. Phaseolin. Enzymes. Embryo. Culture media. Peru. Central America. Mexico. Africa.

In the last 2 years, collaborative efforts have been initiated by the Biotechnology Research Unit, the Bean Program scientists, the Genetic Resources Unit, and scientists in advanced institutions to develop methodologies for expanding the gene pool for plant breeding. A procedure based on acid polyacrylamide gel electrophoresis was developed to characterize common bean germplasm. Single seed analyses showed interseed variation in about 25 percent of the accessions, in contrast to 4 percent visible variation in seed morphology. Phaseolin has been used as a marker for the geographic distribution of common beans in the major centers of diversity. Seven electrophoretically distinct phaseolin types have been described. An electrophoretic survey of isoenzyme variation among landraces from Peru, Central America, Mexico, Africa, the Middle East region, and advanced lines has been initiated this year. Molecular markers (isoenzymes and DNA-restriction fragment length polymorphisms- RFLPs) occur naturally, and their expression or presence is not influenced by the environment or epistatic interactions. Segregating progenies between 2 polymorphic genotypes have been produced, and a cDNA no. and genomic clones for detection of RFLPs have been generated. Immature embryos (which would normally abort) were excised from young pods after cross-fertilization and stimulated for growth into plants in an artificial, sterile, and nutrient medium. (CIAT) 0590

0590

33132 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1987. Developing methods for utilizing germplasm. 2. Interspecific hybridization. In Centro Internacional de Agricultura Tropical. Bean Program. Annual Report 1987. Cali, Colombia, Working Document no.39. pp.42-47. En.

Phaseolus vulgaris. Hybridizing. Phaseolus coccineus. Phaseolus polyanthus. Hybrids. Resistance. Ophiomyia phaseoli. Selection. Crossbreeding. Colombia. Japon.

The main objective of the project between CIAT and the Faculté des Sciences Agronomiques de l'Etat (Gembloux, Belgium) is the genetic improvement of Phaseolus vulgaris through interspecific hybridization. The major donor parents, P. coccineus and P. polyanthus, are species which show many useful characteristics poorly or not expressed in the common bean gene pool. During 1987, 110 F3 interspecific hybrid lines from crosses between P. vulgaris and P. coccineus selected in Taiwan for beanfly resistance were planted in Palmira (Colombia) for multiplication and agronomical selection. F4 seeds from 307 selected plants were sent back to Taiwan for further evaluation and beanfly resistance selection. Results of the interspecific hybridization carried out in Rionegro, Popayán, and Palmira (Colombia) are included. (CIAT)

0591

33129 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1987. Germplasm resources. In Centro Internacional de Agricultura Tropical. Bean Program. Annual Report 1987. Cali, Colombia, Working Document no.39. pp.12-22. En.

Phaseolus vulgaris. Phaseolus lunatus. Phaseolus coccineus. Germplasm. Seed color. Seed coat. Plant habit. Plant introductions. America. Asia. Africa. Europe. Oceania.

The acquisition and introduction of new germplasm continued as a major activity in the management of the Phaseolus germplasm bank during 1987. A total of 2145 accessions were added to the bank; 85, 6, 6, and 2 percent of them correspond to Phaseolus vulgaris, P. lunatus, P. coccineus, and wild Phaseolus sp., resp. With the new germplasm acquired, the Phaseolus collection currently has 40,000 accessions. The search for similarities among germplasm groups is continued by means of seed description (seed coat color) and field characterization of plant phenotypes (plant growth habit). White- and black-colored beans are the most common in the collection, followed by creams, yellows, and reds. Growth habit III is the most common followed by types IV and I. A total of 9004 accessions of Phaseolus beans were distributed to 33 countries (America, Africa, Asia, Europe, and Oceania). Materials collected in Costa Rica, Mexico and Africa by CIAT and national institutions are described. (CIAT)

0592

33149 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1987. Improving other Phaseolus species. 2. P. lunatus. In Centro Internacional de Agricultura Tropical. Bean Program. Annual Report 1987. Cali, Colombia, Working Document no.39. pp.190-193. En.

Phaseolus vulgaris. Plant breeding. Phaseolus lunatus. Germplasm. Plant introduction. Flowering. Yields. Colombia.

As part of the collaboration between CIAT and the Faculté des Sciences Agronomiques de l'Etat (Gembloux, Belgium), a new research project began in May 1986 with the Phaseolus lunatus collection held by CIAT. The 1st priority was to increase the entire collection of 2794 samples; multiplication was started in 2 meshhouses in Palmira (Colombia) with

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previously unmultiplied accessions as well as with some increased accessions which had only produced a few seeds. Thirty-six accessions have been evaluated in Dagua (Colombia) in very heterogeneous soils. Accessions vary in days to flowering (34-81), days to 1st mature pod (89-137), percentage of yield after threshing (54-81), pod set percentage (61-97), yield estimation (0.6-6.2 t/ha). Two data bases including passport and collection information have been established; the collection currently has 650 accessions. Information parallels that of the P. vulgaris data base. (CIAT)

0593

33134 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1987. Improving yield potential. 2. Yield breeding. In Centro Internacional de Agricultura Tropical. Bean Program. Annual Report 1987. Cali, Colombia, Working Document no.39. pp.51-59. En.

Phaseolus vulgaris. Hybrids. Yields. Selection. Climatic requirements. Colombia.

Two different expt. on selection for yield under high and low stress environments were carried out in Quilichao and Popayán (Colombia). Two hybrid populations involving parents belonging to small seeded gene pools 2 and 3 were utilized in Quilichao. Six crosses were utilized in Popayán; 2 of each had low, intermediate, and high yield potential. The 2 stress environments varied in the amount of lime and fertilizers applied as well as in disease inoculation vs. protected conditions. Mass selections in segregating generations were undertaken to obtain seed yield. There was no significant difference in the mean performance of lines from the high and low stress environments. Although selection for yield was effective in all crosses in both environments, significantly high yielding lines were derived only from the highest yielding cross in Popayán compared to the highest yielding parent and check cv. The selection of parents and their knowledge of general combining ability played a key role in selection for yield. (CIAT)

0594

31756 DAVIS, J.H.C.; MORALES, F.; CASTAÑO, M. 1987. Resistance to black root. Bean Improvement Cooperative Annual Report 30:14-15. En., 1 Ref. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Phaseolus vulgaris. Germplasm. Cultivars. Resistance. Bean common mosaic virus. Selection. Colombia.

Bean germplasm was evaluated at CIAT for resistance to BCMV strains NL-4, NL-3, and NL-5 in order to use them in the national breeding and selection programs in Africa, Europe, USA, and Chile. Ninety-eight lines were selected for an international Bean Common Mosaic/Black Root resistance nursery. Not all lines selected showed full resistance to black root but they all have genes that can be combined to obtain such resistance. (CIAT)

0595

31769 HARMSEN, R.; BLISS, F.A.; OSBORN, T.C. 1987. Breeding beans resistant to bruchids. Bean Improvement Cooperative. Annual Report 30:44-45. En., 6 Ref. [Dept. of Horticulture, Univ. of Wisconsin, Madison, WI 53706, USA]

Phaseolus vulgaris. Backcrossing. Genes. Resistance. Zabrotes subfasciatus. Acanthoscelides obtectus. Cultivars. Inheritance. Selection. USA.

A backcrossing program was initiated to transfer the bruchid-resistant genes Arc1, Arc2, Arc3, and Arc4, present in wild bean lines G12882, G12866, G12922, and G12949, to Sanilac (white bean) and Porrillo 70 (black bean) var. used as recurrent cultivated parents in 2 sets of crosses. This program allowed for the development of 2 homozygous lines designated as paired lines, whose formulas are Arc1/Arc1 and arc/arc. In addition, 2 methods were developed to screen the presence of arcelin in seeds. Ongoing research with paired lines is mentioned as well as the steps for adapting this system to a large scale breeding program. (CIAT)

0596

31827 HERNANDEZ S., R.S. 1986. Criterios de selección para la formación de compuestos masales en frijol, Phaseolus vulgaris L. (Selection criteria for mass compounds in beans, Phaseolus vulgaris). Tesis Ing.Agr. Palmira, Colombia, Universidad Nacional de Colombia. 86p. Es., Sum. Es., En., 39 Ref., Il.

Phaseolus vulgaris. Cultivars. Intercropping. Zea mays. Crossbreeding. Resistance. Yields. Yield components. Inheritance. Colombia.

During the 1st semester of 1985 at CIAT (Palmira), 153 segregating populations of bean Phaseolus vulgaris grouped in 27 mass compounds were evaluated to determine the best criterion for mass-compound selection. The characters evaluated were no. of nodes in the main stem, wt. of 100 seeds, and yield/plant. Materials were cultivated in association and monoculture. Ranges for group separation were low no. of nodes (less than 9), medium (9-10), high (greater than 11); low wt. of 100 seeds (less than 28.0 g), medium (28.1-37.5 g), high (greater than 37.6 g); low yield (less than 12.0 g), medium (12.1-20.0 g), high (greater than 20.1 g). It was found that the wt. of 100 seeds was the best criterion to select mass compounds in early generations. No. of nodes in the main stem and yield/plant showed very low heritability (0.164 and 0.061 resp.), while the wt. of 100 seeds showed high heritability, 0.816. It was also found that the wt. of 100 seeds may be used as a selection criterion to form mass compounds both in association with maize or in monoculture. (AS (extract))

0597

31017 MUÑOZ F., L.C.; HIDALGO, R. 1986. Problemas en la hibridación interespecífica del género Phaseolus: aborto del embryon. Ensayo preliminar de cultivo de embriones. (Problems in the interspecific hybridization of Phaseolus: embryo abortion. Preliminary embryo culture test). Acta Agronómica 36(4):17-27. Es., Sum. Es., En., 8 Ref., Il.

Phaseolus vulgaris. Phaseolus lunatus. Phaseolus acutifolius. Phaseolus coccineus. Crossbreeding. Hybridizing. Tissue culture. Culture media. Embryo. Colombia.

Studies were conducted at CIAT to identify, describe, and quantify embryo abortion problems encountered in interspecific crossings between Phaseolus vulgaris, P. lunatus, P. coccineus and P. acutifolius. Preliminary embryo growth tests were also conducted in artificial culture media. Crossings were done in all possible combinations within the 4 species genotypes. Twenty pods were harvested for in vitro culturing (7 from the P. vulgaris x P. acutifolius cross and 1 from the reciprocal; 5 of P. vulgaris x P. lunatus and 7 of the reciprocal). Using a wide range of genotypes (different origin, seed type, and growth habit) of the Phaseolus spp., it is possible to obtain significantly more interspecific hybrids. Embryo culturing has a promising potential to increase the F1 population; however, the nutritional requirements of hybrid embryos and the composition of the transportation media deserve further research. (CIAT)

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0598

30605 OSBORN, T.C. 1984. Genetic control of seed lectins in the common bean (Phaseolus vulgaris L.). Ph.D. Thesis. Madison, University of Wisconsin-Madison. 132p. En., Sum. En., 68 Ref., Il.

Phaseolus vulgaris. Cultivars. Seeds. Analysis. Phaseollin. Lectins. Protein content. Hybrids. Backcrossing. Inheritance. Yields. USA.

Single seeds of over 100 bean cv. were analyzed by 2-dimensional electrophoresis. The cv. could be classified into 8 groups by virtue of their G2/albumin electrophoretic patterns. A reference catalogue of over 100 bean cv. giving their phaseolin and G2/albumin electrophoretic patterns and agglutination ratios is presented. When 11 cv. with different 2-dimensional isoelectric focusing-SDS polyacrylamide gel electrophoresis (IEF-SDS/PAGE) lectin polypeptide compositions were compared, 8 had unique nondenatured lectin patterns and 3 had identical patterns. For some cv., differences in nondenatured lectin patterns were observed between the purified albumin and globulin lectin preparations. Seeds of 40 bean cv. having different lectin types based on IEF-SDS/PAGE were analyzed for quantities of lectin, phaseolin, and total protein. Significant differences were found among groups of cv. for the quantity of lectin and phaseolin. An association between lectin type and the quantity of lectin and phaseolin was also found in the seeds of F2 plants segregating for 2 lectin types. The absence of seed lectin was shown to be inherited as a single recessive gene and allelic to 6 different lectin types. In inbred backcross lines, the allele from Sanilac for the presence of lectin was semidominant to the lectinless allele from Great Northern U.I. 1140 for quantity of lectin. Backcross lines with lectin (L/L) and without lectin (l/l) were developed using 2 lectinless donor parents and Sanilac as the recurrent parent. Backcross lines and parents were grown in the field and analyzed for days to flower, seed yield, seed wt., percentage protein, and quantities of lectin and phaseolin. Variation due to lectin genotype (L/L vs. l/l) was significant for all traits except yield, seed wt., and nonphaseolin nonlectin protein. (AS (extract))

0599

31717 PARK, S.J.; TU, J.C. 1987. Comparison of near-isogenic lines for anthracnose Are are genes in common bean, Phaseolus vulgaris L. Euphytica 36(1):251-256. En., Sum. En., 10 Ref. [Research Station, Agricultural Canada, Harrow, Ontario, NOR 1GO, Canada]

Phaseolus vulgaris. Cultivars. Genes. Resistance. Colletotrichum lindemuthianum. Maturation. Yields. Backcrossing. Canada.

A study was undertaken to determine whether the Are gene controlling anthracnose (Colletotrichum lindemuthianum) resistance had an adverse effect on maturity and yield because backcross-derived cv./lines had numerically lower yield and later maturity than the resp. recurrent parent. Three pairs of common bean lines near-isogenic for the Are gene were developed from Are are F2 plants of the 6th backcross of Seafarer, Fleetwood, and Ex Rico 23. The near-isogenic lines were tested along with the recurrent cv. and backcross-derived cv./lines. The results showed no evidence of any adverse effect of the Are gene on the agronomic characteristics in 11 trails at 5 locations in 3 yr. (AS)

0600

31810 REDDICK, B.B.; SCHWARZ, K.B. 1987. Reactions of half-runner snap beans to virus infection. Tennessee Farm and Home Science 143:22-23. En., Il.

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Phaseolus vulgaris. Snap beans. Plant habit. Planting. Timing. Cultivars. Resistance. Viroses. Yield components. USA.

In a controlled expt. carried out at the Crossville Exptl. Station (USA) in 1984, 5 half-runner snap bean cv. (Mountaineer, State, Striped, Pink and White) were examined for their resistance or tolerance to viral diseases. Cv. White, Mountaineer, and State produced a greater mean pod fresh wt./plot and had lower viral disease ratings than cv. Striped and Pink, in both May and July plantings, although in all cv. disease severity was lower in July. (CIAT)

0601

31813 SAETTLER, A.W.; MABAGALA, R.B. 1987. Studies on bacterial blight resistance. Bean Improvement Cooperative. Annual Report 30:46-47. En., Il. [ARS/U.S. Dept. of Agriculture, Michigan State Univ., East Lansing, MI 48824-1312, USA]

Phaseolus vulgaris. Cultivars. Resistance. Xanthomonas campestris pv. phaseoli. USA.

The field performance of blight-tolerant bean cv. I84100 and Valley was compared with that of susceptible cv. Pinto UI-114, Taylor Hort Cranberry, Charlevoix, Black Magic, and C-20. All plants were inoculated 18 days after planting with a suspension of Xanthomonas campestris pv. phaseoli. Results confirm that I84100 exhibits good blight tolerance under field conditions. Data on progressive leaf and pod reactions to X. campestris pv. phaseoli, and percentage of seed infection of 7 bean genotypes inoculated with the pathogen are included in table form. (CIAT)

0602

31479 SANTOS, J.B.; VENCOVSKY, R. 1986. Controle genetico de alguns componentes do porte da planta em feijoeiro. (Genetic control of some plant architecture components in dry bean). Pesquisa Agropecuaria Brasileira 21(9):957-963. Pt., Sum. Pt., En., 16 Ref., Il. [Depto. de Biología, ESAL, Caixa Postal 37200, Lavras-MG, Brasil]

Phaseolus vulgaris. Cultivars. Crossbreeding. Plant architecture. Genetics. Brazil.

In Lavras (Minas Gerais, Brazil), 8 bean (Phaseolus vulgaris) cv. (Diacol Calima, Goiano Precoce, Roxo, Small White, Manteigao Fosco 11, Pintado, Ricopardo 896, and Cornell 49.242) were crossed following a half diallel model and data were obtained from the parents and F2 generation to determine the genetic control of the insertion height of the 1st pod, length of the main stem, and no. and mean length of internodes on the main stem. The method proposed by Hayman for analyzing diallel crosses was used, and the data met the assumptions of the model. The additive gene action was predominant in relation to dominance for all traits. Consequently, the means of the parents and the F2 for each trait should be considered in breeding programs. An additional technique for choosing the best segregating population is to consider those with larger genetic variability. It is possible to obtain plants with ideal architecture components, such as high insertion of pods and numerous short internodes on the main stem, from the F2 populations. (AS)

0603

31814 SCHMIT, V.; BAUDOIN, J.P. 1987. Evaluations for Ascochyta resistance in Phaseolus coccineus germplasm collection at C.I.A.T. (Centro International de Agricultura Tropical, Cali, Colombia). Bean Improvement Cooperative. Annual Report 30:81-82. En., 2 Ref. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Phaseolus vulgaris. Phaseolus coccineus. Plant introductions. Genotypes. Cultivars. Selection. Resistance. Ascochyta. Crossbreeding. Colombia. Belgium.

Seed multiplication, agronomic evaluation, and identification of parental genotypes for interspecific hybridization with Phaseolus vulgaris constitute the main research activities carried out in the P. coccineus collection (around 1600 accessions) held by CIAT. In 1985, 3 Ascochyta screening trials with replicates were conducted in Popayan and Rionegro (Colombia). Expt. involved 43 and 16 introductions of P. coccineus subspecies polyanthus and coccineus, resp.; 2 susceptible P. vulgaris var., ICA-Llanogrande and G 6040, were used as controls. All the accessions of the polyanthus subspecies performed well with only mild symptoms, if any, on the leaves. The best performing accessions were G 35336 and G 35182 (Guatemala), G 3537 (Mexico), and G 35372 (Colombia). These accessions were included in 1986 as parental genotypes in a crossbreeding program with Andean and East African var. of P. vulgaris, using either coccineus or vulgaris cytoplasm. (CIAT)

0604

31425 SCHMIT, V.; BAUDOIN, J.P. 1987. Multiplication et évaluation de Phaseolus coccineus L. et Phaseolus polyanthus GREENM., deux especes intéressantes pour l'amelioration de la productivité des légumineuses vivrieres. (Multiplication and evaluation of Phaseolus coccineus and Phaseolus polyanthus, two interesting species for the improvement of productivity of food legumes). Bulletin des Recherches Agronomiques de Gembloux 22(3):235-253. Fr., Sum. Fr., En., 41 Ref., Il. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Phaseolus vulgaris. Phaseolus coccineus. Phaseolus polyanthus. Germplasm. Plant breeding. Resistance. Bean golden mosaic virus. Ophiomyia phaseoli. Ascochyta phaseolorum. Belgium. Colombia.

Phaseolus coccineus and P. polyanthus represent 2 food legumes well adapted in the tropical highland regions. These 2 species can also be utilized in the genetic improvement of P. vulgaris, the most important legume of the genus. A collaboration has been established between the Faculté des Sciences Agronomiques in Gembloux (Belgium) and CIAT (Colombia) in order to study the genetic potential of the P. coccineus and P. polyanthus collection present at CIAT. For this purpose, the material is seed-multiplied and evaluated in several stations of Latin America, East Africa, and Asia. The 1st results have shown that P. coccineus and P. polyanthus contain genes of resistance to 3 main enemies of the common bean: Ascochyta sp., BGMV, and the bean fly (Ophiomyia phaseoli). International trials of yield and adaptation have been initiated with the best performing populations. Research work should be carried on and accelerated in order to exploit the total genetic variability present in P. coccineus and P. polyanthus. (AS)

0605

31714 SCHWARTZ, H.F.; CASCIANO, D.H.; ASENGA, J.A.; WOOD, D.R. 1987. Field measurement of white mold effects upon dry beans with genetic resistance or upright plant architecture. Crop Science 27(4):699-702. En., Sum. En., 18 Ref., Il. [Dept. of Plant Pathology & Weed Science, Colorado State Univ., Fort Collins, CO 80523, USA]

Phaseolus vulgaris. Cultivars. Resistance. Whetzelinia sclerotiorum. Disease control. Plant habit. Yields. USA.

Expt. were conducted in 1982, 1984, and 1985 in a Nunn clay loam (fine, montmorillonitic, mesic Aridic Argiustolls) to develop a small plot

research technique to measure bean white mold effects under differential disease pressure, and to test parental and breeding bean lines for their potential in controlling the disease. Sixteen entries were selected for their known resistance to the pathogen and their diverse plant growth habits. Small research plots (6 square meter treated with benomyl and untreated control subplots effectively and reliably differentiated between cv. and lines susceptible to and less affected by the pathogen on the basis of disease intensity and yield potential. Plant growth habit was not an acceptable predictor of the ability to escape white mold infection, because some Type I (bush) lines were as susceptible as Type III (prostrate vine) lines. Some type II (upright vine) entries such as A 51 and 83 VEF MXA 222 had significantly (P = 0.05) less white mold than did other entries in untreated plots. Resistant entries such as P.I. 169787 performed well despite having a Type I habit with compact canopy. Lines having resistance and desirable plant architecture have been identified and incorporated into the germplasm improvement program at Colorado State U. (AS (extract))

0606

31817 SILBERNAGEL, M.J. 1987. Fusarium root rot-resistant snap bean breeding line FR-266. HortScience 22(6):1337-1338. En., 3 Ref., Il. [Agricultural Research Service, United States Dept. of Agriculture, Washington State Univ., Irrigated Agriculture Research & Extension Center, Prosser, WA 99350, USA]

Phaseolus vulgaris. Snap beans. Cultivars. Resistance. Fusarium solani phaseoli. USA.

Line FR-266 is an F16 bulk of an F12 single plant selection from a complex series of crosses made in USA between 1966-71. The source of Fusarium root rot resistance was PI 203958, a wild, black-seeded viny bean from Mexico. FR-266 has a strong, upright plant whose pods are round in cross section, and 14-18 cm long. Green pod yields range from 9 to 15 t/ha; seeds are a true white with a wt. of 37 g/100 seed. Seed yields range from 2 t/ha in Fusarium-infested soils to 4 t/ha in noninfested soils. (CIAT) See also 0465 0469 0554 0558 0614 0624

H00 NUTRITION

0607

31080 HERNANDEZ U., H.Y.; ORTEGA D., M.L. 1987. Water absorption and cooking time in long stored common bean seeds. Michigan Dry Bean Digest 11(4):12. En., 4 Ref. [Centro de Botánica, Colegio de Postgraduados, 56230 Chapingo, México]

Phaseolus vulgaris. Cultivars. Cooking. Water absorption. Seeds. Timing. Storage. Mexico.

Bean var. Canario 107, Negro Mecentral, Jamapa, and Flor de Mayo were studied in relation to cookability and water absorption. In recently harvested seeds, around 1 h was required to obtain 100 percent of the seeds cooked. After 1 yr of storage, from 2 to 3 h were necessary to obtain the same percentage of cooking, and this time increased to between 4-5 h after 5 yr of storage. Recently harvested common bean seeds showed resistance to water absorption. A 27-h soaking period was needed to get whole water imbibition while seeds stored 5 yr required only 5 h to obtain 100 percent imbibition. This suggests that the decrease in phytic acid after prolonged storage is related to the loss of divalent cations from the middle lamella. (CIAT)

322

0608

31732 SCHULTZ, W. 1986. The blue legume. Rodale's Organic Gardening 33(9):22-24,26-27. En., Il.

Phaseolus vulgaris. Cultivars. Center of origin. Organoleptic properties. USA.

Blue Lake-type bean var. originated in a lake region near Ukiah (California, USA). Some Blue Lake-type var. are described in terms of their characteristic taste, odor, texture and general appearance. (CIAT) See also 0573 0639

H01 Foods and Nutritive Value

0609

33145 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1987. Character improvement: developing solutions to major problems. 7. Nutritional quality. In Centro Internacional de Agricultura Tropical. Bean Program. Annual Report 1987. Cali, Colombia, Working Document no.39. pp.166-174. En., Il.

Phaseolus vulgaris. Plant breeding. Germplasm. Cooking. Timing. Water absorption. Proteins. Tannin content. Digestibility. Seed color. Analysis. Colombia.

Preliminary work on bean yield materials concentrated in defining characteristics such as cooking time, water absorption, quantity of solids in the broth, and total protein. Research in specific areas focused on the relationship between tannins and acceptability characteristics such as poststorage seed hardness and darkening, nutritional aspects (protein and starch digestibility) and the bioavailability of Fe. The results of analysis of materials evaluated in the lab. in 1982-86 are included. Water absorption is essentially controlled by physical factors within the seed, and cooking time is controlled by starch chemistry. A study on the relationship of tannin content and seed color showed a tendency of association among the mean values. However, the extremely wide range of values indicates that it is not possible to prove a relationship with any color group other than whites. CIAT's method for tannin determination is included. (CIAT) See also 0638

I00 MICROBIOLOGY

0610

30744 ERNSTSEN, A.; SANDBERG, G.; CROZIER, A.; WHEELER, C.T. 1987. Endogenous indoles and the biosynthesis and metabolism of indole-3-acetic acid in cultures of Rhizobium phaseoli. Planta 171(3):422-428. En., Sum. En., 19 Ref., Il. [Dept. of Forest Genetics & Plant Physiology, The Swedish Univ. of Agricultural Sciences, S-901 83 Umea, Sweden]

Phaseolus vulgaris. Rhizobium phaseoli. Analysis. Indoleacetic acid. United Kingdom.

Gas chromatography-mass spectrometric analyses of purified extracts from cultures of Rhizobium phaseoli wild-type strain 8002, grown in a nontryptophan-supplemented liquid medium, demonstrated the presence of IAA, indole-3-ethanol (IEt), indole-3-aldehyde and indole-3-methanol (IM). In metabolism studies with (3)H-, (14)C-, and (2)H-labelled substrates the

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bacterium was shown to convert tryptophan to IEt, IAA, and IM; IEt to IAA and IM; and IAA to IM. Indole-3-acetamide (IAAm) could not be detected as either an endogenous constituent or a metabolite of ((3)H)tryptophan nor did cultures convert ((14)C)IAAm to IAA. Biosynthesis of IAA in R. phaseoli, thus, involves a different pathway from that operating in Pseudomonas savastanio and Agrobacterium tumefaciens-induced crowngall tumors. (AS)

0611

31492 VAN VEEN, R.J.M.; DEN DULK-RAS, H.; SCHILPEROORT, R.A.; HOOYKAAS, P.J.J. 1987. Chromosomal nodulation genes: Sym-plasmid containing Agrobacterium strains need chromosomal virulence genes (chvA and chvB) for nodulation. Plant Molecular Biology 8(1):105-108. En., Sum. En., 12 Ref., Il. [Dept. of Plant Molecular Biology, Biochemistry Lab., Wassenaarseweg G4, 2333 AL Leiden, The Netherlands]

Phaseolus vulgaris. Agrobacterium tumefaciens. Rhizobium phaseoli. Nodulation. Netherlands.

The chromosomal virulence genes chvA and chvB of Agrobacterium tumefaciens, which mediate attachment to plant cells, were found to be essential not only for tumor induction but also for the formation of root nodules on plants, among them beans. (AS) See also 0427

I01 Rhizobium spp., Nitrogen Fixation and Nodulation

0612

30754 BORTHAKUR, D.; JOHNSTON, A.W.B. 1987. Sequence of psi, a gene on the symbiotic plasmid of Rhizobium phaseoli which inhibits exopolysaccharide synthesis and nodulation and demonstration that its transcription is inhibited by psr, another gene on the symbiotic plasmid. Molecular and General Genetics 207(1):149-154. En., Sum. En., 27 Ref., Il. [John Innes Inst., Colney Lane, Norwick NR4 7UH, UK]

Phaseolus vulgaris. Rhizobium phaseoli. Genes. DNA. Nitrogen fixation. Nodulation. United Kingdom.

A gene termed psi (polysaccharide inhibition), located close to the nodulation genes of the Rhizobium phaseoli symbiotic plasmid pRP2JI, inhibited exopolysaccharide synthesis (EPS) and nodulation ability (Nod) in Rhizobium when it was cloned in a multicopy plasmid. The sequence of psi showed that it specified a polypeptide of mol. wt. 10000 that may be associated with the membrane of Rhizobium. A 2nd gene, psr (polysaccharide restoration), was located on pRP2JI. When cloned in multicopy plasmids, psr overcame the EPS and Nod defects in strains carrying multicopy psi. Strains with multicopy psr induced nonfixing nodules on Phaseolus beans. Using gene fusions between psi and lacZ, it was shown that psi inhibited transcription of psr. (AS)

0613

31747 CAMPOS, F.; PADILLA, J.; VAZQUEZ, M.; ORTEGA, J.L.; ENRIQUEZ, C.; SANCHEZ, F. 1987. Expression of nodule-specific genes in Phaseolus vulgaris L. Plant Molecular Biology 9(6):521-532. En., Sum. En., 35 Ref., Il. [Depto. de Biología Molecular de Plantas, Centro de Investigación sobre Fijación de Nitrógeno, U.N.A.M., Apartado Postal 565-A, Cuernavaca, Morelos, México]

Phaseolus vulgaris. Nodulation. Proteins. Nitrogen fixation. Analysis. Mexico.

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The identification of some nodule-specific host proteins (nodulins) from common bean, a tropical ureide-transporting legume, is described. Particularly, the existence and developmental expression of several abundant nodule-specific transcripts of beans are shown, including leghemoglobin, nodule-specific uricase, and a group that in vitro translates into a cluster of about 30 kDa products. The expression pattern of nodulins in effective (Fix(+)) nodules compared with ineffective (Fix(-)) ones is also presented. The modified expression of main nodulins observed between these nodules indicates that different levels and/or factors associated with their regulation are involved. The intracellular infection by Rhizobium as a decisive step in the induction of some bean nodulins is discussed. (AS)

0614

33135 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1987. Character improvement: developing solutions to major problems. 1. Soil/nutritional constraints. a. Nitrogen fixation. In Centro Internacional de Agricultura Tropical. Bean Program. Annual Report 1987. Cali, Colombia, Working Document no.39. pp.60-71. En., Il.

Phaseolus vulgaris. Nitrogen fixation. Germplasm. Genotypes. Plant breeding. Nodulation. Mineral content. N. Yields. Selection. Rhizobium phaseoli. Strains. Colombia.

Research directed towards increasing N fixation has emphasized improving both the plant genotype and the Rhizobium strain components of the symbiosis. The agronomic management and soil factors that may limit the expression of the improved fixation potential are evaluated in on-farm trials. Genotypes found to be good for the following characters were crossed: early nodulation, late nodule senescence, max. nodule mass, N harvest index, vegetative vigor, specific nodule activity, and yield potential. A promising breeding program for Africa to improve fixation in medium to large seeded materials has been initiated. Germplasm evaluation for the identificaton of parental lines included the measuring of nodulation, plant N and grain yield of 12 var. under low and high mineral N availability. Work on the bacterial component of the symbiosis focused on 3 main areas: (a) maintenance and characterization of the Rhizobium leguminosarum biovar phaseoli strain collection; (b) screening for effective and competitive strains; and (c) ecological studies on nodulation by inoculated Rhizobium. Two bean genotypes (BAT 76 and Frijolica 03.2) were inoculated with varying concn. of 2 Rhizobium strains (CIAT 632 and CIAT 652). After 40 days the proportion of nodules was determined using ELISA. The CIAT 652 strain was more competitive than the CIAT 632 strain in controlled conditions. (CIAT)

0615

30726 PIHA, M.I. 1986. Limitations on nitrogen fixation of common bean (Phaseolus vulgaris L.) compared with other grain legumes. Ph.D. Thesis. Davis, University of California. 82p. En., Sum. En., 62 Ref., Il.

Phaseolus vulgaris. Cultivars. Nitrogen fixation. Fertilizers. N. Symbiosis. Nodulation. Temperature. USA.

The ontogeny of N accumulation by symbiotic and N-fertilized common beans selected for high N fixation potential was compared with commercial bean var., cowpeas, and soybeans in a N-deficient field. Cowpeas and soybeans accumulated more N and at a faster rate than common beans whether symbiotic or N-fertilized. Relative N accumulation (i.e., symbiotic vs. fertilized) during vegetative growth was intermediate for later maturing beans, and lowest for early maturing commercial bean var. Early maturing beans and cowpeas reached physiological maturity at the same time but beans

accumulated more of their N during early development and had a shorter vegetative growth period, suggesting N fixation may be more difficult for this species. To verify if the N fixation capacity of common bean is as high as that of other grain legumes under optimal conditions, a series of greenhouse expt. was performed. Relative N accumulation (i.e., symbiotic vs. N fertilized) was higher for soybean (43 percent) than for the other symbioses (25-39 percent) after 4 wk, but from 4-6 wk both soybean (96 percent) and cowpea (92 percent) accumulated relatively more N than did beans (56-78 percent). Inferior performance of beans could not be attributed to differences in acetylene reduction or nodule wt., but bean nodules were smaller and more numerous and evolved more H. The vegetative N fixation period of early maturing beans was shorter than for cowpeas of similar maturation date; nitrogenase activity declined sooner in beans as a consequence of earlier flowering and a longer pod-filling period. Expt. were done to determine if the sensitivity of the common bean symbiosis to high soil temp. could account for its reputation as a poor N fixer. N accumulation by symbiotic beans was always more sensitive to high root temp. (33, 33/28, 34/28 degrees Celsius compared with 28 degrees Celsius) than were cowpea and soybean symbiosis, but N fertilized beans were unaffected by the higher temp. High temp. inhibited the development and maintenance of bean nodules but nodule no. and nitrogenase activity of healthy nodules were not reduced. For Phaseolus vulgaris some tolerance to high temp. was observed among Rhizobium strains (e.g., CIAT 899) but not among host cv. (AS (extract))

0616

31478 BYLE, G.J.A.; ARNOTT, R.A.; POWELL, C.E.; GORDON, A.J. 1983. Comparisons of the respiratory effluxes of nodules and roots in six temperate legumes. Annals of Botany 52(4):469-477. En., Sum. En., 27 Ref., 1l. [Grassland Research Inst., Hurley, Maidenhead, Berkshire SL6 5LR, United Kingdom]

Phaseolus vulgaris. Plant respiration. Roots. Nodulation. Nitrogen fixation. United Kingdom.

The specific respiration rates of nodulated root systems, nodules, and roots were determined during active N fixation in soybean, navy bean, pea, lucerne, red and white clover by measurements on whole plants before and after the removal of nodule populations. Similar measurements were made on comparable populations of the 6 legumes, lacking nodules but receiving abundant nitrate-N, to determine the specific respiration of their roots. All plants were grown in controlled environments, which promote rapid growth. The specific respiration rates of nodulated root systems of the 3 grain and 3 forage legumes during a 7 to 14-day period of vegetative growth varied between 10-17 mg CO_2/g (dry wt.)/h. This mean value consisted of 2 components: a specific root respiration rate of 6-9 mg CO_2/g/h and a specific nodule respiration rate of 22-46 mg CO_2/g/h. Nodule respiration accounted for 42-70 percent of nodulated root respiration, and nodule wt. accounted for 12-40 percent of nodulated root wt. The specific respiration rates of roots lacking nodules and utilizing nitrate-N were generally 20-30 percent greater than the equivalent rates of roots from nodulated plants. The measured respiratory effluxes are discussed in the context of N fixation/nitrate assimilation. (AS)

0617

31499 WITTY, J.F.; SKOT, L.; NEVSBECH, N.P. 1987. Direct evidence for changes in the resistance of legume root nodules to O2 diffusion. Journal of Experimental Botany 38(192)1129-1140. En., Sum. En., 18 Ref., 1l. [Soil Microbiology Dept., Rothamsted Experimental Station, Harpenden, Herts, AL5 2JQ, U.K.]

2,2b

Phaseolus vulgaris. Snap beans. Nodulation. O. Analysis. United Kingdom.

Expt using O2-specific microelectrodes and dark field microscopy to study directly the operation of the diffusion barrier are described. The O2 concn. sensed by the electrode decreased sharply in the region of the inner cortex and was less than 1.0 millimolar/cubic meter throughout the infected tissue in nodules of both pea and French bean. In a no. of expt. the ambient O2 concn. was increased to 40 percent while the electrode tip was just inside the inner cortex. In 13 out of 21 cases the O2 concn. at this position either remained low and unchanged or increased irreversibly to near ambient values. In the remaining cases the O2 concn. increased after 1.0-2.5 min. and then decreased to its former value. These results are ascribed to an increase in resistance of the barrier in response to increased O2 flux into the nodule. It was shown microscopically that air spaces both at the boundary between the infected zone and the inner cortex, and within the infected zone, started to disappear 3 min after nodules were exposed to high ambient O2 concn. and had disappeared completely after 8 min. (AS (extract)) See also 0478

J00 ECONOMICS AND DEVELOPMENT

0618

31414 ANDERSON M., M.D. 1988. An exploration of the economic responsiveness of emerging commercial bean farmers in the Colombian Andes. M.Sc. Thesis. Edmonton, Alberta, University of Alberta. 130p. Fn., Sum. Fn., 66 Ref., Il.

Phaseolus vulgaris. Socioeconomic aspects. Prices. Technology transfer. Colombia.

The effects of price changes in production and the relationship of adoption of technologies with prices with respect to a bean crop in Dept. of Nariño, Colombia, were studied. The methodology developed, called the Frisch Interview Technique, is an iterative game which presents a farmer with 2 crop combinations to grow in his farm, given a certain price level. The price is increased and the change in the farmer's choice provides an indication of his change in bean acreage as a response to a change in price. The results of the research indicated the farming system in the area is at an intermediate level of development possessing both subsistence and market-oriented goals. Three groups of farmers were identified from their response to the Frisch interview. The main distinguishing characteristics of these groups were their level of commercialization and their perception of the 2 main crops in the system as complements or substitutes. Various proxies of price response, including the 1 obtained from the game, indicated qualitative differences in farmer behavior within a homogenous region. The differences were interpreted as corresponding to stages of development. Farmers unresponsive to prices are preoccupied with subsistence and social obligations within their farming system. Farmers perceiving a complementarity between the 2 main crops are responding to their system environment to improve their social and subsistence achievements. Farmers substituting higher priced crops for lower priced crops in their system have made the transition to commercial goals from social and subsistence goals. It is concluded that the interview technique provides a good indication of responsiveness to price. The results of the interview also aid in the distinction of groups of farmers, which is useful for the targetting of policy measures. It is not clear, however, whether a transition to commercial goals is a precondition to or a result of development. (AS (extract))

0619

29789 AREVALO, V. 1985. Sistemas de producción y tecnología del frejol arbustivo en Pimampiro. Proyecto INIAP-Cornell. (Bush bean production and technology systems in Pimampiro). Quito, Ecuador, Instituto Nacional de Investigaciones Agropecuarias. Departamento de Planificación y Economía Agrícola. Documento de Trabajo 85.SE.4. 27p. Es., Sum. Es., 3 Ref., Il.

Phaseolus vulgaris. Socioeconomic aspects. Cultivation. Technology. Ecuador.

The farmers' socioeconomic characteristics, the technological development of bean production, and cultivation systems were studied in Pimampiro (Ecuador). This region is characterized by the presence of small- and medium-scale farmers, closely related to the agricultural market. Agricultural technology is at an intermediate level between traditional and technical practices. Monocropping is the most widely used system. Farmers' cultivation practices are analyzed, based on data obtained from the survey; recommendations for future research are included. (CIAT)

0620

33155 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1987. Collaborative activities in networks. B. Latin America. 1. Central America and the Caribbean. In Centro Internacional de Agricultura Tropical. Bean Program. Annual Report 1987. Cali, Colombia, Working Document no.39. pp.255-258. En.

Phaseolus vulgaris. Germplasm. Transfer of technology. Technology evaluation. Cultivars. Guatemala. Mexico. Cuba. Nicaragua. Dominican Republic. Haiti. Honduras. El Salvador. Costa Rica. Panama.

The main achievements of the Central American and Caribbean bean project have been the consolidation of strong research networks to address the regional problems caused by Apion, BGMV, and web blight; and the increase in a horizontal technology and information exchange among national programs. Training continues emphasizing on-farm research courses and courses directed towards developing artesanal seed production to overcome the quality-seed bottleneck that often prevents small farmers from adopting new var. National programs have released several improved var. whose advantages are well-known among farmers because of their superior performance in on-farm trials. Examples include ICTA-Ostua in Guatemala, Chirripo in Costa Rica, Catrachita in Honduras, and Siboney in Cuba. Despite the drought stress suffered by most of these lines, a stable yield increase was observed in almost all trials. (CIAT)

0621

33153 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1987. Economics and social science. 1. Latin America. In Centro Internacional de Agricultura Tropical. Bean Program. Annual Report 1987. Cali, Colombia, Working Document no.39. pp.226-239. En.

Phaseolus vulgaris. Economics. Technology evaluation. Transfer of technology. Developmental research. Guatemala. Costa Rica. Peru. Colombia. Dominican Republic. Honduras.

The Bean Economics Section concentrates its research efforts on 3 basic activities: (1) documenting developments in dry bean production and consumption in the 3rd world; (2) diagnosing the bean sector of different countries; and (3) monitoring the release and measuring the impact of new technology. Adoption studies carried out in Guatemala, Costa Rica, and Peru, have a mixed diagnostic/evaluative nature, describe and prioritize research problems, and simultaneously measure the penetration of materials

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released for other zones into these areas. Simple participative research methods, partially based on the methodologies developed by the CIAT's participative research program are being used. The aim of these activities is to improve the understanding of farmers technological needs and to increase feedback from farmers to researchers. In Colombia, promising dry and snap bean lines were evaluated in participatory expt. These expt. emphasized traditional agronomic management, allowing farmers to plant in the way they would liked best. Farmers were visited every 15 days; mutual evaluations of var. performance were undertaken, and farmer-applied treatments were recorded. During the last 4 yr., consumer acceptability studies have been conducted in Colombia, Peru, Dominican Republic, and Honduras. These studies were initially oriented towards methodology development but have switched towards consumer validation of new var. (CIAT)

0622

33150 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1987. On-farm agronomy. 1. Latin America. In Centro Internacional de Agricultura Tropical. Bean Program. Annual Report 1987. Cali, Colombia, Working Document no.39. pp.194-204. En.

Phaseolus vulgaris. On-farm research. Transfer of technology. Technology evaluation. Adaptation. Latin America.

The purposes of the on-farm agronomy activities of the Bean Program in Latin America are to guide scientists working in technology development (in national programs or at CIAT) in setting priorities through feedback from farm surveys and trials, and to increase the chance of effective technology transfer using information from these trials. CIAT considers that on-farm research should be the responsibility of national research and extension programs. Since 1982, the Bean Program has developed and adapted on-farm research methodology for several areas and systems (including beans), demonstrating that on-farm research is an effective technique. The program trains national research and extension personnel in on-farm research techniques and provides follow-up and consultancy for those working in this field. It also initiates and supports links between personnel of national and international institutes. Progress made between 1982-87 in methodology adaptation and development, on-farm research training and follow-up, institutional network development, and identification of technologies for specific areas is summarized. (CIAT)

0623

33151 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1987. On-farm agronomy. 2. Central America. In Centro Internacional de Agricultura Tropical. Bean Program. Annual Report 1987. Cali, Colombia, Working Document no.39. pp.205-207. En.

Phaseolus vulgaris. Transfer of technology. On-farm research. El Salvador. Guatemala. Honduras. Nicaragua. Costa Rica. Dominican Republic. Cuba.

A no. of short courses in on-farm research in Central America grew out of models provided by on-farm research in Latin America. Phases were shorter and some problems arouse with selection of candidates and follow-up. Even so, on-farm research on beans has been established in some areas of El Salvador, Nicaragua, Costa Rica, and Honduras as a result of these courses and from a CIAT-based course in which key personnel from those countries was trained. Results obtained in El Salvador, Guatemala, Honduras, Nicaragua, Costa Rica, Dominican Republic and Cuba are analyzed. (CIAT)

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0624

33147 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1987. Snap beans. In Centro Internacional de Agricultura Tropical. Bean Program. Annual Report 1987. Cali, Colombia, Working Document no.39. pp.178-184. En.

Phaseolus vulgaris. Snap beans. Marketing. Consumption. Prices. Germplasm. Adaptation. Pod characters. Backcrossing. Resistance. Bean common mosaic virus. Colletotrichum lindemuthianum. Inheritance. Brazil. Colombia.

An econometric analysis of snap bean marketing and consumption in Brazil and Colombia was carried out. Marketing margins are normally more than 50 percent of the final price to the consumer; snap bean consumption is income dependent. In 1982, 250 snap bean germplasm accessions were evaluated at CIAT; 21 of them showed good adaptation and acceptable pod characteristics but were susceptible to diseases. Resistance to diseases such as BCMV and anthracnose was obtained from CIAT's dry bean lines using backcross breeding to recover the snap bean type of pod. For resistance to other diseases with more complex patterns of inheritance, a recurrent selection program has been employed using the pedigree method for advancing generations. In May 1987, the 1st international workshop on snap beans was held at CIAT with participants from Argentina, Brazil, Colombia, Ecuador, Spain, the USA, Guatemala, and Peru, to establish an international network of snap bean scientists and promote future research and var. development. (CIAT)

0625

33162 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1987. Training. In Centro Internacional de Agricultura Tropical. Bean Program. Annual Report 1987. Cali, Colombia, Working Document no.39. pp.332-337. En.

Phaseolus vulgaris. Transfer of technology. Technology evaluation. Developmental research. Colombia. Costa Rica. Nicaragua. El Salvador. Honduras. Paraguay. Cuba. Dominican Republic.

The Training Section of the CIAT Bean Program emphasizes training in appropiate technology for various agronomic situations in a range of courses offered both at the CIAT headquarters and in the trainees' countries. Follow-up courses in topics such as on-farm trials and artesanal seed production continue to be an essential aspect of the training methodology. Courses are oriented towards (1) the promotion of promising germplasm through training in appropiate technology for different farming systems; (2) the identification of factors limiting production and the subsequent search for alternative solutions compatible with the farmers' resources and objectives; and (3) the support of good quality on-farm seed production by farmers. Fifteen courses were given in 1987 throughout Latin America. Three were given at CIAT (Colombia), and the others in Costa Rica, Nicaragua, El Salvador, Honduras, Paraguay, Cuba, and Dominican Republic. (CIAT)

0626

28085 FRANCO, A.; CORREA, C. 1984. Data appendices: beans, dry. In Centro Internacional de Agricultura Tropical. Trends in CIAT Commodities. Cali, Colombia, Internal Document-Economics 1.9. 5p. En., Dat.num.

Phaseolus vulgaris. Production. Yields. Trade. Statistical data. Latin America.

Annual growth rates for bean production, area and yield for 1966-82 in different countries and regions of Latin America are presented. Data on bean area, and av. yield, and pulse exports and imports for 1966-68,

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1972-74, and 1980-82 for the different Latin American countries and regions are also included. (CIAT)

0627

31067 HARRIS, S.S. 1987. Beans and the federal assistance programs. Michigan Dry Bean Digest 11(3):6-7. En.

Phaseolus vulgaris. Consumption. Development. USA.

Ways in which the US Department of Agriculture is promoting dry bean consumption, particularly among low-income people throughout the country, are explained. Emphasis is placed on how schools obtain food for the school lunch program, volume of dry beans purchased by USDA in 1986 for such programs, purchases for 1987, trends towards canned dry beans, and commodity distribution and its alternatives. (CIAT)

0628

29965 KUENZLI, F.D. 1986. Michigan, United States, and world dry bean statistics. Michigan Dry Bean Digest 11(1):16-17. En.

Phaseolus vulgaris. Production. Cultivars. USA.

A report on the 1986 Michigan (USA) bean crop area and production estimates is presented, compared to those of other USA western states/cv. The dry bean production and trade situation of Argentina is also discussed. (CIAT)

0629

29963 MDA AND MBSA dry bean inspection program: statement of performance. Michigan Dry Bean Digest 11(1):12.14. 1986. En., Il.

Phaseolus vulgaris. Production. Trade. USA.

A report on the high performance of the Michigan Department of Agriculture-Michigan Bean Shippers Association Dry Bean Inspection Program (USA) is presented. From Jan. 1981-Dec. 1985, 56,632 individual dry bean inspection certificates were issued in the State of Michigan, 15 of which (0.02 percent) were formally appealed by customers. Of these 15 certificates, only 5 grades were reversed. (CIAT)

0630

31073 MICHIGAN, UNITED States, and world dry bean statistics. Michigan Dry Bean Digest 11(3):18-21. 1987. En.

Phaseolus vulgaris. Production. Trade. Statistical data. Prices. USA. Argentina. Chile. Mexico.

The situation of bean production and trade in Michigan, the USA and the world, for 1986 is discussed; prospects are given for 1987. Data show how USA agricultural exports decreased while imports increased; prices fell with new farm legislation; projections for bean production in Mexico changed as a result of frost damage; farm exports to Western Europe continue to decline. The bean production situati in Argentina, Chile and Mexico is discussed, as well as the internal and external policies affecting US bean trade. (CIAT)

0631

31079 MICHIGAN, UNITED States, and world dry bean statistics. Michigan Dry Bean Digest 11(4):10-17. 1987. En., Il.

331

Phaseolus vulgaris. Production. Trade. Statistical data. Yields. North America. South America. Asia. Europe. Oceania.

The situation of bean production and trade in Michigan, the USA and the world, is discussed for 1987. Dry bean area, yield and production data are given per continent and country for 1979-81, 1984, 1985, and 1986. Special bean production data are given for Japan. USA dry bean exports per bean type and country of destination are also given for 1986. Bean area planted and harvested estimates for 198' are provided per state in USA. (CIAT)

0632

30627 NOVAES, F.F. 1985. Formas de producao e adocao de tecnologia: o caso dos produtores de feijao do municipio de Inhumas-Estado de Goiás. (Technology production and adoption: bean growers in Inhumas, State of Goias). Tese Mag.Sc. Vicosa-MG, Brasil, Universidade Federal de Vicosa. 108p. Pt., Sum. Pt., 43 Ref., Il.

Phaseolus vulgaris. Technological package. Transfer of technology. Development. Brazil.

Bean production and technology practices were identified in a survey of 76 producers in Inhumas (Goias, Brazil). The extent to which the generated and recommended technology is being used, was also determined. The predominance of noncapitalist production systems is highlighted, with family labor as the basis of the productive process. The presence of capitalist social relations and certain irregularities between the technology recommended by the Empresa Brasileira de Pesquisa Agropecuaria and the way production is organized were also verified. Farmers tend to adopt more easily agricultural practices requiring intensive labor than practices demanding more financial resources. (AS (extract)-CIAT)

0633

31068 PACHICO, D. 1987. Demand in the world bean market: prospects for international trade. Michigan Dry Bean Digest 11(3):8-9,16. En., Il. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Phaseolus vulgaris. Marketing. Income. Consumption. Trade. Latin America. Europe. Africa.

Demand in the world bean market and prospects for international trade are analyzed. There are 3 main segments in the world bean market. The European market is large, but it is growing slowly. Among the middle income countries, like Mexico and Brazil, there will be significant export opportunities, but access to these markets is likely to be unstable. Among many low income countries, especially in Africa, bean consumption is high and domestic production is often inadequate, but consumers lack purchasing power so that imports will usually be feasible only under concessionary terms. (CIAT)

0634

30653 SILVA, I.O. 1985. Estudo comparativo dos perfis tecnológicos dos sistemas de producao de milho e feijao no municipio de Riachao das Neves-Bahia. (Comparative study of the technological profiles of maize and bean production systems in Riachao das Neves-Bahia). Tese Mag.Sc. Vicosa-MG, Brasil, Universidade Federal de Vicosa. 88p. Pt., Sum. Pt., 26 Ref., Il.

Phaseolus vulgaris. Technological package. Development. Brazil.

The technological profiles of maize and bean production systems used by producers of Riachao das Neves (Bahia, Brazil) were surveyed to identify the limitations in using the practices recommended by the Empresa de

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Pesquisa Agropecuaria da Bahia and Empresa de Assistencia Tecnica e Extensao Rural de Bahia (EMATER-BA). Overall, farmers were found to make little use of the practices recommended for the maize-bean production. According to farmers, the recommended system is not used due to lack of resources, small areas, low investment indexes, difficulty in getting loans, and lack of bean seed. EMATER-BA must intensify its work on the region and try to make farmers aware of the advantage of using the recommended practices. (AS (extract)-CIAT)

0635

31072 VARNER, G.V. 1987. Research report. Michigan Dry Bean Digest 11(3):15-16. En.

Phaseolus vulgaris. Costs. Herbicides. Seed. Fertilizers. USA.

Proved ways for reducing bean production costs, particularly for Michigan (USA) are discussed. They include the use of less herbicides, less fertilizer, no Zn-Mn fertilizer, insecticides only if necessary, less seed, planting classes of beans with low seed prices, and less tillage. (CIAT)

0636

28602 VEET, T.G.M. DE 1986. Women's labour allocation patterns in bean-producing households: present situation, trends and expectations in eastern Antioquia, Colombia. Wageningen, Netherlands, Agricultural University, Department of Women's Studies. Cali, Colombia, Centro Internacional de Agricultura Tropical. 88p. En., Es., Sum. En., 22 Ref., Il.

Phaseolus vulgaris. Socioeconomic aspects. Labor. Income. Colombia.

To study the labor allocation patterns of women in bean-producing households in eastern Antioquia, Colombia, labor within the rural household was divided into 4 groups of activities: (1) crop production activities, (2) home production activities, (3) activities associated with crop and animal production, and (4) other direct income-generating activities. The women's participation in these activities varied depending on the income situation of the household, the family life cycle, the sex role ideology, the opportunities for farm and nonfarm employment, and the appreciation of various activities. Women were found to be still mainly responsible for home production activities and child raising and men for crop production activities. Results indicated that women spend 66.3 h/wk. (9.5 h/day) on home production activities, which are labor intensive and predominantly manual. Daughters also work about 4 h/day. The impact of the stage in family life cycle on the labor allocation in home production activities is significant. The participation of the mother in home production activities declines over time as her daughters grow older. The income situation of peasant households does not influence the allocation of labor with respect to home production activities, which are done regardless of the income level of the rural household. Crop production activities are marked out for the men with assistance of their sons. Men spend 50 h/wk. in these activities (also labor intensive and predominantly manual). The participation of women in crop production activities varied depending on the income situation of the household, being greater in poor families. Women tend to perform fewer crop production activities, with improved standard of living. Crop and animal production activities are shared by women and men (7.7 h/wk.). The participation of women in direct income-generating activities is low. Reasons for nonparticipation are lack of time and the difficulties in finding a job or in finding a consumer market for home-made products. (AS)

0637

31074 ZIMMERMANN, M.J. DE O. 1987. The national research center for rice and beans (CNPAF) in Brazil. Michigan Dry Bean Digest 11(4):2-3. En., Il. [EMBRAPA-CNPAF, Caixa Postal 179, 74.000 Goiania-GO, Brasil]

Phaseolus vulgaris. Research. Agricultural projects. Brazil.

The location, facilities, objectives, and activities developed by the National Research Center for Rice and Beans (CNPAF) in Brazil, are briefly described. Being its objective to coordinate rice and bean research conducted in Brazil, it develops activities in germplasm maintenance, research in the various aspects of crop production, distribution of improved materials among state institutions, training, data statistical analysis, and seed production. (CIAT) See also 0427 0468 0485 0573 0586 0641

M00 USES, INDUSTRIALIZATION AND PROCESSING

0638

30782 GEWAN, M.G. 1982. Nutritive quality of fermented mungbeans (Vigna radiata Wilczek) and white kidney beans (Phaseolus vulgaris L.). M.Sc. Thesis. College, Laguna, University of the Philippines at Los Baños. 106p. En., Sum. En., 96 Ref., Il.

Phaseolus vulgaris. Fermentation. Nutritive value. Amino acids. Methionine. Tryptophan. Flatulence. Philippines.

An expt. was carried out at the U. of the Philippines to (1) isolate and identify the microorganisms responsible for the natural fermentation of mung beans and white kidney beans; (2) evaluate the nutritive quality of the fermented beans compared with nonfermented beans; (3) determine the effect of fermentation on the availability of amino acids (met. and tryptophan) and the oligosaccharides stachyose and raffinose in beans. Natural fermentation of mung beans and white kidney beans resulted in the improvement of their nutritive quality as evidenced by the significant increases in available amounts of limiting amino acids and their resp. relative nutritive value. No detectable levels of pathogenic microorganisms were found in the fermenting samples. The amounts of raffinose and stachyose significantly decreased during fermentation, thus the problem of flatulence will be minimized. (AS (extract))

0639

25330 HOSFIELD, G.L.; GHADERI, A.; UEPERSAX, M.A. 1984. A factor analysis of yield and sensory and physicochemical data from tests used to measure culinary quality in dry edible beans. Canadian Journal of Plant Science 64(2):285-293. En., Sum. En., Fr., 24 Ref. [Agricultural Research Service, U.S. Dept. of Agriculture, East Lansing, MI 48824, USA]

Phaseolus vulgaris. Cultivars. Yields. Protein content. Cooking. Water content. Seed characters. Processing. Canned beans. USA.

A principal factor analysis was applied to data for yield and 16 sensory and physicochemical traits measured on 2[illegible] strains of black-seeded dry beans grown in Michigan, USA, in 1978 and 1979. Five principal factors were extracted from the correlation matrix of traits. These factors described soaking, cooked color, thermal, dry color, and general color constructs. The soaking, cooked color and thermal factors are related to culinary quality and accounted for 67.1, 73.0, and 67.8 percent of the variance in the 1978, 1979, and combined data, resp. The factors themselves did not

provide an image by which culinary quality could be interpreted in a developmental sense from the physicochemical traits of dry, soaked, or cooked bean seeds. Major traits did not appear in more than 1 factor in any of the analyses. When the loadings were examined from the point of view of the tests rather than factors, the constructs which emerged were coherent in a physicochemical or technological sense and reasonable biologically. Soaking, cooked color, and thermal constructs can be measured by the hydration coefficient, L color value, and Kramer shear press, resp. These tests were able to differenciate culinary quality among test samples. Yield and protein content were independent of culinary quality. (AS)

0640

31070 MACHIORLATTI, J.A.; WILSON, J.G.; UEBERSAX, M.A.; HOSFIELD, G.L. 1987. Effect of product evaluation temperature on processed bean texture analysis. Michigan Dry Bean Digest 11(3):12-13. En., 11 Ref., Il. [Dept. of Food Science & Human Nutrition, Michigan State Univ., East Lansing, MI 48824, USA]

Phaseolus vulgaris. Canned beans. Temperature. Organoleptic properties. USA.

Unopened canned navy beans cv. Seafarer were adjusted for 15 min, to selected temp. from 20 to 60 degrees Celsius at 5-degree Celsius increments by submersion in a controlled temp. circulating water bath, or at 5 degrees Celsius through overnight storage in a cooler, to evaluate the effect of temp. on processed bean texture. The firmness-temp. coefficient (percent change in firmness per degree temp. increase) over the temp. range studied was negative for both firmness(-0.65 percent) and compression (-0.75 percent) measurements, indicating that firmness processed beans decreased as temp. increased. Canned bean texture, as influenced by product temp., has implications in overall consumer acceptability and should be taken into consideration when evaluating sensory quality of processed beans. (CIAT)

0641

31066 UEBERSAX, M.A.; ZABIK, M.E. 1987. Bean flour research program. Michigan Dry Bean Digest 11(3):2-4,13,24. En., 43 Ref., Il. [Dept. of Food Science & Human Nutrition, Michigan State Univ., East Lansing, MI 48824, USA]

Phaseolus vulgaris. Bean flour. Marketing. Nutritive value. Uses. USA.

A report on the utilization and market development of dry heated edible bean flour fractions, is presented. An overview is given on bean flour product characteristics, its functional properties in food product systems, nutritional implications, and commercial assessment of ingredient fractions. (CIAT)

0642

31496 WHITE, J.M.; FORBES, R.B.; REDDY, K.R. 1986. Residues from selected vegetable crops and their potential as biofuel. Proceedings. Soil and Crop Science Society of Florida 45:105-107. En., Sum. En., 9 Ref. [Central Florida Research & Education Center, Sanford, Fl 32771, USA]

Phaseolus vulgaris. Snap beans. Biomass production. Uses. USA.

Vegetable crop residues available after harvest were found to offer significant amounts of feedstock for possible conversion to methane gas. About 208, 385 Mg dry wt. of residue could be produced by sweet maize, snap bean, radish, cabbage, and carrot grown on about 60,224 ha, representing a residue yield of about 346 Mg dry wt./ha. N concn. in sweet maize, snap

235

bean, radish, cabbage, and carrot averaged 1.71, 1.83, 3.56, 1.88, and 2.16 percent, resp. (AS (extract))

0643

30718 WILHELM, L.R. 1980. Forced ventilation cooling of commercial snap bean shipments. Tennessee Farm and Home Science no.116:25-27. En., 3 Ref., Il.

Phaseolus vulgaris. Snap beans. Distribution. Processing. USA.

The effectiveness of an air scoop-duct system in providing forced ventilation cooling to commercial snap bean shipments was tested using 3 scoop configurations of 0.60, 0.91, and 1.21 m wide (scoop configurations A and B were tested with all widths; C with the 0.60-m width only) to determine the amount of static pressure produced in the duct as a function of vehicle speed and air-duct conditions. The air-duct cooling system described was clearly effective in providing in-transit cooling of snap beans. Size and configuration of the scoop affected both duct static pressure and amount of cooling. Configuration A (with top installed) was relatively width-independent and appeared less affected by operating conditions. A 0.60-m scoop width appeared sufficiently large for configuration A. The ratio of duct static pressure to total pressure could be 0.70 for configuration A. Vehicle speed was the most important factor affecting air flow through the snap beans. Fans of a reasonable size provide some cooling in parked vehicles, but air flow produced by typically used fans is substantially lower than that produced in transit. (CIAT)
See also 0434

340

ABBREVIATIONS AND ACRONYMS

A	Angstrom(s)
ABA	Abscisic acid
ac	Acre(s)
Af.	Afrikaans
a.i.	Active ingredient
alt.	Altitude
AMV	Alfalfa mosaic virus
approx.	Approximate(ly)
Ar.	Arab
atm.	Atmosphere
ATP	Adenosine 5'-triphosphate
av.	Average
BAP	6-Benzylaminopurine
BBMV	Broad bean mosaic virus
BCMV	Bean common mosaic virus
Bg.	Bulgarian
BGMV	Bean golden mosaic virus
BGYMV	Bean golden yellow mosaic virus
BOD	Biochemical oxigen demand
BPMV	Bean pod mottle virus
BRMV	Bean rugose mosaic virus
BSMV	Bean southern mosaic virus
BV	Biological value
BYMV	Bean yellow mosaic virus
ca.	About (circa)
CAMD	Cassava African mosaic disease
CMV	Cassava African mosaic virus
CBB	Cassava bacterial blight
CBSD	Cassava brown streak disease
CEC	Cation exchange capacity
CER	CO2 exchange rate
CF	Cassava flour
CGR	Crop growth rate
Ch.	Chinese
CLM	Cassava leaf meal
CLV	Cassava latent virus
CM	Cassava meal
cm	Centimeter(s)
COD	Chemical oxigen demand
concn.	Concentration
CP	Crude protein
Cs.	Czech
CSL	Calcium stearyl lactylate
CSW	Cassava starch wastes
C.V.	Coefficient of variation
cv.	Cultivar(s)
2,4-D	2,4-dichlorophenoxyacetic acid
Da.	Danish
DM	Dry matter
DNA	Deoxyribonucleic acid
EC	Emulsifiable concentrate
EDTA	Ethylenediaminetetraacetic acid
EEC	European Economic Community
e.g.	For example
ELISA	Enzyme-linked immunosorbent assays
EMS	Ethyl methane sulfonate
En.	English
EP	Preliminary Trials, CIAT
Es.	Spanish
expt.	Experiment(s)
exptl.	Experimental
Fr.	French
ft-ca	Foot candles (10.76 lux)
FYM	Farmyard manure
g	Gram(s)
G	Ciga (109)
GA	Gibberellic acid
gal	Gallon(s)
GE	Gross energy
GERs	Glucose entry rates
GLC	Gas-liquid chromatography
Gr.	Greek
h	Hour(s)
ha	Hectare(s)
HCN	Hydrocyanic acid
HDP	Hydroxypropyl distarch phosphate (modified cassava starch)
He.	Hebrew
Hi.	Hindi
HI	Harvest index
hp	Horsepower
Hu.	Hungarian
IAA	Indoleacetic acid
IBA	Indolebutyric acid
IBYAN	International Bean Yield and Adaptation Nursery, CIAT
Il.	Illustrations
in.	Inches
In.	Indonesian
It.	Italian
IU	International unit
J	Joule
Ja.	Japanese
kat	Katal(amount of enzymatic activity that converts 1 mole of substrate/s)
kcal	Kilocalorie(s)
kg	Kilogram(s)

De.	German
km	Kilometer(s)
KNap	Potassium naphthenate
Ko.	Korean
kR	Kiloroentgen(s)
La.	Latin
LAD	Leaf area duration
LAI	Leaf area index
lat.	Latitude
lb	Pound(s)
LD50	Mean lethal dose
LER	Land efficiency ratio
LPC	Leaf protein concentrate
lx	Lux
M	Mega
m	Meter(s)
Mal.	Malay
max.	Maximum
MC	Moisture content
ME	Metabolizable energy
meq	Milliequivalent(s)
met.	Methionine
mg	Milligram(s)
mho	Reciprocal ohm
min.	Minimum
min	Minute(s)
ml	Milliliter(s)
mm	Millimeter(s)
mo.	Month
mol. wt.	Molecular weight
m.p.	Melting point
NAA	Alpha-naphthalene acetic acid
NAD	Nicotinamide adenine dinucleotide
NADH	Nicotinamide adenine dinucleotide, reduced form
NAR	Net assimilation rate
NCE	Net CO2 exchange
NE	Northeast
NER	Net energy ratio
Nl.	Dutch
nm	Nanometer(s) (10-9 m)
no.	Number(s)
No.	Norwegian
NPFs	Negative production factors
NPR	Net protein ratio
NPU	Net protein utilization
NW	Northwest
OM	Organic matter
oz	Ounce(s)
p.	Page
P	Probability
Pa	Pascal(s)
PAN	Peroxyacetic nitrate
PCNB	Pentachloronitrobenzene
PDA	Potato dextrose agar
PER	Protein efficiency ratio
pH	Hydrogen ion concentration
Pl.	Polish
kJ	Kilojoule
pp.	Pages
pphm	Parts per hundred million
PPI	Preplanting incorporation
ppm	Parts per million
PSA	Potato sucrose agar
Pt.	Portuguese
pv.	Pathovar
Ref.	Reference
resp.	Respective(ly)
Rf	Retardation factor-chromatography
RGR	Relative growth rate
RH	Relative humidity
RNA	Ribonucleic acid
Ro.	Romanian
rpm	Revolutions per minute
Ru.	Russian
s	Second
SBM	Soybean meal
SCN	Thiocyanate
SCP	Single cell protein
SDS	Sodium dodecyl sulfate
Sk.	Slovak
Sn.	Slovene
sp.	Species
spp.	Species
SSL	Sodium stearyl-2-lactylate
Sum.	Summary
Sv.	Sweddish
t	Ton(s)
TDN	Total digestible nutrients
temp.	Temperature
TIA	Trypsin inhibitor activity
TIBA	2,3,5-Triiodobenzoic acid compound with N-methylmethanamine
TLC	Thin-layer chromatography
TMV	Tobacco mosaic virus
Tr.	Turkish
TSH	Thyroid-stimulating hormone
UDPG	Uridine diphosphate glucose
Uk.	Ukrainian
UMS	Unmodified cassava starch
Ur.	Urdu
UV	Ultraviolet
var.	Variety(ies), varietal
VEF	Bean Team Nursery, CIAT
VFA	Volatile fatty acids
vol.	Volume
VPD	Vapor pressure deficit
vpm	Volume per million
vs.	Versus
W	West, watt
wk.	Week
WP	Wettable powder
wt.	Weight
yr	Year(s)
/	Per

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DETONGNON, J.
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DEVAY, J.E.
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DHANVANTARI, B.N.
0389

DHINGRA, O.D.
0110 0340

DIAZ, F.
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DIAZ, M.
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DICKSON, M.H.
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DIMAGNO, E.P.
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DINIZ, M. DE S.
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DIXON, R.A.
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DOBIE, P.
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DORE, C.
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DORMOND H., M.
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DUDIENAS, C.
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DUFFEY, S.S.
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DUNN, M.F.
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DUQUE, M.C.
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DYNIA, J.F.
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DZIEDZIC, S.Z.
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EAMUS, D.
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ECHANDI, E.
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ECHEVERRI L., M.J.
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ECKENRODE, C.J.
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EDWARDS, M.C.
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EHRENBERG, L.
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EICHELKRAUT M., K.
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EL-SHARKAWY, A.M.
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FARINEAU, J.
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FEDORCSAK, I.
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FELIX, J.F.
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FENN, L.B.
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FENNO JUNIOR, C.W.
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FERNANDEZ DE SOTO M., J.A.
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HALL, J.S.
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HEATH, M.C.
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HERNANDEZ U., H.Y.
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HERRERA G., G.
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JAHN, O.
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KELLY, P.
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KURTZMAN JUNIOR, R.H.
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LABOUGLE, J.M.
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LACCETTI, L.B.
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LAMB, J.W.
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LEE, K.W.
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LEWIS, L.N.
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LIETH, J.H.
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LIM, J.S.K.
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LIMA, C.A. DE S.
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LINDGREN, P.B.
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LINDOW, S.E.
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LINK, D.
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LIRA, C.L.
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LISA, V.
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LOPEZ G., C.A.
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LORIA, R.
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LORIMER, G.H.
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MACKENZIE, S.A.
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MAFFIA, L.A.
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MAGALHAES, N.F.M.
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MAHRT, G.G.
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MAKKOUK, K.M.
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MARKAKIS, P.
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MARTIN, G.B.
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MARTINS, M.C. DEL P.
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MARTINS, M.C.D.P.
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MATSUOKA, K.
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MCBRIDE, M.B.
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MCFADDEN, W.
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MCKYES, E.
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MCVEY, M.A.
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MELAKEBERHAN, H.
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MELENDEZ, P.L.
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MELIN, D.
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MELLO, F. .F. DE
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MESSINA, F.J.
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MIACHIR, J.I.
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MICHAELS, T.E.
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MIKULSKA, M.
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MILFORT, N.
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MNUKOVA, J.
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MULLINS, C.A.
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OHKI, S.T.
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PATRICK, J.W.
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PATTABIRAMAN, T.N.
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RAMOS, M.L.C.
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RAO, M.
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RAUHUT, R.
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REDDY, K.R.
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REDDY, P.P.
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REIS, E.F. DOS
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REIS, W.P.
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ROCHE, P.
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RODRIGUEZ C., M.
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RODRIGUEZ, E.N.
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0325 0401 0434 0456 0462 0480 0639

CONGO
0320

CONOTRACHELUS PHASEOLI
0304

CONSUMPTION
0212 0213 0415 0624 0627 0633

COOKING
0010 0066 0192 0217 0225 0226 0398
0401 0607 0609 0639
NUTRITIVE VALUE
0223

COPPER
0238 0251 0253 0294 0295 0444 0467
0548
LEAVES
0254
STEMS
0254

CORYNEBACTERIUM FLACCUMFACIENS
0510

371

COSTA RICA
0069 0074 0082 0087 0088 0097 0128
0135 0138 0141 0146 0157 0182 0228
0303 0306 0308 0309 0356 0377 0381
0407 0485 0487 0531 0569 0620 0621
0623 0625

COSTS
0176 0308 0309 0324 0635

COTYLEDONS
0011 0237 0239 0241 0246 0269 0443
GERMINATION
0458

COVER CROPS
0301

COVERED BEANS
0082 0128 0141

COWPEA APHID-BORNE MOSAIC VIRUS
RESISTANCE
0363

CROP LOSSES
0067 0116 0160 0165 0169 0172 0173
0204 0312 0378 0499 0514 0530 0549
0555

CUPA
0005 0353 0421 0450 0451 0620 0623
0625

CUCUMBER MOSAIC VIRUS
SYMPTOMATOLOGY
0150

CUCUMIS SATIVUS
0494

CUCURBITA PEPO
0322 0494

CULTIVARS
0005 0017 0023 0024 0052 0071 0075
0077 0080 0081 0085 0088 0089 0097
0111 0127 0129 0130 0132 0133 0134
0137 0138 0139 0140 0141 0142 0150
0151 0152 0154 0158 0167 0180 0184
0189 0200 0201 0202 0204 0205 0211
0220 0221 0228 0232 0233 0267 0278
0281 0295 0296 0297 0299 0303 0305
0306 0309 0316 0320 0328 0342 0343
0349 0357 0358 0364 0367 0376 0378
0384 0385 0388 0390 0392 0394 0395
0407 0435 0438 0450 0451 0462 0464
0465 0471 0473 0476 0477 0478 0480
0483 0489 0493 0495 0499 0504 0510
0519 0531 0539 0540 0542 0546 0550
0554 0561 0568 0581 0595 0596 0598
0599 0600 0601 0602 0605 0606 0607
0608 0615 0628 0639
ADAPTATION
0095 0099 0290 0326 0401 0448 0469
0505 0506 0507 0571
GERMPLASM
0099 0112 0182 0186 0187 0506 0569
0583 0584 0594 0620
PLANT INTRODUCTIONS
0099 0257 0571 0603

CULTIVATION SYSTEMS
0017 0070 0082 0084 0089 0090 0091
0092 0093 0094 0095 0096 0097 0128
0141 0184 0313 0314 0315 0316 0317
0318 0319 0320 0321 0322 0323 0324
0464 0468 0494 0495 0496 0497 0498
0499 0500 0501 0502 0596

CULTURAL CONTROL
0108 0135 0137 0139 0140 0141 0165
0342 0346 0419 0532 0555

CULTURE MEDIA
0263 0332 0338 0453 0525 0589 0597

CURBITA MAXIMA
0499

CYTOKININS
0013 0044 0263

CYTOLOGY
0004 0010 0012 0016 0142 0144 0206
0229 0285 0344 0357 0428 0429 0430
0563

CZECHOSLOVAKIA
0028

DEFICIENCIES
0288 0394 0432 0446 0448 0469 0481
0573 0584

DEFOLIATION
0067 0378
DISEASES AND PATHOGENS
0369

DETERIORATION
0216
MECHANICAL DAMAGE
0160

DETERMINATE CULTIVARS
0204 0450 0451 0568

DEVELOPMENT
0627 0632 0634

372

DEVELOPMENTAL RESEARCH
0210 0211 0320 0621 0625

DEVELOPMENTAL STAGES
0025 0035 0049 0074 0075 0114 0129
0147 0261 0262 0284 0307 0351 0355
0359 0378 0443 0453 0475 0479 0535
0552
BRANCHING
0290
FLOWERING
0034 0037 0042 0043 0079 0099 0175
0234 0248 0290 0356 0389 0476 0580
0592
GERMINATION
0016 0037 0098 0130 0132 0171 0208
0218 0264 0265 0267 0337 0458 0462
0504
MATURATION
0037 0175 0580
PODDING
0037 0042 0043 0076 0268 0356 0389
0476

DIABROTICA BALTEATA
0081
INSECT CONTROL
CHEMICAL CONTROL
0165
PLANT INJURIES
0165
RESISTANCE
0173

DIABROTICA SPECIOSA
0094

DIETARY VALUE
0189 0191 0192 0193 0198 0199 0398
0404 0609

DIETS
0190 0193 0195 0398 0402 0404

DIGESTIBILITY
0191 0192 0193 0198 0199 0398 0609

DIPTERA
0164 0188 0585 0590 0604

DISEASE CONTROL
0128 0491
BACTERIOSES
0101 0105 0333 0337 0464 0512 0514
0528
MYCOSES
0081 0109 0115 0116 0117 0118 0119
0120 0121 0133 0136 0138 0337 0342
0346 0354 0356 0360 0369 0464 0517
0527 0528 0529 0531 0532 0536 0560
0605
VIROSES
0147 0149 0337 0464 0528

DISEASE PHYSIOLOGY AND BIOCHEMISTRY
0107 0113 0121 0355 0509 0520 0525
0533

DISEASE TRANSMISSION
0184 0537
SEED TRANSMISSION
0337 0340 0511 0513
VIROSES
0151 0155 0337 0365 0538 0539 0541
0542

DISTRIBUTION
0643

DNA
0002 0050 0062 0153 0174 0351 0383
0508 0566 0612

DOMINICAN REPUBLIC
0141 0184 0547 0620 0621 0623 0625

DRAINAGE
0301

DROUGHT
0022 0185 0340 0392 0465 0476 0573
0578 0587

DRY MATTER
0039 0040 0071 0291 0296 0298 0299
0305 0308 0309 0461 0465 0467 0473
0510

DUNG
0482

DWARF BEANS
0097 0320 0329 0391 0574 0588

ECOLOGY
0201 0202 0203 0204 0205 0206 0207
0208 0209 0289 0298 0299 0300 0406
0407 0409 0410 0411 0412 0478 0553
0611 0612 0613 0614 0615 0616 0617

ECONOMICS
0093 0096 0159 0176 0212 0213 0215
0283 0308 0309 0318 0324 0415 0427
0482 0573 0618 0621 0624 0627 0630
0633 0635 0636

ECUADOR
0096 0216 0270 0528 0583 0619

EGYPT
0052 0134 0148 0305 0365 0539

EL SALVADOR
0137 0141 0146 0620 0623 0625

FLASMOPALPUS
0081

ELECTRON MICROSCOPY
0246 0266 0365 0373 0534

ELSINOE PHASEOLI
0585

EMBRYO
0011 0016 0042 0178 0230 0430 0455
0589 0597

EMERGENCE
0007 0264 0462 0504 0535

EMPOASCA
0464

EMPOASCA FABAE
0560
INSECT CONTROL
CHEMICAL CONTROL
0556
PLANT INJURIES
0499

EMPOASCA KRAEMERI
INSECT CONTROL
0166
RESISTANCE
0577

ENTOMOLOGY
0094 0163 0165 0166 0167 0172 0375
0376 0418 0419 0421 0422 0498 0553
0555 0557 0577

ENTYLOMA PETUNIAE
0120

ENZYMES
0002 0004 0011 0021 0026 0029 0034
0047 0049 0050 0051 0054 0055 0056
0061 0062 0064 0065 0124 0191 0206
0229 0230 0237 0238 0240 0241 0245
0247 0255 0259 0269 0272 0275 0276
0282 0336 0341 0343 0347 0348 0351
0357 0359 0409 0412 0417 0420 0431
0433 0436 0447 0458 0518 0520 0521
0533 0566 0589

EPICAUTA
0081

EPILACHNA VARIVESTIS
0170 0311 0541 0552 0560
INSECT CONTROL
0464
CHEMICAL CONTROL
0556
PLANT INJURIES
0067 0169 0172 0499
RESISTANCE
0378

EREMOTHECIUM
0171

ERYSIPHE POLYGONI
DISEASE CONTROL
0120 0464
EPIDEMIOLOGY
0120
SYMPTOMATOLOGY
0120 0464

ETHIOPIA
0301 0587

ETHYLENE PRODUCTION
0023

EVAPOTRANSPIRATION
0042 0435 0438 0482

EXPERIMENT DESIGN
0210

FAT CONTENT
0066 0196 0229 0280 0309
PODS
0308

FATTY ACIDS
0229

FEDERAL REPUBLIC OF GERMANY
0034 0039 0061 0143

FERMENTATION
0059 0638

FERTILIZERS
0017 0069 0070 0071 0077 0080 0081
0201 0203 0205 0207 0208 0253 0287
0289 0294 0295 0296 0298 0308 0320
0407 0408 0411 0413 0464 0466 0467
0471 0472 0473 0474 0477 0478 0481
0494 0501 0517 0615 0635

FIBER CONTENT
0066 0196 0280 0308 0309 0461

FIJI
0009

374

FLATULENCE
0400 0402 0403 0638

FLOWERING
0034 0037 0042 0099 0175 0248 0356
0389 0476 0580 0592
PHOTOPERIOD
0079 0290
TEMPERATURE
0043 0234 0290

FOLIAGE
0169 0248 0253 0294 0295 0296 0299
0307 0407 0524

FRANCE
0014 0015 0022 0023 0041 0168 0176
0178 0200 0206 0231 0357 0441 0442
0555

FRUCTOSE
0280

FUNGICIDES
0109 0132 0133 0137 0138 0145 0310
0354 0356 0360 0369 0517 0527 0531
0536 0560

FUSARIUM
0132 0353 0464

FUSARIUM OXYSPORUM
DISEASE CONTROL
0528
SYMPTOMATOLOGY
0528

FUSARIUM SOLANI PHASEOLI
0341 0486 0523
DISEASE CONTROL
0119 0120 0528
EPIDEMIOLOGY
0119 0120
INOCULATION
0127
RESISTANCE
0127 0606
SYMPTOMATOLOGY
0119 0120 0127 0528

GENES
0002 0014 0015 0062 0102 0124 0174
0351 0363 0383 0390 0391 0397 0459
0460 0520 0540 0543 0558 0566 0567
0575 0595 0599 0612

GENOTYPES
0024 0163 0188 0270 0290 0327 0376
0408 0418 0448 0484 0579 0580 0588
0603 0614

GEOGRAPHICAL DISTRIBUTION
0170 0270 0608

GERMAN DEMOCRATIC REPUBLIC
0060

GERMINATION
0016 0037 0130 0132 0337 0504
SEED
0098 0218 0265 0267 0458 0462
DISEASES AND PATHOGENS
0132 0171
TEMPERATURE
0208 0264 0265

GERMPLASM
0003 0099 0112 0126 0175 0182 0185
0186 0187 0188 0330 0501 0506 0564
0565 0569 0570 0573 0574 0575 0576
0577 0578 0579 0582 0583 0584 0585
0586 0587 0588 0589 0591 0592 0594
0604 0609 0614 0620 0624

GIBBERELLINS
0044 0160 0449 0451

GLUCOSE
0142 0280 0350

GOSSYPIUM HIRSUTUM
0502

GREEN MANURES
0474 0482

GROWTH
0006 0039 0075 0242 0257 0260 0284
0292 0374 0410 0429 0449 0470 0474
LIGHT
0040
MINERALS AND NUTRIENTS
0031 0032 0033 0044 0250 0266 0287
0289 0300 0371 0394 0411 0467 0478
0481 0551
NUTRIENT SOLUTION
0031 0032 0044 0250 0266 0300 0394
PLANTING
0076 0318 0535
SOLAR RADIATION
0020 0040
SPACING
0087 0535
TEMPERATURE
0043 0076 0411 0438 0579

GUATEMALA
0139 0141 0186 0270 0321 0392 0404
0620 0621 0623

HAITI
0175 0200 0620

375

HARVESTING
0081 0082 0325 0464 0478 0488 0489

HEAT TREATMENT
0219

HELIOTHIS ZEA
PLANT INJURIES
0499

HEMIPTERA
0163 0171

HERBICIDES
0048 0063 0083 0302 0303 0306 0319
0432 0487 0492 0635
DISEASES AND PATHOGENS
0337 0486 0531
PLANT INJURIES
0312

HETEROSIS
0382

HOMOPTERA
0167 0376 0499 0538 0542 0560 0577
INSECT CONTROL
0166 0556

HONDURAS
0270 0620 0621 0623 0625

HOST RANGE
0120 0365 0557

HOSTS AND PATHOGENS
0150 0157

HUMAN NUTRITION
0047 0189 0190 0193 0194 0195 0197
0198 0223 0224 0398 0402 0404 0573
0638

HUNGARY
0512

HYBRIDIZING
0006 0178 0389 0572 0573 0590 0597

HYBRIDS
0178 0183 0590 0593 0598

HYDROLYSIS
0053

HYPOCOTYL
0025 0049 0129 0351 0355 0359 0443

ILLUMINATION
0041 0079

INCOME
0093 0096 0159 0212 0213 0308 0309
0318 0324 0415 0482 0633 0636

INDETERMINATE CULTIVARS
0204 0450 0451 0568

INDIA
0054 0078 0114 0147 0164 0245 0256
0258 0262 0302 0310 0330 0382 0391
0396 0413 0549

INDOLEACETIC ACID
0009 0025 0261 0334 0452 0610

INFLORESCENCES
0007 0234 0451

INHIBITORS
0148 0230 0247 0259 0262 0272 0276
0392 0420 0433 0436

INJURIOUS INSECTS
0212 0213 0427 0483 0553 0554 0558
0559 0595
COLEOPTERA
0067 0081 0094 0165 0168 0169 0170
0172 0173 0304 0311 0378 0418 0419
0420 0421 0422 0464 0499 0541 0552
0555 0556 0557 0560 0577 0585
DIPTERA
0164 0188 0585 0590 0604
HEMIPTERA
0163 0171
HOMOPTERA
0166 0167 0376 0499 0538 0542 0556
0560 0577
LEPIDOPTERA
0081 0304 0375 0380 0381 0499

INJURIOUS MITES
0377 0562

INSECT BIOLOGY
0163 0165 0166 0167 0172 0375 0376
0418 0419 0421 0422 0498 0553 0555
0557 0577

INSECTICIDES
0019 0056 0164 0218 0381 0556 0559

INTEGRATED CONTROL
DISEASES AND PATHOGENS
0108 0117 0135 0346 0531

INTERCROPPING
0089 0091 0321 0495 0498 0500

316

ZEA MAYS
0017 0070 0084 0092 0093 0094 0095
0096 0097 0184 0313 0314 0315 0316
0317 0318 0319 0320 0322 0323 0494
0496 0497 0499 0502 0596

IRON
0066 0253 0295 0548
LEAVES
0030 0254 0432
MINERAL DEFICIENCIES
0432 0448
ROOTS
0071 0073 0254 0294
STEMS
0254

IRRADIATION
0219 0236 0424 0438

IRRIGATION
0043 0068 0074 0075 0257 0283 0292
0293 0307 0435 0465 0466 0470 0476
0479 0485 0584

ISARIOPSIS GRISEOLA
0587
DISEASE CONTROL
0116 0120 0528
CHEMICAL CONTROL
0138 0354
EPIDEMIOLOGY
0106 0120
RESISTANCE
0017 0099 0342 0343 0564 0569 0574
0586
SYMPTOMATOLOGY
0116 0120 0528

ISOLATION
0101 0114 0116 0117 0119 0122 0123
0146 0151 0207 0332 0339 0341 0343
0351 0361 0362 0364 0368 0370 0508
0510 0515 0519 0522 0526 0537 0538
0542 0546

ISRAEL
0372

ITALY
0019 0063 0220 0364 0433 0507

JAPAN
0018 0590

KENYA
0092 0202 0323 0476 0496 0500 0587

LABOR
0636

LABORATORY ANIMALS
0190 0193 0195 0398 0402 0403

LABORATORY EXPERIMENTS
0015 0028 0039 0048 0063 0101 0114
0116 0117 0119 0122 0123 0124 0151
0161 0169 0207 0234 0263 0331 0332
0338 0339 0341 0343 0351 0361 0362
0364 0368 0370 0453 0508 0510 0515
0519 0522 0525 0526 0537 0538 0542
0546 0589 0597

LAGRIA VILLOSA
0304

LAND PREPARATION
0081 0175 0464 0517

LATIN AMERICA
0194 0622
DISEASES AND PATHOGENS
0343 0573 0575
GERMPLASM
0573 0575
MARKETING
0633
PRODUCTION
0212 0213 0468 0626

LEAF AREA
0075 0085 0158 0258 0291 0292 0371
0408 0438 0450 0484 0580

LEAVES
0001 0005 0007 0009 0011 0012 0020
0022 0023 0024 0026 0029 0034 0041
0043 0045 0048 0057 0064 0157 0235
0236 0237 0239 0240 0241 0242 0243
0244 0245 0246 0256 0257 0258 0259
0261 0269 0282 0292 0429 0439 0453
0458 0476 0480 0563
DISEASES AND PATHOGENS
0100 0103 0105 0110 0125 0134 0138
0143 0144 0356 0443
INJURIOUS INSECTS
0173
MINERALS AND NUTRIENTS
0030 0032 0033 0044 0105 0162 0249
0250 0254 0255 0287 0432 0445

LEBANON
0361

LECTINS
0035 0046 0239 0277 0383 0399 0458
0558 0598

LEGUME CROPS
0500

577

LEPIDOPTERA
0081 0304 0375 0499
INSECT CONTROL
0380 0381

LEPTINOTARSA DECEMLINEATA
0498

LESOTHO
0588

LIGHT
0009 0027 0041 0057 0064 0235 0243
0244 0445
GROWTH
0040
PHOTOPERIOD
0079

LODGING
0484 0490 0581

LOXAGROTIS ALBICOSTA
INSECT CONTROL
0380

LYGUS HESPERUS
0163

MACROPHOMINA PHASEOLI
0114 0353
DISEASE CONTROL
0119 0120
CHEMICAL CONTROL
0337
DISEASE TRANSMISSION
0337
EPIDEMIOLOGY
0119 0120
SYMPTOMATOLOGY
0119 0120

MAGNESIUM
0066 0072 0093 0254 0446 0481
PLANT ASSIMILATION
0073 0253 025[illegible] 0294 0295 0296 04[illegible]

MALAWI
0190 0232 0233 0588

MANGANESE
0071 0253 0254 0294 0295 0548

MANIHOT ESCULENTA
0084 0495 0502

MANURES
0474 0482

MAPS
0468

MARKETING
0212 0213 0215 0416 0586 0624 0626
0629 0630 0631 0633 0641

MARTINIQUE
0211

MATHEMATICAL MODEL
0159 0258 0284 0352 0374 0429 0450
0535 0552

MATURATION
0037 0168 0175 0330 0573 0578 0580
0599

MECHANICAL DAMAGE
0160

MECHANIZATION
0217

MEGALOTOMUS PARVUS
0304

MELOIDOGYNE ARENARIA
0550

MELOIDOGYNE HAPLA
0528 0550

MELOIDOGYNE INCOGNITA
0349 0369 0370 0371 0528 0548
NEMATODE CONTROL
CHEMICAL CONTROL
0549
RESISTANCE
0550

MELOIDOGYNE JAVANICA
NEMATODE CONTROL
CHEMICAL CONTROL
0372
RESISTANCE
0550

METABOLISM
0011 0048 0061 0161 0162 0229 0231

METHIONINE
0014 0270 0638

MEXICO
0003 0170 0260 0270 0281 0319 0322
0324 0349 0378 0384 0408 0409 0412
0426 0438 0482 0493 0501 0505 0552
0582 0589 0607 0613 0620 0630

MICROBIOLOGY
0059 0061 0400 0427

378

MICRONUTRIENTS
0030 0066 0071 0072 0073 0093 0195
0250 0251 0252 0253 0254 0255 0266
0278 0294 0295 0296 0297 0300 0432
0444 0446 0448 0461 0467 0481 0548

MINERAL CONTENT
0066 0071 0196 0248 0251 0252 0253
0266 0294 0295 0296 0298 0299 0371
0394 0408 0413 0441 0442 0444 0447
0548 0551 0617
LEAVES
0030 0250 0254 0255 0256 0445
SEED
0407 0461
STEMS
0249 0254 0278

MINERAL DEFICIENCIES
0288 0394 0432 0446 0448 0469 0481
0573 0584

MINERALS AND NUTRIENTS
0032 0033 0105 0162 0249 0250 0266
0278 0285 0297 0300 0551
BORON
0071 0294 0295 0467 0481
CALCIUM
0031 0066 0071 0073 0093 0195 0229
0248 0253 0254 0294 0295 0296 0446
0461 0481 0548
COPPER
0251 0253 0254 0294 0295 0444 0467
0548
IRON
0030 0066 0071 0073 0253 0254 0294
0295 0432 0448 0548
MAGNESIUM
0066 0072 0073 0093 0253 0254 0255
0294 0295 0296 0446 0461 0481
MANGANESE
0071 0253 0254 0294 0295 0548
MOLYBDENUM
0080 0467
NITROGEN
0031 0069 0073 0080 0193 0201 0203
0205 0211 0253 0287 0288 0289 0295
0296 0298 0371 0407 0408 0411 0413
0441 0442 0445 0446 0447 0466 0467
0471 0472 0477 0481 0494 0501 0614
0615
PHOSPHORUS
0017 0072 0077 0253 0254 0294 0298
0299 0308 0394 0469 0473 0478 0573
0584
POTASSIUM
0031 0044 0066 0073 0080 0093 0201
0248 0253 0286 0287 0288 0294 0295
0296 0299 0437 0467 0472 0481 0494
0548
ZINC
0030 0066 0071 0195 0252 0253 0254
0255 0294 0295 0467 0481 0548

MITOCHONDRIA
0014 0015

MOLYBDENUM
0080 0467

MORPHOGENESIS
0042

MOZAMBIQUE
0588

MULCHING
0128 0137 0139 0141 0494

MUTATION
0109

MYCORRHIZAE
0298 0299 0405 0478

MYCOSES
0017 0049 0081 0099 0102 0111 0112
0113 0115 0118 0121 0124 0126 0129
0130 0131 0133 0136 0137 0139 0142
0145 0177 0180 0182 0184 0185 0186
0317 0337 0340 0342 0344 0347 0348
0349 0353 0354 0355 0357 0358 0359
0360 0369 0384 0388 0390 0483 0486
0517 0518 0520 0521 0523 0524 0525
0527 0528 0529 0531 0532 0533 0534
0535 0536 0560 0564 0565 0569 0572
0574 0583 0585 0586 0587 0599 0603
0604 0605 0606 0624
EPIDEMIOLOGY
0106 0108 0116 0119 0120 0135 0140
0141 0346 0352 0516 0530
INOCULATION
0108 0127 0211 0345 0350 0522
ISOLATION
0114 0117 0119 0122 0123 0341 0343
0351 0370 0515 0519 0526
LEAVES
0125 0134 0138 0143 0144 0356 0443
PODS
0110
ROOTS
0443
SEED
0132 0171 0464 0573
TEMPERATURE
0109 0134 0143 0516 0573

NEMATODES
0157 0158 0349 0369 0370 0371 0528
0547 0548 0550

319

NEMATODE CONTROL
0156 0372 0549

NEMATOSPORA
0171

NETHERLANDS
0235 0243 0350 0454 0551 0611

NEW ZEALAND
0086 0107

NEZARA VIRIDULA
0171

NICARAGUA
0017 0130 0620 0623 0625

NITROGEN
0211 0371 0445 0614
FERTILIZERS
0069 0080 0201 0203 0205 0253 0287
0289 0295 0296 0298 0407 0408 0411
0413 0466 0467 0471 0472 0477 0481
0494 0501 0615
MINERAL DEFICIENCIES
0288 0446 0481
NUTRIENT UPTAKE
0031 0073 0253 0295 0296 0447
PLANT ASSIMILATION
0031 0073 0253 0295 0296 0447 0466
PROTEIN CONTENT
0069 0193 0407 0413 0441 0442

NITROGEN FIXATION
0161 0200 0203 0205 0289 0406 0408
0409 0410 0411 0412 0573 0612 0613
0614 0615 0616

NODULATION
0202 0204 0206 0207 0208 0209 0406
0409 0410 0412 0611 0612 0613 0616
0617
MINERALS AND NUTRIENTS
0201 0203 0205 0289 02[illegible]00 0407
0411 0478 0614 0615

NOXIOUS ANIMALS
0067 0081 0081 0094 0156 0158 0163
0164 0165 0166 0167 0168 0169 0170
0171 0172 0173 0185 0188 0212 0213
0304 0311 0349 0369 0370 0371 0372
0375 0376 0377 0378 0380 0381 0418
0419 0420 0421 0422 0427 0464 0483
0499 0528 0538 0541 0542 0547 0548
0549 0550 0552 0553 0554 0555 0556
0557 0558 0559 0560 0562 0577 0585
0590 0595 0604

NUCLEIC ACIDS
00[illegible]4 0015 0016 0026 0050 0061
0062 0124 0153 0174 0282 0347 0351
0383 0508 0566 0612

NUTRIENT SOLUTION
0031 0032 0044 0248 0249 0250 0252
0254 0255 0266 0278 0285 0300 0394
0441 0442 0445 0446

NUTRIENT TRANSPORT
0033 0248 0452

NUTRIENT UPTAKE
0030 0031 0032 0073 0251 0252 0253
0255 0256 0266 0294 0295 0296 0444
0447 0473 0478

NUTRITIONAL REQUIREMENTS
0017 0069 0070 0071 0077 0080 0081
0201 0203 0205 0207 0208 0253 0287
0289 0294 0295 0296 0298 0308 0320
0407 0408 0411 0413 0464 0466 0467
0471 0472 0473 0474 0477 0478 0481
0482 0494 0501 0517 0615 0635

NUTRITIVE VALUE
0047 0190 0193 0195 0198 0223 0224
0573 0638 0641

OCEANIA
0009 0038 0066 0076 0086 0107 0155
0242 0447 0452 0591 0631

OIDIUM BALSAMII
0528

ON-FARM RESEARCH
0573 0583 0586 0622 0623

OOTHECA BENNIGSENI
0585

OPHIOMYIA PHASEOLI
0164
RESISTANCE
0188 0585 0590 0604

ORGANOLEPTIC PROPERTIES
0017 0197 0224 0608 0640

OSTRINIA NUBILALIS
0561

OUTCROSSING
0232 0233

OVIPOSITION
0562

OZONE
0159 0260 0374

AIR POLLUTION
0373

PALATABILITY
0189

PANAMA
0081 0140 0141 0620

PARAGUAY
0625

PATHOGENICITY
0104 0107 0114 0119 0122 0123 0131
0151 0153 0339 0343 0364 0367 0508
0510 0515 0519 0522 0526 0537 0538
0542

PERU
0270 0583 0589 0621

PEST CONTROL
0081 0101 0105 0109 0115 0116 0117
0118 0119 0120 0121 0128 0133 0136
0138 0147 0149 0156 0165 0166 0218
0333 0337 0342 0346 0354 0356 0360
0369 0372 0377 0380 0381 0419 0464
0491 0512 0514 0517 0527 0528 0529
0531 0532 0536 0549 0555 0556 0559
0560 0605

PETIOLES
0029

PH
0093 0109 0185 0278 0281 0442 0469
0573
AGRICULTURAL LIME
0070 0207 0208 0474

PHASEOLLIN
0269 0270 0327 0443 0566 0598

PHASEOLUS ACUTIFOLIUS
0006 0008 0183 0187 0260 0264 0292
0500 0597

PHASEOLUS ANGUSTISSIMUS
0178

PHASEOLUS AUREUS
0024

PHASEOLUS COCCINEUS
0006 0008 0024 0181 0187 0339 0389
0565 0590 0591 0597 0603 0604

PHASEOLUS DUMOSUS
0260

PHASEOLUS LUNATUS
0006 0008 0187 0260 0591 0592 0597

PHASEOLUS POLYANTHUS
0565 0590 0604

PHENOL CONTENT
0434 0609

PHENOLOGY
0232 0529

PHILIPPINES
0337 0638

PHOMOPSIS
0120

PHOSPHORUS
0017 0072 0077 0080 0201 0254 0287
0289 0298 0298 0299 0308 0413 0467
0471 0472 0494 0501
MINERAL DEFICIENCIES
0288 0394 0446 0469 0481 0573 0584
NUTRIENT UPTAKE
0253 0294 0295 0473 0478
PLANT ASSIMILATION
0253 0294 0295 0461 0473 0478

PHOTOPERIOD
0079 0290 0573
GROWTH
0579

PHOTOSYNTHESIS
0020 0022 0027 0034 0041 0061 0064
0161 0235 0243 0244 0250 0255 0257
0259 0284 0371 0373 0438 0439 0445
0548

PHYLLOPHAGA
0081

PHYTOALEXINS
0049 0062 0124 0269 0270 0327 0341
0443 0459 0566 0598

PHYTOHEMAGGLUTININS
0046 0239 0383 0399 0458 0558

PHYTOPHTHORA
0120

PIEZODORUS GUILDINII
0094 0171

PLANT AGE
0450

PLANT ANATOMY
0001 0005 0006 0007 0008 0009 0010
0011 0012 0017 0018 0020 0022 0023
0024 0026 0029 0030 0032 0033 0034
0035 0038 0039 0041 0042 0043 0044
0045 0048 0056 0057 0060 0064 0066
0071 0073 0098 0100 0103 0105 0110
0125 0134 0138 0143 0144 0157 0162
0168 0171 0173 0178 0192 0199 0208
0217 0230 0231 0232 0234 0235 0236
0237 0239 0240 0241 0242 0243 0244
0245 0246 0249 0250 0251 0254 0255
0256 0257 0258 0259 0261 0263 0269
0278 0279 0282 0283 0284 0287 0291
0292 0294 0296 0298 0305 0308 0333
0340 0356 0371 0383 0385 0386 0394
0426 0429 0430 0431 0432 0434 0436
0437 0439 0443 0444 0445 0447 0451
0452 0453 0454 0455 0456 0458 0461
0462 0476 0480 0511 0551 0563 0589
0591 0597 0598 0607 0616

PLANT ARCHITECTURE
0175 0484 0573 0581 0602

PLANT ASSIMILATION
0019 0022 0030 0031 0032 0040 0043
0073 0083 0251 0252 0253 0255 0256
0266 0273 0281 0294 0295 0296 0438
0440 0444 0447 0454 0455 0461 0466
0473 0478 0607 0609

PLANT BREEDING
0090 0141 0176 0177 0182 0183 0188
0232 0233 0283 0394 0397 0427 0563
0565 0570 0574 0577 0578 0579 0589
0592 0598 0599 0604 0609 0624
CROSSBREEDING
0102 0180 0181 0270 0363 0382 0385
0386 0390 0391 0393 0396 0582 0583
0586 0590 0596 0597 0602 0603
HYBRIDIZING
0006 0178 0389 0572 0573 0590 0597
MUTATION
0109
SELECTION
0179 0181 0367 0575 0580 0581 0590
0595 0603 0614

PLANT DEVELOPMENT
0006 0020 0031 0032 0033 0037 0039
0040 0042 0043 0044 0075 0076 0087
0098 0168 0175 0242 0250 0257 0260
0266 0284 0287 0289 0292 0300 0318
0330 0371 0374 0394 0410 0411 0429
0438 0449 0455 0467 0470 0474 0478
0481 0535 0551 0573 0578 0579 0580
0599

PLANT FERTILITY
0397

PLANT HABIT
0005 0006 0007 0040 0097 0099 0102
0204 0228 0320 0329 0385 0389 0391
0450 0451 0469 0471 0491 0497 0568
0574 0580 0581 0583 0588 0591 0600
0605

PLANT INJURIES
0067 0116 0160 0165 0169 0172 0173
0278 0499 0514 0530 0555
HERBICIDES
0312

PLANT NUTRITION
0248 0250 0283 0442

PLANT PHYSIOLOGICAL DISORDERS
0162 0373 0446

PLANT PHYSIOLOGICAL PROCESSES
0158 0292 0450 0476 0551
ABSCISSION
0029 0451
NUTRIENT TRANSPORT
0033 0248 0452
PHOTOSYNTHESIS
0020 0022 0027 0034 0041 0061 0064
0161 0235 0243 0244 0250 0255 0257
0259 0284 0371 0373 0438 0439 0445
0548
PLANT ASSIMILATION
0019 0022 0030 0031 0032 0040 0043
0073 0083 0251 0252 0253 0255 0256
0266 0273 0281 0294 0295 0296 0438
0440 0444 0447 0454 0455 0461 0466
0473 0478 0607 0609
PLANT RESPIRATION
0143 0242 0616

PLANT PIGMENTS
0030 0058 0221 0240 0244 0266 0282
0371 0413 0432

PLANT RESPIRATION
0143 0242 0373 0616

PLANT TISSUES
0263

PLANTING
0076 0081 0082 0094 0301 0304 0318
0320 0451 0464 0493 0600
SPACING
0067 0078 0085 0086 0175 0221 0305
0308 0309 0311 0316 0317 0323 0482
0484 0496 0501 0517 0535

POD CHARACTERS
0221 0268 0305 0329 0391 0477 0489
0624

PODDING
0037 0042 0043 0076 0268 0356 0389
0476

PODS
0007 0098 0203 0245 0256 0305 0308
0426 0451
DISEASES AND PATHOGENS
0110
INJURIOUS INSECTS
0168

POLAND
0044

POLLEN
0234

POTASSIUM
0044 0066 0080 0093 0201 0248 0286
0287 0299 0437 0467 0472 0494 0548
MINERAL DEFICIENCIES
0288 0481
NUTRIENT UPTAKE
0031 0073 0253 0294 0295 0296
PLANT ASSIMILATION
0031 0073 0253 0294 0295 0296

PREDATORS AND PARASITES
0094 0126

PRICES
0159 0212 0213 0215 0415 0618 0624
0630

PROCESSED PRODUCTS
0047 0059 0189 0196 0197 0221 0222
0224 0225 0271 0273 0280 0281 0398
0423 0424 0425 0425 0639 0640 0640

PROCESSING
0059 0212 0213 0219 0220 0227 0423
0425 0638 0639 0643

PRODUCTION
0081 0212 0213 0215 0414 0468 0626
0628 0629 0630 0631

PROLINE
0480

PROPAGATION
0263

PROTEIN CONTENT
0002 0014 0025 0066 0069 0193 0196
0198 0206 0224 0242 0272 0279 0280
0282 0309 0327 0413 0441 0442 0457
0598 0638
PODS
0305 0308
SEED
0270 0407 0461 0639

PROTEINS
0016 0239 0246 0276 0404 0433 0459
0558 0567
AMINO ACIDS
0193 0272 0457
ANALYSIS
0046 0052 0058 0060 0240 0272 0274
0275 0279 0457 0458 0460 0521 0566
0613
DIGESTIBILITY
0192 0193 0198 0199 0609

PSEUDOMONAS PHASEOLICOLA
DISEASE TRANSMISSION
0513

PSEUDOMONAS PUTIDA
0431

PSEUDOMONAS SYRINGAE PV. PHASEOLICOLA
0104 0107 0336 0337 0507 0508 0512
0528 0575

PSEUDOMONAS SYRINGAE PV. SYRINGAE
0100 0105 0334 0335 0508 0509 0513
0583

PUERTO RICO
0133 0339

PYTHIUM
0017 0119 0120

RACES
0104 0107 0129 0142 0150 0154 0332
0334 0338 0366 0508 0522 0542

RADIATION
0020 0040 0043 0056 0265 0277

RAINFALL
0110 0159 0297 0314 0323 0340 0500
0516 0524

RAMULARIA PHASEOLI
0106 0120

RED CLOVER NECROTIC MOSAIC VIRUS
0366

RELATIVE HUMIDITY
0134 0234 0480

RELAY CROPS
0097 0313 0317 0324 0501

384

RESEARCH
0015 0028 0039 0048 0063 0101 0114
0116 0117 0119 0122 0123 0124 0126
0151 0152 0161 0169 0176 0207 0210
0211 0234 0263 0320 0331 0332 0338
0339 0341 0343 0351 0361 0362 0364
0368 0370 0453 0508 0510 0515 0519
0522 0525 0526 0537 0538 0542 0546
0589 0597 0621 0625 0637

REUNION
0200 0211

RHIZOBIUM
0203 0204 0206 0298 0300 0310 0406
0410 0411 0442 0478 0610 0611 0612
INOCULATION
0200 0201 0205 0208 0211 0299 0407
0408 0413
ISOLATION
0207
STRAINS
0200 0202 0205 0207 0208 0209 0614

RHIZOBIUM PHASEOLI
0442 0610
INOCULATION
0200 0201 0205 0299 0407 0408 0413
NODULATION
0201 0204 0206 0298 0406 0407 0410
0478 0611 0612 0614
STRAINS
0200 0202 0205 0209 0614

RHIZOCTONIA SOLANI
0126 0132 0353 0443 0486 0515 0526
0535 0587
DISEASE CONTROL
0081 0115 0119 0120 0528
CHEMICAL CONTROL
0346 0350 0517 0531
INTEGRATED CONTROL
0117 0346 0531
EPIDEMIOLOGY
0106 0108 0119 0120 0135 0140 0141
0346 0530
ETIOLOGY
0135 0517
INOCULATION
0108 0211 0370
RESISTANCE
0017 0130 0137 0139 0141 0177 0182
0184 0186 0359 0574
SYMPTOMATOLOGY
0117 0119 0120 0346 0528

RHIZOSPHERE
0109

RNA
0014 0015 0016 0026 0050 0061 0062
0124 0174 0282 0347 0351 0383 0566

ROOTING
0261 0262 0284 0307 0453 0475 0479

ROOTS
0007 0032 0033 0039 0071 0073 0242
0249 0251 0254 0278 0291 0294 0296
0371 0431 0436 0443 0444 0447 0616

ROTATIONAL CROPS
0464 0500
ZEA MAYS
0319 0324

RWANDA
0210 0300 0586

SACCHARUM OFFICINARUM
0321

SALINITY
GROWTH
0032
PLANT DEVELOPMENT
0032

SCLEROTIUM ROLFSII
0353
DISEASE CONTROL
0119 0120 0528
EPIDEMIOLOGY
0119 0120
INOCULATION
0211
SYMPTOMATOLOGY
0119 0120 0528 0532

SCOTLAND
0012

SEED
0007 0010 0080 0220 0226 0226 0230
0325 0386 0423 0426 0434 0440 0503
0589 0591 0609 0635
AMINO ACIDS
0270
DISEASES AND PATHOGENS
0283 0331 0464 0507 0573 0582
GENETICS
0567
GERMINATION
0098 0132 0171 0218 0265 0267 0458
0462
INJURIOUS INSECTS
0171
PROTEIN CONTENT
0270 0407 0461 0639

RADIATION
0265
STORAGE
0216 0217 0218 0219 0267 0417 0461
YIELDS
0132 0221 0265 0310 0407 0507 0568
0573 0584 0639

SEED CHARACTERS
0080 0132 0171 0217 0218 0220 0221
0267 0270 0325 0386 0423 0426 0507
0568 0573 0582 0584 0589 0591 0609
0631

SEED COAT
0430 0434 0437 0454 0462 0591
INHERITANCE
0386

SEED COLOR
0220 0221 0386 0568 0573 0582 0584
0591 0609

SEED HARDENING
0010 0219 0226 0434 0461 0462

SEED PRODUCTION
0298 0503 0504

SEED TREATMENT
0216 0218 0310

SEED VIGOR
0098 0132 0218 0265

SEEDLING
0025 0035 0049 0096 0114 0129 0147
0208 0351 0355 0359 0443

SEEDS
0010 0011 0018 0035 0038 0042 0060
0066 0098 0171 0178 0192 0199 0217
0230 0237 0239 0279 0333 0340 0356
0383 0386 0426 0430 0434 0437 0454
0455 0456 0461 0462 0511 0589 0591
0597 0598 0607

SELECTION
0099 0175 0184 0186 0328 0480 0497
0506 0571 0584 0593 0594
PLANT BREEDING
0179 0181 0387 0575 0580 0581 0590
0595 0603 0614

SELFING
0563

SEROLOGY
0150 0537

SHADING
0027 0040 0385

SHOOTS
0033 0039 0056 0071 0073 0231 0251
0263 0284 0294 0298 0371 0394 0444
0447 0551

SILICON
0131

SNAP BEANS
0023 0045 0046 0049 0053 0055 0058
0060 0076 0078 0086 0105 0115 0123
0129 0131 0144 0147 0148 0158 0160
0161 0164 0176 0180 0206 0211 0212
0213 0221 0223 0225 0226 0227 0236
0250 0251 0262 0268 0278 0308 0309
0312 0325 0328 0329 0335 0344 0345
0350 0357 0360 0369 0371 0374 0382
0391 0396 0413 0416 0417 0434 0444
0456 0462 0472 0474 0477 0483 0485
0489 0490 0494 0515 0518 0522 0529
0547 0549 0556 0561 0570 0571 0573
0600 0606 0617 0624 0642 0643

SOCIOECONOMIC ASPECTS
0194 0468 0485 0618 0619 0636

SODIUM
0022 0033 0066 0286 0461

SOIL AMENDMENTS
0093

SOIL COMPACTION
0039 0071 0072 0073 0284 0291 0294
0295 0296

SOIL CONSERVATION
0301

SOIL FERTILITY
0072 0078 0288 0468 0469 0481

SOIL MOISTURE
0072 0301 0465 0466 0470 0475 0479
0482 0578

SOIL REQUIREMENTS
0072 0078 0093 0288 0301 0468 0469
0481

SOIL TEMPERATURE
0411

SOILS
0071 0072 0073 0253 0256 0291 0299
0307 0468 0469 0478 0573

38

SOLANUM TUBEROSUM
0498

SOLAR RADIATION
0020 0040

SOLUBLE CARBOHYDRATES
0142 0280 0350 0437 0455

SOMALIA
0587

SOUTH AFRICA
0029 0237 0314

SOYBEAN MOSAIC VIRUS
RESISTANCE
0363

SO2
0103 0161 0373 0551

SPACING
0175 0305 0311 0323 0498 0524
YIELDS
0067 0078 0085 0086 0087 0088 0221
0308 0309 0315 0316 0317 0322 0482
0434 0490 0496 0501 0517 0535

SPAIN
0021 0030 0035 0249 0254 0266 0285

SPODOPTERA FRUGIPERDA
0304 0375

STAMENS
0234

STARCH CONTENT
0051 0066 0189 0280 0282
PODS
0098
SEED
0098

STATISTICAL ANALYSIS
0210 0324 0481 0502 0535 0568

STATISTICAL DATA
0194 0215 0468 0626 0630 0631

STEMS
0005 0007 0385 0452
GROWTH
0032 0242 0250
MINERALS AND NUTRIENTS
0032 0249 0250 0254 0278
NUTRIENT UPTAKE
0032 0256
TRANSLOCATION
0250

STERILITY
0397

STOMATA
0009 0022 0043 0045 0125 0134 0143
0257 0292 0439 0476

STORAGE
0216 0218 0267 0329 0417 0461 0488
0504 0607
INJURIOUS INSECTS
0555
TEMPERATURE
0217 0219 0425

STORED GRAIN PESTS
0219 0419 0420 0464 0555

SUCROSE
0280 0437 0455

SUGAR CONTENT
0066 0280 0461

SULPHUR
0069 0287 0288 0467 0481 0551

SURVEY
0579

SWAZILAND
0588

SWEDEN
0050

SYMBIOSIS
0289 0299
NODULATION
0202 0204 0206 0207 0208 0209 0406
0409 0410 0412 0611 0612 0613 0616
0617
MINERALS AND NUTRIENTS
0201 0203 0205 0289 0298 0300 0407
0411 0478 0614 0615
PHOSPHORUS
0201 0289 0298 0296 0478

TAIWAN
0048

TANNIN CONTENT
0609

TANZANIA
0169 0224

TECHNOLOGICAL PACKAGE
0632 0634

386

TECHNOLOGY
0176 0210 0222 0496 0585 0618 0619
0620 0621 0622 0623 0625 0632 0634

TECHNOLOGY EVALUATION
0496 0585 0620 0621 0622 0625

TEMPERATURE
0023 0024 0047 0065 0100 0109 0134
0199 0217 0219 0224 0225 0226 0234
0239 0264 0273 0281 0425 0480 0516
0615 0640
CARBON DIOXIDE
0009 0143
GROWTH
0043 0076 0411 0438 0579
PHOTOSYNTHESIS
0438 0439
PLANT RESPIRATION
0143
YIELDS
0159 0208 0265 0290 0573

TETRANYCHUS NEOCALEDONICUS
0377

TETRANYCHUS URTICAE
0377 0562

THIAMIN
0028

THIELAVIOPSIS BASICOLA
DISEASE CONTROL
0119 0120
EPIDEMIOLOGY
0119 0120
SYMPTOMATOLOGY
0119 0120

THRESHING
0325 0504

TILLAGE
0084 0301 0307 0490 0531

TIMING
0042 0047 0048 0065 0078 0081 0094
0207 0224 0225 0267 0318 0325 0401
0451 0478 0489 0493 0517 0600 0607
0609

TISSUE CULTURE
0013 0453 0597

TOBACCO NECROSIS VIRUS
0148 0544

TOXICITY
0192
HERBICIDES
0306 0487
MINERALS AND NUTRIENTS
0250 0254 0266 0285 0286 0300 0444

TRADE
0215 0416 0626 0629 0630 0631 0633

TRANSFER OF TECHNOLOGY
0496 0585 0618 0620 0621 0622 0623
0625 0632

TRANSLOCATION
0019 0033 0063 0083 0250 0251 0444
0454

TRANSPIRATION
0043 0158 0257 0284 0292 0438 0476
0551

TRIALEURODES VAPORARIORUM
0167

TRICHODERMA HAMATUM
0115

TRICHODERMA HARZIANUM
0109 0115

TRICHOPLUSIA
0081

TRINIDAD AND TOBAGO
0530

TRYPSIN
0004 0047 0050 0272 0276

TRYPTOPHANE
0272 0638

TUNISIA
0032 0033

TURKEY
0223 0436

UGANDA
0587

UNITED KINGDOM
0001 0002 0004 0026 0046 0053 0079
0113 0124 0125 0160 0268 0347 0348
0406 0414 0420 0422 0449 0457 0459
0518 0533 0534 0554 0567 0610 0612
0616 0617

UROMYCES PHASEOLI
0145 0317 0349 0521 0525 0587
DISEASE CONTROL
0120 0464 0528

381

CHEMICAL CONTROL
0121 0133 0136 0369 0527 0529 0536
EPIDEMIOLOGY
0120 0352
INOCULATION
0127 0345
RESISTANCE
0017 0102 0111 0112 0127 0134 0143
0358 0384 0564 0569 0572
SYMPTOMATOLOGY
0120 0127 0464 0528

UROMYCES VICIAE-FABAE
0125

UROMYCES VIGNAE
0131

USA
0020 0027 0031 0042 0045 0048 0049
0055 0056 0059 0062 0064 0065 0067
0075 0083 0100 0102 0103 0104 0105
0109 0115 0123 0129 0136 0142 0150
0158 0161 0162 0163 0172 0173 0174
0181 0189 0191 0196 0197 0204 0209
0221 0225 0226 0227 0234 0238 0239
0246 0247 0251 0257 0259 0263 0264
0265 0269 0273 0277 0278 0282 0284
0286 0289 0290 0292 0307 0311 0312
0325 0326 0327 0328 0329 0331 0335
0341 0342 0351 0352 0355 0358 0359
0360 0362 0363 0369 0373 0374 0375
0380 0383 0385 0386 0387 0394 0399
0400 0402 0403 0410 0411 0416 0423
0424 0425 0429 0431 0434 0439 0444
0445 0448 0453 0458 0462 0463 0464
0471 0472 0474 0477 0486 0489 0490
0492 0494 0498 0499 0508 0509 0513
0514 0515 0516 0520 0522 0525 0526
0527 0529 0535 0537 0541 0544 0550
0553 0556 0557 0558 0559 0560 0561
0562 0563 0566 0568 0570 0571 0579
0595 0598 0600 0601 0605 0606 0608
0615 0627 0628 0629 0630 0635 0639
0640 0641 0642 0643

USES
0197 0283 0395 0424 0641 0642

USSR
0057 0058

VARIETAL MIXTURES
0233

VECTORS
0538 0541 0542

VENEZUELA
0192 0248 0270 0333 0338 0511 0572

VIGNA UNGUICULATA
0500

VIROSES
0017 0106 0147 0148 0149 0150 0151
0152 0153 0154 0155 0167 0175 0180
0185 0337 0361 0362 0363 0365 0367
0368 0388 0395 0464 0507 0528 0538
0539 0540 0541 0542 0543 0544 0545
0546 0564 0573 0576 0582 0594 0600
0604 0624

VIRUS INHIBITION
0147

VITAMIN CONTENT
0028 0066 0305

WATER ABSORPTION
0043 0273 0281 0438 0440 0461 0466
0607 0609

WATER CONTENT
0001 0044 0066 0216 0217 0265 0280
0325 0401 0434 0456 0462 0480 0639

WATER REQUIREMENTS
0068 0293 0476

WATER STRESS
0001 0034 0040 0075 0080 0100 0201
0249 0285 0292 0307 0465 0466 0476
0480 0578

WATERMELON MOSAIC VIRUS 2
0363 0537

WEEDING
0081 0084 0088 0303 0306 0312 0319
0486 0487 0490 0492

WEEDS
0084 0427 0498
HERBICIDES
0492

WHETZELINIA SCLEROTIORUM
0524 0533 0534
DISEASE CONTROL
0120 0464 0528
CHEMICAL CONTROL
0560
EPIDEMIOLOGY
0120 0516
RESISTANCE
0181 0516 0605
SYMPTOMATOLOGY
0120 0464 0528 0560

WILD BEANS
0006 0018 0270

388

XANTHOMONAS CAMPESTRIS PV. GLYCINES
SYMPTOMATOLOGY
0339

XANTHOMONAS CAMPESTRIS PV. PHASEOLI
0017 0102 0103 0106 0127 0180 0331
0332 0333 0338 0339 0389 0464 0511
0514 0528 0564 0572 0575 0582 0587
0601
DISEASE TRANSMISSION
0513

XANTHOMONAS PHASEOLI VAR. FUSCANS
0332
DISEASE TRANSMISSION
0513

YIELD COMPONENTS
0017 0036 0067 0075 0078 0080 0092
0099 0154 0287 0292 0293 0309 0313
0315 0318 0330 0349 0365 0382 0393
0418 0435 0465 0466 0470 0473 0475
0479 0487 0489 0507 0531 0596 0600

YIELDS
0017 0039 0067 0068 0069 0070 0074
0075 0077 0078 0085 0086 0087 0088
0089 0092 0095 0097 0099 0126 0132
0138 0158 0159 0169 0180 0182 0184
0186 0201 0202 0205 0208 0211 0212
0213 0214 0215 0221 0228 0253 0254
0260 0265 0284 0287 0289 0290 0291
0293 0297 0299 0304 0306 0307 0308
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0495 0496 0497 0500 0501 0502 0505
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0545 0549 0551 0552 0556 0564 0568
0572 0573 0580 0581 0584 0588 0592
0593 0596 0598 0599 0605 0614 0626
0631 0639

ZABROTES SUBFASCIATUS
0421 0422
INSECT CONTROL
CHEMICAL CONTROL
0419
RESISTANCE
0554 0558 0577 0595

ZAIRE
0300 0320 0586

ZAMBIA
0188 0588

ZEA MAYS
0324
INTERCROPPING
0017 0070 0084 0092 0093 0094 0095
0096 0097 0184 0313 0314 0315 0316
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0496 0497 0499 0502 0596

ZIMBABWE
0588

ZINC
0030 0066 0071 0195 0252 0253 0254
0255 0294 0295 0467 0481 0548

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