PN-AAQ-615

Abstracts on Field Beans
[*Phaseolus vulgaris* L.]

Centro Internacional de Agricultura Tropical

ABSTRACTS ON FIELD BEANS

Publication of CIAT's Bean Information Center.

Documentalist:
Francy González V.

Periodicity: *3 issues per year.*

Annual subscription rates:

US$16.00 for Latin America, the Caribbean, Africa, and Southeast Asia.

US$25.00 for other countries.

Colombia: $1.000.00.

Printed at CIAT.

Correspondence and subscriptions should be sent to:

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936[illegible]/57

Abstracts on Field Beans

(*Phaseolus vulgaris* L.)

Vol. IX | No. 2 | August, 1984

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INTRODUCTION

This journal of analytical abstracts, which replaces the former combination of abstract cards and yearly cumulative volumes, 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 report condensed information from journal articles, booklets, mimeographed reports, theses, manuals and other conventional and nonconventional material, categorized into broad disciplinary fields to facilitate rapid scanning. Additionally, abstracts are author and subject indexed to enable more comprehensive consultation.

When retrospective or exhaustive coverage of a topic is desired, mechanized bibliographic searches of the entire document collection can be provided by CIAT's Documentation Center. Abstracts of all articles that match the topic of interest are provided to users who request this search service. The full text of every article abstracted by the Documentation Center is also available, through the photocopy service.

CIAT's Documentation Center also publishes journals of analytical abstracts on cassava (*Manihot esculenta* Crantz) grown under tropical conditions, and on tropical pastures. Other CIAT publications dedicated to keeping users aware of research developments in their respective fields include: Pages of Contents, Cassava Newsletter, Pastos Tropicales - Boletín Informativo, and Hojas de Fríjol.

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. (Author's summary) F01

Abstract

Abstractor and/or translator

Subject categories

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.

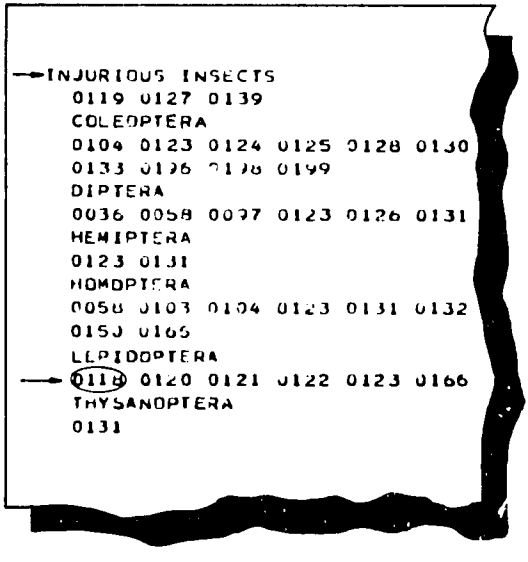
The last issue of the year contains cumulative author and subject indexes for the year.

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.

Subject Index

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

A00 BOTANY, TAXONOMY AND GEOGRAPHICAL DISTRIBUTION

0201

20068 MATEO B., J.M. 1961. Judía común Phaseolus vulgaris L. (Common bean). In _____. Leguminosas de grano. Barcelona, España, Salvat. pp.355-409. Span., Illus.

Phaseolus vulgaris. Plant geography. Plant anatomy. Taxonomy. Pods. Plant habit. Cultivars. Seed color. Land preparation. Planting. Spacing. Irrigation. Weeding. Harvesting. Spain.

Different aspects of the bean crop in relation to geographical origin, botany and plant morphology, taxonomic classification into subspecies and var., and important characteristics to identify and classify var. and commercial types in Spain, are described. The different forms of bean consumption, crop requirements, tasks required before planting, fertilization, planting density, irrigation, crop management, and harvesting are also discussed. The most important plant characteristics to improve yields are internode length; leaves; foliole size; inflorescence; flower color; seed shape, profile, color, size, section, and no./ped. Tables are included that describe the most important characteristics of 247 var. (Summary by EDITEC) A00

0202

19766 RHEENEN, H.A. VAN 1983. Beans and research on beans. Kenya's past, present and future. Kenya Farmer 1983(August. Special issue: Food beans in Kenya):17-18. Engl., Illus. [Grain Legume Project, National Horticultural Research Station, P.O. Box 220, Thika, Kenya]

Phaseolus vulgaris. History. Canned beans. Kenya.

The past, present, and future importance of beans in Kenya since its 1st appearance in Africa about 350 yr ago is described as well as its use as a canned product and the current emphasis on beans for local consumption. Beans enrich traditional dishes like ugali and githeri and supply a cheap source of protein, especially lysine. The role of the Grain Legume Project, with headquarters at the National Horticultural Research Station in Thika, is highlighted. Advances made by the project's staff toward solving diverse questions and problems related to beans are mentioned. Future plans include improved agronomic practices, the release of more var. resistant to diseases and drought, and the strengthening of links between extension and research. (Summary by EDITEC. Trans. by L.M.F.) A00

0203

19851 WESTPHAL, E. 1974. Phaseolus vulgaris L. In _____. Pulses in Ethiopia, their taxonomy and agricultural significance. Wageningen, The Netherlands, Centre for Agricultural Publishing and Documentation. Agricultural Research Projects 815. pp.159-176,235-240. Engl., 205 Refs., Illus.

Phaseolus vulgaris. Plant anatomy. Plant geography. Ecology. Taxonomy. Uses. Cultivars. Seed color. Ethiopia.

The synonymy, geographic distribution with particular reference to Ethiopia, and morphological description of Phaseolus vulgaris as to stems, stipulae, leaves, leaflets, stipellae, inflorescence, calyx, corolla, androecium, disk, gynoecium, pod, seeds, and seedlings are given. A bibliographic review on bean taxonomy, ecology, and cropping systems is

included and the different uses given to this crop are described. A differentiation of cv. based on 33 seed types (color and shape) is included as well as results of a study carried on at Wageningen on plant growth habits with 218 bean seed samples. (Summary by EDITEC. Trans. by L.M.F.) A00

B00 PLANT ANATOMY, MORPHOLOGY AND CYTOLOGY

See 0203

C00 PLANT PHYSIOLOGY

0204

20626 BORTOLI, S.A. DE; NAKANO, O.; PERECIN, D. 1982. Efeitos de desfolhas e dobras artificiais de folíolos sobre a produtividade do feijoeiro (Phaseolus vulgaris L.) em cultivo das águas. (Effect of artificial defoliation and leaflet folding in bean crops planted during the rainy season). Científica 10(1):105-111. Port., Sum. Port., Engl., 9 Refs. [Depto. de Defesa Fitossanitária, Facultade de Ciencias Agrárias e Veterinárias, Univ. Estadual de Sao Paulo, 14.870 Jaboticabal-SP, Brasil]

Phaseolus vulgaris. Defoliation. Plant physiological processes. Developmental stages. Yields. Yield components. Leaves. Brazil.

Research was carried out at the U. Estadual de Sao Paulo at Jaboticabal, Brazil, to evaluate the effect of artificial defoliation and leaflet folding on bean crops planted during the rainy season. Three levels of artificial defoliation and leaflet folding were used at stages A, F, and M (20, 35, and 60 days after plant emergence, resp.): 33%, removal and fold of 1 leaflet/leaf; 67%, removal and fold of 2 leaflets/leaf; and 100%, removal and fold of all the leaflets. All levels of defoliation and leaflet folding were found to affect final yield. Highest sensitivity to foliar defoliation and leaflet folding was observed at stage F (flowering time). In plants submitted to defoliation and leaflet folding yields were lower, mainly due to the reduction in the no. of pods/plant and the no. of grains/pod. (Author's summary) C00

0205

20666 CHRISPEELS, M.J. 1983. Incorporation of fucose into the carbohydrate moiety of phytohemagglutinin in developing Phaseolus vulgaris cotyledons. Planta 157(5):454-461. Engl., Sum. Engl., 37 Refs., Illus. [Dept. of Biology, C-016, Univ. of California/San Diego, La Jolla, CA 92093, USA]

Phaseolus vulgaris. Cotyledons. Phytohaemagglutinins. Proteins. Analysis. Enzymes.

Incubation of developing Phaseolus vulgaris cotyledons with ^{3}H-fucose resulted in the incorporation of radioactivity into the cell wall, membranous organelles, and soluble macromolecules. Fractionation of the proteins showed that phytohemagglutinin (PHA) was the major fucosylated protein synthesized in the cotyledons. Incorporation of fucose into PHA

occurred in the membranous organelle fraction and the radioactive fucose remained associated with the PHA during a 20-h chase of the radioactivity. Tunicamycin inhibited incorporation of glucosamine and fucose into PHA to the same extent (65%), indicating the involvement of a lipid intermediate in the incorporation of fucose, or the attachment of fucose to the high-mannose oligosaccharide moiety of newly synthesized PHA. Digestion with proteinase K of ^{3}H-fucose- or ^{3}H-glucosamine-labelled PHA resulted in the formation of glycopeptides of similar size. These glycopeptides were partially resistant to digestion with endo-beta-N-acetylglucosaminidase H, even after the removal of fucose by mild acid hydrolysis. It is suggested that the transport of PHA from the endoplasmic reticulum to the protein bodies is accompanied by the modification of its oligosaccharide side-chain. This modification involves the attachment of fucose and renders the oligosaccharide side-chain resistant to digestion with endo-beta-N-acetylglucosaminidase H. Analogy with animal glycoproteins indicates that this modification probably occurs in the Golgi apparatus. (Author's summary) COO

0206

19888 EZE, J.M.O.; DUMBROFF, E.B.; THOMPSON, J.E. 1983. Effects of temperature and moisture stress on the accumulation of abscisic acid in bean. Physiologia Plantarum 58(2):179-183. Engl., Sum. Engl., 21 Refs., Illus. [Dept. of Biology, Univ. of Waterloo, Waterloo, Ontario N2L 3G1, Canada]

Phaseolus vulgaris. Leaves. Temperature. Water content. Water stress. Plant physiological processes.

Levels of ABA and several indicators of leaf-water status were measured in excised and intact primary leaves of bean cv. Kinghorn exposed to different temp. and moisture regimes. After 2 h at 5, 25, or 45°C under moist conditions, the water status of detached leaves showed only minor changes, and there was no increase in ABA. Under conditions favoring water loss, ABA rose over 10-fold at 25°C, and trends towards higher ABA levels were observed at 5° and 45°C. When intact leaves on whole plants were exposed to the same temp. for 10 h, there was still no evidence of a temp.-dependent rise in ABA that was not associated with a disturbance in the water balance of the plant. These data suggest that the rapid accumulation of ABA during temp. stress is a function of induced moisture deficits and does not result from high or low temp. per se. (Author's summary) COO

0207

20671 FUHRER, J. 1982. Ethylene biosynthesis and cadmium toxicity in leaf tissue of beans (Phaseolus vulgaris L.). Plant Physiology 70(1):162-167. Engl., Sum. Engl., 36 Refs., Illus. [School of Forestry & Environmental Studies, Yale Univ., New Haven, CT 06511, USA]

Phaseolus vulgaris. Ethylene production. Leaves. Cd. Toxicity. Enzymes.

Levels in excess of 1 micromolar Cd stimulated stress ethylene production by Phaseolus vulgaris leaf tissue. This Cd-induced ethylene synthesis was dependent on the synthesis of 1-aminocyclopropane-1-carboxylic acid (ACC) by ACC synthase. Max. ACC synthase activity and ethylene production rate occurred after 8 h and thereafter declined, probably as a result of enzyme inactivation by Cd, which inhibited ACC synthase activity in vitro at levels as low as 0.1 micromolar. Decrease in ethylene production rate was accompanied by leakage of solutes, but both of these effects were reduced by the presence of Ca. The mechanism by which Cd exerts its toxic effect is discussed. (Summary by Field Crop Abstracts) COO

0208

19900 LICHTNER, F.T. 1983. Amitrole absorption by bean (Phaseolus vulgaris L. cv 'Red Kidney') roots: mechanism of absorption. Plant Physiology (Bethesda) 71(2):307-312. Engl., Sum. Engl., 19 Refs., Illus. [E.I. du Pont de Nemours & Co., Biochemicals Dept., Experimental Station, Wilmington, DE 19898, USA]

Phaseolus vulgaris. Herbicides. Plant assimilation.

The mechanism of transport of the herbicide amitrole into Phaseolus vulgaris roots appears to be passive, as judged by the effect of temp. (Q_{10} = 1.3 between 15-25°C) and the lack of sensitivity to metabolic inhibition afforded by 2,4-dinitrophenol and NaN_3. Amitrole absorption is a linear function of external concn. over several orders of magnitude and, thus, is not facilitated by a carrier mechanism. The absorption of amitrole is sensitive to external pH, being stimulated under acid conditions. This stimulation of amitrole absorption is seen at low (less than or equal to 1 mM) amitrole concn., but not at high (50 mM) amitrole levels. While the apparent octanol-water partition coefficient varies with the pH of the aqueous phase, there is no clear correspondence between absorption and the apparent partition coefficient. Roots do not accumulate amitrole above concn. equilibrium; however, at a time when the net amitrole content of the root tissue begins to saturate, amitrole can be detected in the xylem stream. On a fresh wt. basis, amitrole absorption by roots is equal to that accomplished by trifoliate leaf tissue. An estimate of the permeability coefficient suggests that amitrole possesses near-optimal permeability for an ambimobile solute, on the order of 2.12 ($\pm$ 0.47) x 10^{-9} m/s. (Author's summary) COO

0209

20661 POWLES, S.B.; BERRY, J.A.; BJORKMAN, O. 1983. Interaction between light and chilling temperature on the inhibition of photosynthesis in chilling-sensitive plants. Plant, Cell and Environment 6(2):117-123. Engl., Sum. Engl., 22 Refs., Illus. [Dept. of Plant Biology, Carnegie Institution of Washington, 290 Panama St., Stanford, CA 94305, USA]

Phaseolus vulgaris. Leaves. Photosynthesis. Temperature. Irradiation. Light. USA.

Fully expanded leaves of Phaseolus vulgaris cv. Hawkesbury Wonder and 6 other species, grown at 25°C, were exposed for 3 h to chilling temp. (6°C) at photon flux densities equivalent to full sunlight. In P. vulgaris this treatment resulted in substantial inhibition of the subsequent quantum yield of CO_2 uptake, indicating reduction of the photochemical efficiency of photosynthesis. The extent of inhibition depended on the photon flux density during chilling and no inhibition occurred when chilling occurred at a low photon flux density. No inhibition occurred at more than 11.5°C, even in the presence of the equivalent of full sunlight. This interaction between chilling and light to cause inhibition of photosynthesis was promoted by the presence of O_2 at normal air partial pressure and was unaffected by the CO_2 partial pressure present when chilling occurred in air. When chilling occurred at low O_2 partial pressures, CO_2 was effective in reducing the degree of inhibition. (Author's summary) COO

0210

18790 SACHER, J.A.; DE LEO, P. 1977. Wound-induced RNase in senescing bean pod tissue: post-transcriptional regulation of RNase. Plant and Cell Physiology 18(1):161-171. Engl., Sum. Engl., 22 Refs., Illus.

Phaseolus vulgaris. Pods. Maturation. Timing. RNA. Proteins. Enzymes. USA.

In endocarp of Phaseolus vulgaris var. Kentucky Wonder, cutting induced an increase of RNase activity dependent on RNA and protein synthesis which lasted 6 h, followed by a decrease in activity. RNase degradation in the presence of cycloheximide showed a half-time of 3 h. Addition of actinomycin-D between 0.5-2 h after cutting increased RNase synthesis for more than 24 h, indicating that RNase messenger RNA is long-lived; this increase depended on protein synthesis and was not due to inhibition of degradation. From these results it was concluded that control of RNase synthesis is at translation. It was suggested that cutting induced transcription of messenger RNA both for RNase and for a repressor preventing translation of RNase messenger RNA. (Extracted from author's summary) COO

0211

19845 WATERS JUNIOR, L. 1979. Carbohydrate and photosynthate distribution and nitrogen fixation in beans (Phaseolus vulgaris L.). Ph.D. Thesis. Corvallis, Oregon State University. 112p. Engl., Sum. Engl., 126 Refs., Illus.

Phaseolus vulgaris. Soil temperature. Spacing. Nodulation. Nitrogen fixation. Carbohydrate content. Plant development. Nutrient transport. Colombia.

Four studies were conducted at CIAT to examine the effect of soil temp., plant population, and competition for light on nodulation, N fixation, and carbohydrate distribution in beans. The data collected provides information for developing cultural practices which maximize unit area production. Mulching bean plants (cv. P498) of determinate growth habit with rice hulls reduced soil temp., improved soil MC, reduced soil temp. fluctuations, and increased N fixation compared with unmulched plants. Roots and leaves of mulched plants contained 37 and 42%, resp., higher quantities of total carbohydrates. At a hot, low alt., low precipitation site (Palmira) and a cool, high alt., high precipitation site (Popayan) in Colombia (a) a determinate, P590 and (b) an indeterminate cv., P498 were grown at different plant populations. Plant development characteristics were similar at both sites. With increase in plant population, plant wt. and shoot:root ratios were lower. Root wt. were higher and shoot:root ratios lower in (b) than in (a). N fixation and soluble and insoluble carbohydrate concn. were higher at the cooler site. The distribution of photosynthate to the roots and nodules by leaves at nodes 4 and 8 of (a) were determined 35, 48, 63, and 70 days after sowing. Roots retained 45% of the ^{14}C-photosynthate translocated from node 4 but accumulated none from node 8. From day 35 to 48, ^{14}C-accumulation in the lower stem decreased 16% with an equal increase in the nodules. ^{14}C-photosynthate from node 8 went to mid and upper stems and leaves (day 48). N fixation peaked after flowering and was positively related to the quantity of nodule soluble carbohydrate. In field trials using (b), light penetration of the canopy was increased to different depths by defoliating to nodes 12, 8, 4, or ground level 17 days before or 3 days after flowering. Nodule N content was reduced by postflowering treatments. Leaf and stem dry wt. and carbohydrate contents increased significantly with defoliation to the ground only. (Summary by Field Crop Abstracts) COO

0212

20602 FINDYSZ, L.M.; SEVERSON JUNIOR, J.G.; HILLMAN, R.E. 1982. Uptake of ^{14}C-alpha-aminoisobutyric acid by Phaseolus vulgaris. Phytochemistry 21(12):2831-2834. Engl., Sum. Engl., 26 Refs., Illus. [Dept. of Biology, Saint Louis Univ., Saint Louis, MO 63103, USA]

Phaseolus vulgaris. Plant assimilation. Amino acids. Nutrient transport.

Specific uptake of alpha-aminoisobutyric acid [(1-^{14}C)AIB], a nonmetabolizable neutral amino acid analog, by dwarf bush bean plants cv. Top Crop demonstrated wide differences in active transport between various plant organs. The kinetic and timed uptake data reported were expressed as specific uptake because this corrects for the diffusion of AIB, which is part of the total AIB uptake process. Roots accumulated AIB to concn. up to 18 times and leaf disks to twice those of the incubation medium. Stem tissue showed very little uptake, if any, that could not be accounted for by simple diffusion or water-free space. Although initial rate kinetic studies demonstrated the presence of a normal transport system, timed uptake studies revealed greatly decreased transport by etiolated plants, suggesting a relationship between active transport and the lack of photosynthate. The reproducibility of the AIB uptake pattern by mature roots strongly supports the concept that the transport of neutral amino acids is biphasic and suggested one or more carrier systems are inducible by either low intracellular concn. or repressed by high intracellular concn. of the amino acid. (Author's summary) C01

0213

19883 WALLACE, A.; ROMNEY, E.M.; WOOD, R.A.; ALEXANDER, C.V. 1983. Influence of potassium on uptake and distribution of cesium in bush beans. Journal of Plant Nutrition 6(5):397-403. Engl., Sum. Engl., 7 Refs., Illus. [The Laboratory of Biomedical & Environmental Sciences, Univ. of California, Los Angeles Campus, Los Angeles, CA 90024, USA]

Phaseolus vulgaris. Dwarf beans. Nutrient solution. K. Cs. Mineral deficiencies. Nutrient uptake. USA.

Bush beans, cv. Improved Tendergreen, were grown for 18 days in 3700 ml nutrient solutions in a factorial expt. involving 3 levels of K (10^{-2}, 10^{-3}, 10^{-4} N) and 3 levels of Cs (10^{-4}, 5×10^{-5}, 10^{-5} N). Mild K deficiency was observed for the low K level but no yield differences were due to Cs. Increasing K markedly decreased the Cs concn. in all plant parts. The relative uptake of K vs. Cs was not influenced by Cs but was by K. The concn. ratio (C.R.) for K in trifoliate leaves varied from 99 (high K) to 7315 (low K). The C.R. for Cs in trifoliate leaves varied from 8.67 (high K) to 0.96 (low K). K was translocated to trifoliate leaves from 89 to 843 times that of Cs. The Y values for Cs in plant parts were consistently near 1 meaning that Cs uptake was directly proportional to its concn. in the nutrient solution. The Y values for K in plant parts were around 0.5 for $10^{-3}/10^{-4}$ N K but only about 0.2 for $10^{-2}/10^{-3}$ N K. Roots accumulated about 6 times more Cs than did leaves while K was quite uniformly distributed among plant parts. The uptake relationship for K and Cs then was different indicating that K would not likely be a good carrier of radiocesium in food chains. (Author's summary) C01

See also 0225

0214

19868 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1981. Studies of yield-limiting factors. In _____. Bean Program. Annual Report 1980. Cali, Colombia. pp.53-61,81-83. Engl., Illus. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Also in Spanish.

Phaseolus vulgaris. Yields. Yield components. Plant habit. Flowering. Mathematical model. Empoasca kraemeri. Insect control. Cultivars. Resistance. Adaptation. Colombia.

A comparative trial was conducted at CIAT-Palmira to evaluate the yield efficiency of Phaseolus vulgaris and 8 other legume species (Cajanus cajan, Glycine max, Arachis hypogaea, Vigna unguiculata, V. radiata, V. angularis, P. lunatus, and P. acutifolius). The best-adapted genotypes for most of the species were selected from previous yield trials and materials available from national and international programs were included. Mean species grain yield ranged from 2.2 to 4.5 t/ha. LAD, total biomass, and days to maturity were all highly and positively correlated with yield, while HI and yield/LAD of common beans were comparable with soybeans and higher than those of other species. In bean peak grain growth rate (GGR) is higher and grain growth phase is proportionally shorter. Common beans apparently adjust potential sink size (pod no.) to the available source (leaf area), and then proceed to fill the sink (GGR) as quickly as possible. Yield among grain legumes is simply related to the no. of nodal units present, which is, in turn, chiefly a function of time. Forty lines were selected for each of the 4 growth habits of P. vulgaris to design yield models. Basic components of the model were LAI, CGR, days to flower, and no. of nodes. For growth habit I, the no. of total seeds, no. of pods, no. of seeds/pod, no. of pods/node, CGR, and GGR were all correlated with yield; days to flowering were negatively correlated with yield. For growth habit II, all yield components except seed size, days to flowering, and length of seed-filling period were correlated with yield. For growth habit III, the no. of total seeds, no. of pods, no. of seeds/pod, and the max. LAI were correlated with yield. Growth habit IV differs from the others in that seed size and no. of seeds/pod were correlated with yield. The physiology section of CIAT's Bean Program developed a mathematical model that predicts the phenologic response of a line or cv. for a particular region. Results of the application of this model are included. The effects of the leafhopper (Empoasca kraemeri) on yield and yield components of bean were studied. Yield and most of the major yield components decreased significantly from protected to unprotected treatments, regardless of whether lines were tolerant or susceptible. Yield parameters in bean were also assessed under high levels of inputs (complete control of insects and diseases and application of fertilizers at planting) and low levels (application of a small amount of fertilizer at planting). The major cause of decreased yield under low inputs is the reduced no. of seeds/pod. Growth habits of P. vulgaris are briefly described and the accessions of Phaseolus referred to in this report are listed. (Summary by F.G. Trans. by L.M.F.) C02

0215

19887 DASGUPTA, J.; BEWLEY, J.D. 1982. Desiccation of axes of Phaseolus vulgaris during development of a switch from a development pattern of protein synthesis to a germination pattern. Plant Physiology 70(4):1224-1227. Engl., Sum. Engl., 10 Refs., Illus. [Dept. of Biology, Univ. of Calgary, Calgary, Alberta T2N 1N4, Canada]

Phaseolus vulgaris. Seed. Water content. Germination. Proteins. Growth.

Immature seeds of Phaseolus vulgaris removed from the pod 32 days after anthesis did not germinate unless 1st subjected to desiccation. The change induced by the predrying was reflected in patterns of protein synthesis at the apex. Rehydrated axes synthesized some proteins found in germinating axes of mature dry seeds, and ceased to synthesize proteins unique to seed development. Seeds desiccated on day 22 did not germinate or operate the developmental switch in protein synthesis. It was suggested that desiccation naturally suppressed synthesis of proteins associated with seed development on the one hand and enhanced synthesis of germination proteins on the other. (Summary by Horticultural Abstracts) C02

0216

19936 KRIZEK, D.T.; MANDAVA, N.B. 1983. Influence of spectral quality on the growth response of intact bean plants to brassinosteroid, a growth-promoting steroidal lactone. 1. Stem elongation and morphogenesis. Physiologia Plantarum 57(3):317-323. Engl., Sum. Engl., 29 Refs., Illus. [Plant Physiology Inst., Agricultural Research Service, U.S. Dept. of Agriculture, Beltsville, MD 20705, USA]

Phaseolus vulgaris. Plant growth substances. Irradiation. Stems. Growth.

The growth response of bean plants treated with 5 micrograms brassinosteroid (BR) in the bean 2nd-internode assay was measured in a controlled environment under 3 radiation sources: cool white fluorescent (CWF), far-red (FR) fluorescent, and incandescent (INC) lamps. Growth comparisons were made under equal levels (90 micromol/s m^2) of photosynthetic photon flux density provided by CWF or INC lamps and equal levels of far-red (28 W/m^2, 700-800 nm) radiation provided by the same INC or FR lamps. Treatment of the 2nd internode with BR produced a sequential increase in elongation, curvature and swelling under normal bioassay conditions (CWF lamps), as observed previously with brassins. In addition, BR induced marked splitting of the treated internode provided that ample photosynthate was available. Spectral quality had a differential effect on internodal elongation. Under CWF lamps, internodes 6 days after BR treatment were 2-3 times longer than those of controls; under INC or FR lamps they were 30-60% shorter than those of controls. In all cases, BR treatment greatly stimulated accumulation of photosynthate in the treated internode, as indicated by fresh and dry wt. and stem diameter measurements. This suggests a possible mobilization role for BR in the intact plant. BR also partially overcame the natural inhibitory effects of CWF radiation on stem elongation. (Author's summary) C02

0217

19937 KRIZEK, D.T.; MANDAVA, N.B. 1983. Influence of spectral quality on the growth response of intact bean plants to brassinosteroid, a growth-promoting steroidal lactone. 2. Chlorophyll content and partitioning of assimilate. Physiologia Plantarum 57(3):324-329. Engl., Sum. Engl., 29 Refs. [Plant Physiology Inst., Agricultural Research Service, U.S. Dept. of Agriculture, Beltsville, MD 20705, USA]

Phaseolus vulgaris. Leaves. Plant growth substances. Growth. Stems. Chlorophyll. Leaf area. Irradiation. Photosynthesis. USA.

The chlorophyll content and partitioning of assimilate of bean plants were determined 6 days after treatment of the 2nd internode with 5 micrograms brassinosteroid (BR). Plants were grown for 6 days under equal levels (90 micromol/s m^2) of photosynthetic photon flux density (PPFD) provided by

cool white fluorescent (CWF) or incandescent (INC) lamps and equal levels of far-red (28 W/m^2, 700-800 nm) radiation provided by the same INC or far-red (FR) fluorescent lamps. Brassinosteroid treatment had no appreciable effect on total biomass production but caused a decrease of 15-20% DM distribution in the upper portion of the shoot, a small (4%) but constant increase in DM in the 2nd internode and a large (11-16%) increase in DM in the lower portion of the shoot (especially the 1st internode). Treatment with BR increased assimilate accumulation in the primary leaves, especially under INC and FR lamps, and reduced DM in the trifoliate leaves. BR also caused a 16-21% reduction in total leaf area and an even greater reduction in area of the trifoliate leaves, but significantly increased specific leaf wt. of the primary leaves and the 1st trifoliate leaf and the amount of DM in the lateral shoots under all radiation sources. Compared with controls, BR treatment increased DM accumulation in the treated internode 3.3 times under CWF and 1.6 times under INC or FR. BR treatment also increased chlorophyll content in the primary leaves under all radiation sources and in the trifoliate leaves under CWF and INC lamps. These findings suggest a possible mobilization role of BR and establish the importance of adequate PPFD (and photosynthate) for max. swelling and splitting response to brassinosteroid. (Author's summary) CO2

0218

20031 KRZYZANOWSKI, F.C.; COSTA, J.D.; SCOTTI, C.A.; SILVEIRA, J.F. DA 1982. O envelhecimento precoce na avaliacao de lotes de sementes de feijoeiro. (Accelerated aging as a vigor test for bean seeds). Revista Brasileira de Sementes 4(1):45-58. Port., Sum. Port., Engl., 24 Refs.

Phaseolus vulgaris. Seed. Seed vigor. Germination. Storage. Temperature. Relative humidity. Brazil.

The accelerated aging test was assessed as a vigor test for seeds of 5 bean cv. (Goiano Precoce, Rosinha Precoce, Bico de Ouro, Carioca, and Rico 23) stored under 2 different environmental conditions with no temp. and moisture control, and controlled conditions of temp. (23°C) and moisture (35% RH). Three aging periods of 72, 96, and 120 h under 42°C and 100% of RH conditions in an accelerated aging chamber were evaluated. Along with lab. tests, a field emergence expt. was conducted during 2 crop seasons. The accelerated aging test proved to be efficient for evaluating vigor levels of bean lots and its variations throughout the storage period. An aging period of 72 h was required to rank vigor levels of seed lots stored under noncontrolled conditions; therefore a 96 h period was necessary for seed lots stored under controlled conditions of temp. and moisture. (Author's summary) CO2

0219

20615 LOPES, N.F.; OLIVA, M.A.; FREITAS, J.G. DE; MELGES, E.; BELTRAO, N.E. DE M. 1982. Análise de crescimento e conversao da energia solar em feijoeiro (Phaseolus vulgaris L.) submetido a tres níveis de densidade do fluxo radiante. (Growth analysis and conversion of solar energy in bean under three levels of light intensity). Revista Ceres 29(166):586-606. Port., Sum. Port., Engl., 46 Refs., Illus. [Depto. de Biologia Vegetal, Univ. Federal de Vicosa, 36.570 Vicosa-MG, Brasil]

Phaseolus vulgaris. Growth. Solar radiation. Dry matter. Leaf area. Plant habit. Canopy. Brazil.

Growth analysis and evaluation of solar energy efficiency were carried out with common bean cv. Negrito 897, under 3 light levels (30, 62, and 100% sunlight) in the greenhouse. Plants were harvested at 10-day intervals.

Max. rates of DM production were 0.64, 0.85, and 0.92 g/pot/day, in order of increasing light level. These were recorded 50 days after emergence for all treatments. Differences in DM production rates at the 3 light levels were due mainly to the values of the NAR. On the contrary to leaf area, NAR increased with decreasing light. Max. leaf area for each treatment was 15.6, 20.6, and 24.5 dm^2/pot, in order of increasing light level recorded 60 days after emergence. The RGR and leaf area ratio decreased as a curvilinear function of plant age. Shading increased leaf area ratio. Max. efficiency of solar energy conversion was 10.6% for shaded plants (30% sunlight). Mean efficiency of solar energy conversion throughout the entire crop cycle was 1.2, 1.7, and 2.7% for the 100, 62, and 30% light treatments, resp. Plant growth habit changed from type II to type III by shading. Bean plants showed high plasticity and great ability to change canopy structure in response to environmental conditions. (Author's summary) C02

0220

19952 PEREIRA, M.F.A.; DALE, J.E. 1982. Effects of 2,4-dichlorophenoxyacetic acid on shoot apex development of Phaseolus vulgaris. Zeitschrift fur Pflanzenphysiologie 107(2):169-177. Engl., Sum. Engl., 18 Refs., Illus. [Depto. de Fisiologia Vegetal, Univ. Estadual de Campinas, Caixa Postal 6109, 13.100 Campinas-SP, Brasil]

Phaseolus vulgaris. Stems. Shoots. Plant growth substances. Leaves. Growth. Cell division.

The development of plumular apices of seedlings of Phaseolus vulgaris treated with 2,4-D was followed to examine the early effects of this growth regulator. Changes in morphology of the apex of treated plants ranged from a slight lateral extension of the trifoliate leaf primordium with reduction in lateral leaflet formation, to bizarre forms in which the primordium developed to girdle the apical dome as a broad ring from which leaf-like structures were produced. Serial sections of the seedling apex showed that treatment with 2,4-D led to a reduction in apical vol. and cell no. although effects on mean cell size were small. Treatments at 24 and 36 h had most effect in reducing cell no. in the apical dome and in the primordium of the 2nd trifoliate leaf, although there were also large reductions in cell no. in the primordium of the 1st trifoliate leaf and in the presumptive stem tissues. The morphological abnormalities which follow treatment result from changes in the direction of growth within the apex and are not primarily due to effects on cell no. or size. (Author's summary) C02

See also 0231 0237 0343

C03 Chemical Composition, Methodology and Analyses

0221

20605 BOLLINI, R.; CHRISPEELS, M.J. 1978. Characterization and subcellular localization of vicilin and phytohemagglutinin, the two major reserve proteins of Phaseolus vulgaris L. Planta 142(3):291-298. Engl., Sum. Engl., 26 Refs., Illus.

Phaseolus vulgaris. Cotyledons. Proteins. Analysis. Phytohaemagglutinins.

Extracts of Phaseolus vulgaris cotyledons contained 2 abundant proteins, vicilin and phytohemagglutinin. Vicilin, a 6.9S protein fraction at neutral pH, associated to an 18.0S form at pH 4.5 and had 3 nonidentical

subunits with mol.wt. of 52,000, 49,000, and 46,000. Phytohemagglutinin, a 6.4S protein fraction, had 2 nonidentical subunits with mol.wt. of 34,000 and 36,000. Phytohemagglutinin could be separated by isoelectrofocusing into a mitogenic and nonerythroagglutinating protein with a single subunit with mol.wt. 34,000 and a mitogenic and erythroagglutinating protein fraction which contained both subunits. Vicilin is apparently identical with the so-called glycoprotein II and with globulin G1 while phytohemagglutinin is identical with globulin G2. Since vicilin and phytohemagglutinin are internationally used names there is no need to introduce new names to describe P. vulgaris reserve proteins. Both proteins are catabolized in the course of seedling growth and are located in the protein bodies, indicating that they are reserve proteins. Vicilin isolated in its 18.0S form from the cotyledons of young seedlings contains substantial quantities of smaller polypeptides, in addition to the 3 original ones. It is suggested that the presence of these small polypeptides represents partial breakdown of the vicilin prior to its complete catabolism. (Author's summary) C03

0222

19729 CHANG, K.C.; SATTERLEE, L.D. 1982. Chemistry of dry bean proteins. Journal of Food Processing and Preservation 6(4):203-225. Engl., 87 Refs., Illus. [Food Protein Research Group, Dept. of Food Science & Technology, Univ. of Nebraska, Lincoln, NE 68583, USA]

Phaseolus vulgaris. Seed. Biochemistry. Proteins. Inhibitors. Digestibility. Processing. Nutritive value. USA.

Recent developments in the protein chemistry and nutritional quality of bean are reviewed. The physicochemical properties of these proteins are analyzed, in particular trypsin inhibitory activities in different bean cv. The role of lectins, quite toxic to exptl. animals and partially responsible for the poor nutritive value of raw beans, is explained and lectins isolated from red and white Kidney beans are reported. The isolectin with an isoelectric point of 5.7 was found to be the most effective agglutinin for both red and white cells. The amino acid composition of several lectins is discussed as well as the characterization of storage proteins and globulins. The stability of various storage proteins is attributed to their tertiary and quaternary structure, which is stabilized by numerous hydrogen bonds, hydrophobic interactions, and electrostatic forces. The factors affecting the nutritional quality of bean proteins are discussed. The amino acid pattern, generally characterized by its deficiency in sulfur amino acids and tryptophan, is reviewed. Digestibility of raw bean proteins generally ranges from 25 to 60%. Cooked beans have a protein digestibility ranging from 65 to 85%, depending on the var. and the cooking process used. Factors affecting digestibility are analyzed. The identification of nutritional characteristics through detailed compositional and structural studies is of 1st importance. The different methods used for the qualification and quantification of nutritional characteristics are described. The effects of processing (heat, trypsin inhibitors, soaking, and pH) on protein quality are described. The different methods used in the study of bean protein nutritional quality are analyzed, giving advantages and disadvantages. A procedure modified to determine available cystine and cysteine is given. Recommendations for future research are included. (Summary by EDITEC. Trans. by L.M.F.) C03

0223

17737 COLE, L.M.; CASIDA, J.E.; RUZO, L.O. 1982. Comparative degradation of the pyrethroids tralomethrin, tralocythrin, deltamethrin, and

cypermethrin on cotton and bean foliage. Journal of Agricultural and Food Chemistry 30(5):916-920. Engl., Sum. Engl., 14 Refs., Illus. [Dept. of Entomological Sciences, Univ. of California, Berkeley, CA 94720, USA]

Phaseolus vulgaris. Leaves. Analysis. Insecticides. Composition. USA.

Residues on cotton and bean foliage up to 20 days after treatment with nonstabilized formulations of tralomethrin and tralocythrin consist of the parent pyrethroids and various ester photoproducts: significant amounts of deltamethrin and (1R,alphaS)-cis-cypermethrin from debromination and trans-deltamethrin and -cypermethrin from 1R-cis → 1RS-cis,trans isomerization and minor levels of 1'-bromodeltamethrin and 1'-bromocypermethrin from dehydrobromination. Small amounts of the alphaR enantiomers of deltamethrin and (1R)-cis-cypermethrin are also detected. The acid moiety of tralomethrin undergoes rapid debromination on cotton foliage. Additional products include polar conjugates and compounds not readily recovered on extraction with chloroform-acetonitrile. With the exception of the initial debromination and dehydrobromination reactions, the degradation processes and ultimate residues of tralomethrin and tralocythrin appear to be essentially the same as those of deltamethrin and (1R,alphaS)-cis-cypermethrin. (Author's summary) C03

0224

20640 CULLIMORE, J.V.; LARA, M.; LEA, P.J.; MIFLIN, B.J. 1983. Purification and properties of two forms of glutamine synthetase from the plant fraction of Phaseolus root nodules. Planta 157(3):245-253. Engl., Sum. Engl., 28 Refs., Illus. [Biochemistry Dept., Rothamsted Experimental Station, Harpenden, Herts. AL5 2JQ, England]

Phaseolus vulgaris. Nodules. Enzymes. Roots. Rhizobium phaseoli. Analysis.

Two forms of glutamine synthetase (GS) were purified from the plant fraction of Phaseolus vulgaris root nodules. One form appeared identical to the form found in roots but the other was probably specifically associated with the nodule. Free-living Rhizobium phaseoli also contained 2 GS forms both of which had different mol.wt. from the plant enzymes. Bacteroids contained only the higher mol.wt. form of rhizobial GS. There were only minor differences between the plant enzymes in K_m or $S_{0.5}$ values for the synthetase-reaction substrates and both forms had identical mol.wt. of the holoenzyme (380,000 daltons) and its subunits (41,000). They could be separated by ion-exchange chromatography and polyacrylamide gel electrophoresis. The only other distinguishing feature observed was that the ratio of transferase:synthetase activity of the root form was 3-fold greater than that of the nodule-specific GS. (Author's summary) C03

0225

20161 HOWELER, R.H. 1983. Análisis del tejido vegetal en el diagnóstico de problemas nutricionales: algunos cultivos tropicales. (Plant tissue analysis in diagnosis of nutritional problems in some tropical crops). Cali, Colombia, Centro Internacional de Agricultura Tropical. 28p. Span., 23 Refs., Illus. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Phaseolus vulgaris. Plant tissues. Analysis. Mineral content. N. P. K. Ca. Mg. S. Mineral deficiencies. Colombia.

The different steps involved in tissue analysis to diagnose nutritional problems in rice, beans, soybeans, maize, cassava, and pastures and forages are presented. The concept of critical level is defined and 3 methods for its determination are indicated. The procedure for sample taking, washing,

drying, and preparation are explained. The best sampling method, the critical levels for nutrient concn., and some observations on the interpretation of the results of analyses are indicated for each crop. N, P, K, Ca, Mg, and S are considered deficient in beans when their values are at levels lower than 3, 0.25, 1, 1.25, 0.3, and 0.14%, resp. The sampling method suggested should be carried out at 3-4 mo. of age or 1 mo. after the onset of rains following summer; the part of the plant to be sampled is the leaf blade of younger completely expanded leaves. (Summary by EDITEC) C03

0226

20606 McCURDY, A.R.; LEUNG, H.K.; SWANSON, B.G. 1980. Moisture equilibration and measurement in dry pinto beans (Phaseolus vulgaris). Journal of Food Science 45(3):506-508. Engl., Sum. Engl., 15 Refs., Illus.

Phaseolus vulgaris. Seed. Water content. Seed characters. Storage. USA.

Investigations of postharvest spoilage of dry beans have been inconclusive about the moisture level at which loss of quality will occur. Different moisture equilibration and moisture determination methods used with dry beans in previous investigations were evaluated and compared. Results indicated that significant variation among individual dry beans existed for all methods of moisture equilibration especially with direct addition of water. No significant differences were found among methods of moisture analysis. Storage of pinto beans with MC of 14.1% or less is recommended for microbial stability. Because of bean to bean variation, a mean and C.V. for MC of a representative sample of beans described the condition of the beans better than a mean alone. (Author's summary) C03

0227

20611 SCHMITT, H.A.; WEAVER, C.M. 1982. Effects of laboratory scale processing on chromium and zinc in vegetables. Journal of Food Science 47:1693-1694. Engl., Sum. Engl., 17 Refs. [Foods & Nutrition Dept., Purdue Univ., West Lafayette, IN 47907, USA]

Phaseolus vulgaris. Processing. Canned beans. Mineral content. Seed. Zn. Cr. USA.

Bush beans, kale, and soybeans were used as models for studying the effects of processing by canning and freezing upon ^{51}Cr and ^{65}Zn content. Plants were grown hydroponically, intrinsically labeled with ^{51}Cr and ^{65}Zn, and processed either by canning or freezing. Freezing resulted in ^{65}Zn losses of 10.7, 8.6, and 6.7% for kale, bush beans, and soybeans, resp. A loss of 3.8% of ^{51}Cr resulted during freezing of bush beans. Canning resulted in ^{65}Zn losses of 23, 19.7, and 28.8% for kale, bush beans, and soybeans, resp. Canned bush beans and kale contained 40.7 and 62.7%, resp., less ^{51}Cr than unprocessed samples. Freezing resulted in a greater mineral retention than canning. Less opportunity for leaching is available in freezing and reduction in radionuclide content of the vegetables by canning was accounted for by transfer to the drained liquid. (Author's summary) C03

0228

19957 SOUCIET, G.; DIETRICH, A.; COLAS, B.; RAZAFIMAHATRATRA, P.; WEIL, J.H. 1982. Purification and properties of chloroplast leucyl-tRNA synthetase from a higher plant: Phaseolus vulgaris. Journal of Biological Chemistry 257(16):9598-9604. Engl., Sum. Engl., 55 Refs., Illus. [Institut de Biologie Moléculaire et Cellulaire du Centre National de la Recherche Scientifique, Université Louis Pasteur, 67084 Strasbourg, France]

Phaseolus vulgaris. Enzymes. Chloroplasts. Amino acids.

The chloroplast leucyl-tRNA synthetase from Phaseolus vulgaris was purified by ammonium sulfate precipitation and chromatography of DEAE-cellulose, hydroxylapatite, and phosphocellulose. Finally, the pure enzyme was obtained after affinity chromatography on Blue Sepharose CL-6B using specific elution with a pure Escherichia coli $tRNA^{Leu}$ isoacceptor. The specific activity of chloroplast leucyl-tRNA synthetase (1550 units/mg) is the highest ever obtained for a higher plant aminoacyl-tRNA synthetase. The purified enzyme has an optimal pH of 9.0 and K_m values are, resp., 2.6 x 10^{-6} M for unfractionated E. coli tRNA, 0.85 x 10^{-6} M for E. coli $tRNA^{Leu}$, 1.8 x 10^{-4} M for ATP, and 1.4 x 10^{-5} M for L-leucine. Chloroplast leucyl-tRNA synthetase is a large monomer which has a M_r of 122,000 as determined by electrophoresis on polyacrylamide gel in the presence of SDS and urea and by gel filtration. Determination of Stokes radius, diffusion coefficient, and frictional ratio suggests that the enzyme structure is rather compact. The amino acid composition shows a relatively large proportion of apolar residues. Specific antibodies were raised in rabbits against the pure chloroplast leucyl-tRNA synthetase. (Author's summary) C03

0229

20613 VAN BUREN, J.P. 1980. Calcium binding to snap bean water-insoluble solids. Calcium and sodium concentrations. Journal of Food Science 45(3):752-753. Engl., Sum. Engl., 11 Refs., Illus.

Phaseolus vulgaris. Snap beans. Ca. Pods. Mineral content. Canned beans. Na. USA.

The degree of Ca binding to bean pod constituents under various conditions of Ca and sodium salt concn. was determined using snap bean pods of var. Tendercrop. A limit of Ca binding on insoluble solids of canned beans was approx. 10,000 mg/kg. This amount was increased in snap beans that underwent a low temp. blanch. Sodium chloride decreased the binding of Ca and the firmness of the canned beans. (Author's summary) C03

0230

20096 VAN BUREN, J.P.; LEE, C.Y.; MASSEY JUNIOR, L.M. 1982. Variation of vitamin concentration and retention in canned snap beans from three processing plants during two years. Journal of Food Science 47(5):1545-1548. Engl., Sum. Engl., 16 Refs. [New York State Agricultural Experiment Station, Cornell Univ., Geneva, NY 14456, USA]

Phaseolus vulgaris. Snap beans. Canned beans. Processing. Vitamin content. Amino acids. USA.

A statistical evaluation of vitamin status during canning was obtained by sampling raw, blanched, and canned snap beans. With the exception of folic acid retention, it was not possible to distinguish the separate plants. This leads to the expectation that the seasonal av. of vitamins from processing plants obtaining material from the same area would be similar. Retention % were lower for thiamin, folic acid, and vitamin B_6 than for ascorbic acid which was lower than for carotene. Raw material was a source of variation. Av. concn. in drained canned beans (dry wt. basis) were: 116 mg ascorbic acid/100 g and 22, 3.4, 5.3, and 7.3 micrograms/g of carotene, thiamin, B_6, and folic acid/g, resp. (Author's summary) C03

0231

20100 WALKER, K.A. 1974. Changes in phytic acid and phytase during early development of Phaseolus vulgaris L. Planta 116(2):91-98. Engl., Sum. Engl., 19 Refs., Illus.

Phaseolus vulgaris. Cotyledons. Enzymes. Embryo. Water content. Developmental stages. Analysis. Amino acids.

Changes in phytic acid, phytase, and inorganic phosphate were examined in the cotyledon of Phaseolus vulgaris cv. Taylor's Horticultural during embryogeny and germination. Embryogeny usually took 36 days; phytic acid was accumulated most rapidly between days 24 and 30, during which time relatively high values of inorganic phosphate were observed in the cotyledon. Levels of inorganic phosphate in the developing cotyledon did not decrease until the dehydration phase, and this decrease could not be entirely accounted for by the residual synthesis of phytic acid during this time. Phytase activity was undetectable during embryogeny, but a rapid rise in phytase activity was observed after day 2 of germination. This rise was well correlated with the disappearance of phytic acid from the cotyledon. Phosphate levels remained much lower than those observed during embryogeny. (Author's summary) C03

See also 0239 0242 0345

D00 AGRONOMY

0232

19783 PATIÑO, B. 1983. El cultivo del fríjol en El Salvador; factores que limitan la producción. (Bean cultivation in El Salvador; factors affecting production). In Mesa Redonda sobre el Programa Cooperativo Subregional de Producción de Leguminosas Alimenticias de los Países de Centroamérica y Panamá, San José, Costa Rica, 1983. Trabajos presentados. Costa Rica, Ministerio de Agricultura y Ganadería. pp.26-41. Span.

Phaseolus vulgaris. Climatic requirements. Soil requirements. Intercropping. El Salvador.

Different factors affecting bean production in El Salvador are reviewed. Aspects such as climate and soils, areas for bean production, and planting systems used (covered beans, monocropped beans, beans in association) are described. Three levels of technology can be differentiated: traditional, semitechnical, and technical, accounting for 60, 25, and 15% of the production area, resp. Major diseases are BGMV, BCMV, root rots caused by Rhizoctonia, Sclerotium, and Fusarium, web blight (Thanatephorus cucumeris), anthracnose (Colletotrichum lindemuthianum), bacteriose (Xanthomonas phaseoli), and angular leaf spot (Isariopsis griseola). Most important insect pests are Phyllophaga spp., Anomala sp., Melanotus sp., lice (Ulus sp., Blapstinus sp.), chrysomelids (Diabrotica balteata, Cerotoma salvini, Adrector ruficornis), Mexican bean beetle (Epilachna varivestis) and others such as Empoasca kraemeri, Apion godmani, Bemisia tabaci, and slugs (Vaginulus plebeius and Limax maximus). Storage grain pests are Zabrotes subfasciatus and Callosobrochus maculatus. In recent years there has been a significant increase in financing mechanisms for small bean producers. Commercialization is coordinated by the Instituto Regulador de Abastecimientos. (Summary by EDITEC) D00

0233

19879 REUNIAO NACIONAL DE PESQUISA DE FEIJAO, 1a., GOIANIA-GO, BRASIL, 1982. Anais. Brasil, Empresa Brasileira de Pesquisa de Arroz e Feijao. Documentos, 1. 384p. Port., Illus.

Phaseolus vulgaris. Plant breeding. Cultivation. Plant nutrition. Entomology. Seed characters. Economics. Microbiology. Nodulation. Nitrogen fixation. Brazil.

Research papers presented at the 1st Reuniao Nacional de Pesquisa de Feijao, held in Goiania, GO, Brazil, are discussed. The following topics were discussed: breeding, agronomic aspects, soils and plant nutrition, entomology, plant pathology, microbiology, seeds (characteristics and conservation), and socioeconomic aspects. (Summary by F.G. Trans. by L.M.F.) D00

D01 Soil, Water, Climate and Fertilization

0234

18714 APOLITANO S., C. 1981. Tolerancia a la sequía. (Drought tolerance). In Curso Intensivo de Adiestramiento Post-Grado en Investigación para la Producción de Fríjol en el Perú, La Molina, 1981. Trabajos presentados. Lima, Instituto Nacional de Investigación y Promoción Agropecuaria. pp.1-4. Span.

Phaseolus vulgaris. Drought. Water requirements. Resistance. Peru.

General considerations are given on the plant physiological factors that enable their resistance to drought. Studies carried out on bean plants are highlighted. Considering that beans in Peru are produced mostly under conditions of low water availability, some suggestions on how to select plants adapted to drought are given: identification of critical periods (development stages) for beans and plant characteristics that allow the selection for resistance to drought; collection of information on the variability of tolerant genotypes; and agronomic practices that minimize drought effects. (Summary by EDITEC) D01

0235

20078 BONANNO, A.R.; MACK, H.J. 1983. Use of canopy-air temperature differentials as a method for scheduling irrigations in snap beans. Journal of the American Society for Horticultural Science 108(5): 826-831. Engl., Sum. Engl., 23 Refs., Illus. [Dept. of Horticultural Science, North Carolina State Univ., Raleigh, NC 27650, USA]

Phaseolus vulgaris. Irrigation. Temperature. Canopy. Snap beans. Rainfall. Yields. USA.

Two field expt. were conducted at the Oregon State U. Vegetable Research Farm (USA) during 1981-82 to determine the feasibility of using midday canopy temp., measured with an infrared radiation thermometer, for irrigation scheduling in Oregon 1604 and Galamor snap beans. Treatments which allowed various levels of positive canopy minus air temp. differences [stress-degree-days (SDD)] to accumulate between irrigations were evaluated along with a treatment irrigated at 4 growth stages, a dry treatment, and a control treatment which was irrigated at -0.06 MPa soil water potential (SWP). Diurnal measurement of canopy and air temp. indicated that the greatest differences between canopy and air temp. occurred near noon. In

1981, all treatments irrigated by an accumulation of positive SDD had reduced yields compared with the control SWP treatment. In 1982, under higher rainfall and lower air saturation vapor pressure deficits (VPD) than in 1981, yields of the SDD irrigated treatments were comparable with those obtained with the SWP treatment. Accumulation of positive SDD values to schedule irrigations was adequate when midday VPD values were low. However, when high VPD occurred, SDD values were always negative. A model is presented in which SDD values can be adjusted for environmental variability to more accurately schedule irrigations. Measurements of air temp. within the canopy were made and compared with surface canopy temp. measured with an infrared thermometer. Regression analysis showed that canopy temp. could be predicted using the air temp. within the canopy (R^2 = 0.89). The sum of SDD values for the season was used to estimate canning maturity pod yield (R^2 = 0.65). (Author's summary) DOI

0236

20079 BONANNO, A.R.; MACK, H.J. 1983. Yield components and pod quality of snap beans grown under differential irrigation. Journal of the American Society for Horticultural Science 108(5):832-836. Engl., Sum. Engl., 22 Refs., Illus. [Dept. of Horticultural Science, North Carolina State Univ., Raleigh, NC 27650, USA]

Phaseolus vulgaris. Snap beans. Irrigation. Yields. Yield components. Cultivars. Soil moisture. Water requirements. Water stress. USA.

Field expt. were conducted to evaluate the effects of differential irrigation treatments on the yield and pod quality of Oregon 1604 and Galamor snap beans in 1981 and 1982 at the Oregon State U. Vegetable Research Farm (USA). Treatments in which various levels of positive canopy minus air temp. differences [stress-degree-days (SDD)] accumulated between irrigations were evaluated along with irrigation at 4 growth stages, a dry treatment which received only one irrigation to establish plants, and a control treatment irrigated at -0.06 MPa soil water potential (SWP). In both seasons, yield was related strongly to the av. soil water potential from planting to harvest. Yields in 1982 were at least 5 MT/ha greater at a given av. soil water potential than in 1981. Yields of Oregon 1604 and Galamor were similar under adequate irrigation, but under greatest water stress, yield of Oregon 1604 was higher than for Galamor. Pod no. was reduced only in the dry treatment. Percentage of set pods, pod length, and no. of seeds/pod were all reduced by low irrigation, while fiber content of pods and wt./seed were increased by low irrigation. (Author's summary) DOI

0237

20080 BONANNO, A.R.; MACK, H.J. 1983. Water relations and growth of snap beans as influenced by differential irrigation. Journal of the American Society for Horticultural Science 108(5):837-844. Engl., Sum. Engl., 31 Refs., Illus. [Dept. of Horticultural Science, North Carolina State Univ., Raleigh, NC 27650, USA]

Phaseolus vulgaris. Cultivars. Irrigation. Growth. Plant development. Water content. Leaf area. Osmotic potential. Stomata. Transpiration. Water stress. USA.

Two field expt. were conducted to evaluate the effects of differential irrigation on plant growth, development, and water status of 2 snap bean cv., Oregon 1604 and Galamor. Plants were grown at various irrigation levels ranging from a well-watered control to a dry treatment which received only one irrigation to establish plants. Measurements on plants sampled weekly at 6 times during the growing season showed that total plant

dry wt., total leaf dry wt., total leaf area, av. area/leaf, and no. of leaves/plant were reduced by water deficits in both cv. Also, for both cv., total leaf area/plant was reduced more by a decrease in area/leaf than by a reduction in leaf no. Specific dry leaf wt. was higher in the drier treatments. During each year, a significant difference between treatments occurred earlier in the season for total leaf area/plant than for total plant wt. At predawn, leaf water potential was always more negative in the dry treatment than in the control. Early in the season, there was no significant difference in midday leaf water potential between the control and dry treatment. Later, as soil water became limiting, the dry treatment had a more negative leaf water potential than the control. Near the end of the season, after the dry treatment had been subjected to a long period of water stress, midday leaf water potential was more negative in the control than in the dry treatment. Although some osmotic adjustment occurred in the dry treatment, leaf turgor potential was generally lower than in the control throughout the day. As leaf water potential decreased from early morning through midday, transpiration rates increased due to an increase in evaporative demand on the leaves. Leaf diffusive resistance also increased with decreasing leaf water potential but a threshold value for stomatal closure was not demonstrated. (Author's summary) D01

0238

19865 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1981. Agroclimatology study. In _____. Bean Program. Annual Report 1980. Cali, Colombia. pp.9,81-83. Engl. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Also in Spanish.

Phaseolus vulgaris. Temperature. Rainfall. Colletotrichum lindemuthianum. Epidemiology. Latin America.

The main activity consisted of climatic data base validation and error correction. A sensitive technique of error detection was developed, based on the relative amplitudes of the high and low frequencies of the Fourier transform. The Bean Program desired to obtain a characterization and listing of areas susceptible to anthracnose (Colletotrichum lindemuthianum) attack, including production figures. To do so, an alternative method was chosen of defining climatic limits for the disease. A growing season temp. between 17-22°C and a daily rainfall of 1.5 mm/day were chosen. Total at-risk bean production amounts to 57% of the total target area production. Growth habits of Phaseolus vulgaris are briefly described and accessions of Phaseolus referred to in this report are listed. (Summary by F.G. Trans. by L.M.F.) D01

0239

20077 MACK, H.J. 1983. Fertilizer and plant density effects on yield performance and leaf nutrient concentration of bush snap beans. Journal of the American Society for Horticultural Science 108(4):574-578. Engl., Sum. Engl., 18 Refs. [Dept. of Horticulture, Oregon State Univ., Corvallis, OR 97331, USA]

Phaseolus vulgaris. Fertilizers. Spacing. Snap beans. N. P. K. Cultivars. Yields. Leaves. Mineral content. Ca. Mg. Dwarf beans. USA.

There were no significant fertilizer x plant density interactions affecting yields or leaf nutrient concn. of snap beans in 5 field expt. Higher rates of fertilizer application produced significantly higher yields of pods than did lower rates in 2 expt. At higher plant densities (15.2 to 30.5 cm rows, 43-65 plants/m^2) yields were 20-38% higher than at lower plant

densities (91.4-cm rows, 22-29 plants/m^2). Av. yield increase at higher densities was 29%. Crop economic values followed similar trends. At higher plant densities, av. N, K, Ca, and Mg concn. in leaves at early bloom were lower than at lower densities. Higher fertilizer rates tended to increase N concn. in leaves but had no consistent effects on P, K, Ca, and Mg. (Author's summary) D01

0240

20085 MACK, H.J.; BONANNO, A.R. 1981. Water stress reduces bush bean and sweet corn yields. Oregon Vegetable Digest 30(4):1-2. Engl. [Dept. of Horticulture, Oregon State Univ., Corvallis, OR 97331, USA]

Phaseolus vulgaris. Cultivars. Dwarf beans. Irrigation. Water stress. Yields. Yield components. Water requirements. USA.

Bush beans and maize were cultivated under 3 irrigation regimes (dry, intermediate, wet) at the Oregon State U. Vegetable Research Farm (USA). Maize var. Jubilee and 2 bush bean var., Oregon 1604 and Roma, were used. The treatment under dry conditions with 3 replications included 2 irrigations for a total of 63 mm; under intermediate conditions, 2 replications with 3 irrigations for a total of 115 mm; and under wet conditions, 3 replications with approx. 240 mm distributed in 8 irrigations. The no. of pods/plant was lower in the dry and intermediate treatments than in the wet treatment. Both Roma and Oregon 1604 showed similar results in terms of yields and no. of pods/plant. Maize var. Jubilee showed increased yields as moisture increased: 6.4, 4.4, and 4.1 t husked maize/ac for the wet, intermediate, and dry treatments, resp. (Summary by EDITEC) D01

0241

19962 NAKAGAWA, J.; NAKAGAWA, J.; BRINHOLI, O.; MACHADO, J.R.; MARCONDES, D.A.S.; ROSOLEM, C.A. 1981. Comportamento de algumas cultivares de feijao (Phaseolus vulgaris L.) na presenca e ausencia de micronutrientes. Experimento II. (The performance of some bean cultivars in the presence and absence of micronutrients. Experiment 2). Ecossistema (Brasil) 6(1):13-19. Port., Sum. Port., Engl., 13 Refs. [Depto. de Agricultura e Silvicultura, Univ. Estadual de Sao Paulo, 18.600 Botucatu-SP, Brasil]

Phaseolus vulgaris. Cultivars. Fertilizers. Zn. B. Cu. Fe. Mn. Mo. Yields. Brazil.

Two field expt. were carried out in order to study the performance of 6 bean cv. (Bico de Ouro, Carioca, Goiano Precoce, Piratã, Regente Feijó, and Rosinha G-2) in the presence and absence of micronutrients applied as basic and residual fertilization on a Dark Red Latosol, sandy phase, in the municipality of Sao Manoel, SP, Brazil, during the rainy and dry seasons. A micronutrient fertilizer, Fritted Trace Elements BR-9, containing 6.5, 7.0, 1.0, 9.5, 5.5, and 0.2% of ZnO, B_2O_3, CuO, Fe_2O_3, MnO_3, and MoO_3, resp., was applied at 100 kg/ha in the rainy season and the residual effect was observed in the dry season. All plots received an application of dolomitic limestone during the rainy season and NPK fertilization during both seasons. The micronutrient employed did not affect cv. seed production as basic fertilization but increased cv. seed production as residual fertilization. Cv. performance did not depend on the presence or absence of micronutrient fertilizer. Cv. Piratã was the most productive in both seasons; statistically, it was superior only to Rosinha G-2 in the rainy season and to Goiano Precoce in the dry season. (Author's summary) D01

0242

20092 PECK, N.H. 1978. Plant and soil analyses: efficient use of energy in agriculture through improved vegetable fertilization. New York Food and Life Sciences 11(3):4-7. Engl., Illus.

Phaseolus vulgaris. Analysis. Fertilizers. Snap beans. P. K. Mineral content. Developmental st ges. Soil fertility. N. Yields. Plant assimilation.

The use of soil and plant analyses in the development of efficient fertilizer systems during the growth of a no. of crops including Phaseolus vulgaris is described. Although P promotes seedling growth, it has been shown that an extremely high concn. of P without adequate K will reduce seedling growth and yields of snap bean. (Summary by Field Crop Abstracts) D01

0243

19954 ROSOLEM, C.A.; MACHADO, J.R.; BALDUCCI JUNIOR, J.J.; HING, L.T. 1982. Adubacao foliar do feijoeiro (Phaseolus vulgaris L.): 2. Efeitos do nitrogenio com e sem cobertura nitrogenada. (Foliar fertilization in bean: 2. Effects of nitrogen with or without topdressed nitrogen). Turrialba 32(4):423-428. Port., Sum. Port., Engl., 10 Refs., Illus. [Depto. de Agricultura e Silvicultura, Univ. Estadual de Sao Paulo, 18.600 Botucatu-SP, Brasil]

Phaseolus vulgaris. Fertilizers. N. Toxicity. Leaves. Yields. Yield components. Brazil.

The effects of N fertilizers applied to the soil and/or the leaves on bean production were studied in 2 field expt. carried out at the Sao Manuel exptl. station, municipality of Sao Manoel, SP, Brazil. The 1st expt. was conducted during the rainy season and the 2nd during the dry season. N (32-0-0) was applied on the leaves at 5 levels (0, 12, 24, 36, and 48 l/ha) in split applications 15, 30, 45, and 60 days from seedling emergence in the presence or absence of 30 kg N/ha as topdressing. All plots received basic fertilization of 80 kg P and 30 kg K/ha. Topdressed N always increased bean production. In the wet season there was a small yield increase due to foliar fertilization in the absence of topdressing but in the dry season a tendency to quadratic response to foliar fertilization was observed, regardless of topdressed N. N applied to the soil 20 days after seedling emergence increased the no. of pods/plants whereas foliar N fertilization in the absence of topdressing increased 100-seed wt. (Author's summary) D01

0244

19878 ROSTON, A.J.; BULISANI, E.A. 1982. Calagem e adubacao do feijoeiro. (Liming and fertilization in beans). Campinas-SP, Brasil, Secretaria de Agricultura e Abastecimento. Coordenadoria de Assistencia Técnica Integral. Instrucao Prática CATI no.218. 9p. Port., Illus. [Coordenadoria de Assistencia Técnica Integral, Caixa Postal 960, 13.100 Campinas-SP, Brasil]

Phaseolus vulgaris. Agricultural lime. Fertilizers. N. P. K. Timing. S. Micronutrients. Dung. Green manures. Brazil.

Liming and fertilization practices on acid or low fertility soils to make them apt for bean cultivation are detailed, beans being considered of great economic and social importance in Brazil. Plant requirements, application rate, form and time, deficiency symptoms, and sources are analyzed for the

major nutrients N, P, and K. The following doses are recommended: 30-40 kg N/ha; 60 kg P/ha or a P:K ratio of 2:1 or 3:1 in combined formulas; 30 kg K/ha. Fertilization with S, micronutrients, and the application of organic manures (FYM, chicken manure, topsoil, peat, castor oil or cottonseed cakes) and green manures such as legumes (especially crotalaria), white lupine (Lupinus albus), Dolichos lablab, and pigeon pea (Cajanus cajan) are also included. Green manures should be cut and buried during flowering, stage during which they present the largest vol. of green material. (Summary by EDITEC. Trans. by L.M.F.) D01

0245

19932 RUIZ-SIFRE, G.V.; RIES, S.K. 1983. Response of crops to sorghum residues. Journal of the American Society for Horticultural Science 108(2):262-266. Engl., Sum. Engl., 17 Refs., Illus. [Dept. of Horticulture, Pesticide Research Center, Michigan State Univ., East Lansing, MI 48824, USA]

Phaseolus vulgaris. Green manures. Growth. Yields. Snap beans. USA.

Vegetable and field crops were grown on young residues of several cv. of sorghum in the greenhouse and field. The growth and yield of snap bean in the field was increased or decreased by sorghum residues depending on the sorghum plant part, quantity, cv., and soil environment. Residues from Bird-a-Boo and Milkmaker sorghum stimulated field-grown snap beans more than those from Haygrazer. The optimum amount of young sorghum shoot residues needed to stimulate snap bean growth and yield was about 2500 kg/ha. Although sorghum residues may stimulate crop growth in some instances, this stimulation was not easily controlled because the optimal range of sorghum residues and soil environment is too narrow and unpredictable. (Author's summary) D01

0246

20087 VOSE, P.B. 1983. Rationale of selection for specific nutritional characters in crop improvement with Phaseolus vulgaris L. as a case study. Plant and Soil 72:351-364. Engl., Sum. Engl., 57 Refs. [Centro de Energia Nuclear na Agricultura, Caixa Postal 96, 13.400 Piracicaba-SP, Brasil]

Phaseolus vulgaris. Fertilizers. Plant nutrition. Minerals and nutrients. Plant breeding. Selection. N. P. Brazil.

Phaseolus vulgaris was taken as a model to examine the economic relevance of research and take an overview of nutritional variation in crops to evaluate the type of information available and indicate major gaps. Specific mechanisms of nutritional variation should remain a research priority. (Summary by L.M.F.) D01

See also 0257 0262 0267 0268 0276 0326 0339 0359 0365 0368

D02 Cultivation Practices: Planting, Weed Control and Harvesting

0247

18722 BULLON F., O. 1981. Manejo del cultivo del fríjol para la represión de malezas. (Bean crop management to control weeds). In Curso Intensivo de Adiestramiento Post-Grado en Investigación para la Producción de Fríjol en el Perú, La Molina, 1981. Trabajos presentados.

Lima, Instituto Nacional de Investigación y Promoción Agropecuaria. pp.1-2. Span., Illus.

Phaseolus vulgaris. Weeding. Statistical analysis.

An equation is presented that explains the function of integrated weed control in bean production, where the integral of production is obtained by the sum of the integrals of crop potential and genetics, soil fertility and texture, environmental factors and pests. The values assigned to the variables, pests, and adverse environmental factors, are indicated. (Summary by EDITEC) D02

0248

19876 GELMINI, G.A.; ROSTON, A.J. 1980. Herbicidas para a cultura de feijao. (Herbicides for bean crops). Campinas-SP, Brasil, Secretaria de Agricultura e Abastecimento. Coordenadoria de Assistencia Técnica Integral. Boletim Técnico CATI no.147. 40p. Port., 21 Refs.

Phaseolus vulgaris. Weeding. Herbicides. Weeds. Brazil.

This handbook deals with the use of herbicides in bean crops. The competition between bean plants and weeds can result in yield losses of up to 50%. A critical period approx. 20-30 days after plant emergence was established, during which weed competition should be avoided in both irrigated and upland beans. General characteristics and an individual description of major annual and perennial weeds are given. Control of annual weeds should tend toward preventing their growth. This group includes numerous grasses. The control of perennial weeds by mechanical means is difficult and expensive due to their underground organs. Herbicide application preplanting incorporated or preemergence (especially for annual grasses) or postemergence (long-leaved weeds), as well as the specifications of EPTC, trifluralin, EPTC + trifluralin, pendimethalin, chlorthal-dimethyl (DCPA), bentazon, and dinoseb acetate, are described. Treatment procedure, basic conditions for an adequate chemical control, and the precautions that should be taken when handling herbicides are given. Commercial names of products are annexed. (Summary by EDITEC. Trans. by L.M.F.) D02

0249

20022 GROOT, W. DE 1979. Review of results of weed control experiments in dry beans in Kenya. In Eastern Africa Weed Control Conference, 7th., Nairobi, Kenya, 1979. Papers presented. Kenya, Ministry of Agriculture. Grain Legume Project. pp.55-62. Engl., Sum. Engl., 19 Refs.

Phaseolus vulgaris. Weeding. Herbicides. Weeds. Yields. Kenya.

Results of research carried out in Kenya on the effects of weeds on yields of bean in monoculture and in association with maize are reviewed. Large weeds such as Tagetes minuta, Leonotis mollissima, Nicandra physalodes, and Datura stramonium were found to shade out bean plants. The critical period for weed competition was determined to be 10-40 days after plant emergence. Chemical weed control methods are compared with standard hand weeding. Resulting recommendations are being tested in a no. of demonstration plots in Central Province. (Summary by L.M.F.) D02

0250

19864 HARDWICK, R.C.; ANDREWS, D.J.; PARKS, L.J. 1982. Navy bean. In National Vegetable Research Station. Annual Report 1981. Wellesbourne, Scotland. pp.89-90. Engl.

Phaseolus vulgaris. Spacing. Timing. Planting. Yields. Seedlings.

Results of expt. conducted with different navy bean var. are discussed. According to the cropping season, the av. yield of 8 selected cv. ranged between 210-381 g seed/m^2. Cv. Seafarer and Limelight showed variable yields whereas selections 222 and 196 were comparatively stable. The hypothesis of a yield increment through late transplanting of cv. Prelude seedlings on 3 different dates (21, 38, and 56 days after planting) was evaluated. A systematic design was used with populations between 4-50 plants/m^2. The relationship between planting density (P) and seed yield/unit area (Y) is described in the following equation: $1/Y = 1/A + 1/BP$, where A estimates yield increase/unit area for high densities and B, for low densities. The values for A increased progressively as the transplanting date was delayed, while the values for B decreased. The hypothesis that delayed transplanting increases yields was confirmed but this is only true for high planting densities. (Summary by EDITEC) D02

0251

20622 LAMELAS, J.A. 1981. Características del manejo del cultivo de poroto chaucha en los alrededores de Buenos Aires. (Characteristics of bean management in regions near Buenos Aires). Tesis Ing.Agr. Argentina, Universidad de Buenos Aires. 57p. Span., 6 Refs., Illus.

Phaseolus vulgaris. Planting. Timing. Spacing. Disease control. Harvesting. Marketing. Labor. Cultivars. Yields. Uromyces phaseoli. Nezara viridula. Epilachna pacnulata. Irrigation. Argentina.

The main objective of the study was to identify characteristics of bean crop management in bean growing regions near Buenos Aires, Argentina, through surveys of 8 farms. Aspects on land tendency, planted area, planting densities, use of agricultural inputs, sanitary measures, harvesting and marketing, and other crops planted by the farmer were examined. Beans are produced on farms with an av. surface area of 11.12 ha; family and external labor is used. The planting season ranges from Aug. to March; the 1st planting is carried out in Aug. or Sept. using cv. Balin and the 2nd, between Dec.-March, with cv. Contrancha. The av. yield is 6 t/ha; the most common disease is rust (Uromyces phaseoli) and the most frequent pests are Epilachna pacnulata and Nezara viridula. Other crops planted are tomato, lettuce, pumpkin, chard, and parsley. (Summary by EDITEC) D02

0252

20694 MACO T., E.; MATA N., R.H. 1975. Efecto de mezclas de herbicidas en la nodulación de ocho variedades de fríjol (Phaseolus vulgaris L.) y algunas correlaciones entre los diferentes factores de crecimiento. (Effect of herbicide mixtures on the nodulation of eight bean varieties and some correlations between various growth factors). Alajuela, Universidad de Costa Rica. Facultad de Agronomía. Estación Experimental Agrícola Fabio Baudrit M. Boletín Técnico 8(1):1-13. Span., Sum. Span., 8 Refs.

Phaseolus vulgaris. Cultivars. Herbicides. Weeding. Weeds. Nodulation. Yields. Mineral content. N. Costa Rica.

The effect of 4 herbicide mixtures applied preemergence (DNBP + dalapon, DNBP + chloramben, chlorobromuron + dalapon, and linuron + alachlor) on the nodulation, root and canopy fresh wt., total N concn. of the canopy, and yield of 8 bean var. (Mexico 27, Porrillo, S-182, Jamapa, Turrialba 4, Mexico 80, Mexico 81, and Blanco de Verdura San Jero) was studied in a field trial carried out at the Fabio Baudrit Moreno Agricultural Expt.

Station, Costa Rica. Herbicide mixtures did not affect the no. of bacterial nodules of the genus Rhizobium, on the contrary, those mixtures containing DNBP increased nodules 19.1 and 31.6% over hand weeding. Wt. of aboveground parts was significantly higher in plots that received treatments with DNBP. All herbicide mixtures increased root wt., except the mixture linuron + alachlor which decreased wt. Total N content in bean plants was not affected by any of the herbicides. There were negative correlations between total N concn. in plants and wt. of above ground parts and seed yield, and between root wt. and wt. of aboveground parts and seed yield. There were also positive correlations between the total N concn. in plants and root wt., and between the wt. of aboveground parts and seed yield. Var. Turrialba 4 was superior in yield (1281.4 kg seed/ha). (Author's summary. Trans. by L.M.F.) D02

0253

20695 MAGO T., E.; MATA N., R.H. 1974. Evaluación de mezclas de herbicidas en variedades de fríjol (Phaseolus vulgaris L.). (Evaluation of herbicide mixtures in bean varieties). Alajuela, Universidad de Costa Rica. Facultad de Agronomía. Estación Experimental Agrícola Fabio Baudrit M. Boletín Técnico 7(6):1-13. Span., Sum. Span., 11 Refs.

Phaseolus vulgaris. Herbicides. Cultivars. Weeding. Toxicity. Weeds. Yields. Costa Rica.

The effect of 4 herbicide mixtures applied preemergence (DNBP + dalapon, DNBP + chloramben, chlorobromuron + dalapon, and linuron + alachlor) on 8 bean var. (Mex. 27, Porrillo No. 1, S-182, Jamapa, Turrialba 4, Mex. 80, Mex. 81, and Blanco de Verdura San Jero) was evaluated in field trials carried out at the Fabio Baudrit Moreno Agricultural Expt. Station in Alajuela, Costa Rica. The mixtures linuron + alachlor, DNBP + chloramben, DNBP + dalapon, and chlorobromuron + dalapon controlled narrow-leaved weeds by 93, 86, 77, and 80%, resp., and broad-leaved weeds, by 86, 82, 80, and 72%, resp., with regard to the control. Seed yields for these treatments were 36, 12, 28, and 62%, resp., less than hand weeding at 20 days and 42, 67, 50, and 17% higher than the unweeded check, resp. Herbicide application did not affect seed germination. The mixture linuron + alachlor was the only one that had phytotoxic effects. There was no differential performance of var. regarding the different mixtures applied. (Author's summary. Trans. by L.M.F.) D02

0254

20009 MURITHI, C.N. 1982. On-farm experiments: some experiences. In Keswani, C.L.; Ndunguru, B.J., eds. Symposium on Intercropping in Semi-Arid Areas, 2nd., Morogoro, Tanzania, 1980. Proceedings. Ottawa, Canada, International Development Research Centre. pp.141-145. Engl., 1 Ref. [Kenya Agricultural Research Inst., Muguga Agricultural Research Dept., P.O. Box 30148, Nairobi, Kenya]

Phaseolus vulgaris. Technology evaluation. Relay crops. Planting. Timing. Zea mays. Land preparation. Weeding. Labour. Kenya.

On-farm trials were carried out in a marginal area of Machakos District, eastern Kenya. Some of the experiences encountered are presented, indicating that: (1) It is necessary to carry out a presurvey of small-scale farmers, preferably before developing the technological package, to determine the situation for the majority of the farmers and assess their reaction to new techniques. (2) The no. of farmers selected should be slightly more than the no. required to allow for dropouts due to the lack of

collaboration. (3) The nature and timing of the activities should be explained so that farmers can decide whether to cooperate or not. (4) Strict supervision is required during planting and harvesting. (5) Selected farmers should represent the majority of the farmers. (6) Only those farmers who have crop combination and crop sequence that allow the effect of the technological package to be observed should be selected. (7) Researchers need assistants; however, the interviews should be conducted personally. (8) Research institutes and stations should support and understand this type of research approach. (Summary by EDITEC. Trans. by L.M.F.) D02

0255

19858 ORMEÑO N., J. 1983. El control de las malezas como práctica agronómica en el cultivo del frejol. (Weed control as an agronomic practice in bean cultivation). Investigación y Progreso Agropecuario Quilamapu (Chile) 15:9-20. Span., Illus.

Phaseolus vulgaris. Weeding. Herbicides. Weeds. Chile.

The criteria necessary to maximize weed control efficiency in beans are established. Some characteristics of weeds that favor their competitive ability are indicated as well as the critical period for competition that ranges between plant emergence and 40-60 days after. Cultural, mechanical, and chemical control methods are given. Factors (types of weeds, environment, soil, and available equipment) and general requirements are indicated to select and recommend herbicides according to the type of application: incorporated preplanting (IPP), preemergence (PRE), or postemergence (POST). Herbicides recommended for IPP are EPTC, trifluralin, metolachlor, and alachlor; for PRE, linuron, methabenzthiazuron, metolachlor, alachlor, and metribuzin, which control well Amaranthus sp., Portulaca sp., Datura sp., and Solanum sp. Among the POST herbicides are bentazon, selective dinitro, and dichlofop methyl. Herbicides, herbicide mixtures, rates, successive applications, and supplemental applications for other weed control practices are indicated. (Summary by EDITEC) D02

0256

19496 PEÑATE C., B. 1979. Prácticas agronómicas tendientes a aprovechar el agua de lluvia en condiciones de temporal deficiente, para la producción de fríjol (Phaseolus vulgaris L.) y sorgo (Sorgun sp.). (Agronomic practices tending to take advantage of rainfall water under deficient rainfed conditions in bean and sorghum crops). Tesis Ing.Agr. Guatemala, Universidad de San Carlos. 58p. Span., 16 Refs.

Phaseolus vulgaris. Rotational crops. Rainfall. Land preparation. Cover crops. Fertilizers. Weeding. Guatemala.

Some agronomic practices that partially reduce the damage caused by insufficient, irregular rainfall and prolonged drought in eastern and SE Guatemala, and that are also easy for small and intermediate farmers to apply, were evaluated. Sorghum was planted after beans on a 2880 m^2 plot in Buena Vista, municipality of Quezada, under conditions of drainage, soil type, temp., and rainfall similar to those of most of the farms in the region. Water infiltration trials, and physical and chemical analyses of the soil were conducted. For field work in beans, 8 treatments were applied at random, consisting of different agronomic practices: deep plowing with tractor and disk plow, harrowing or no harrowing, use or not of ridges, plowing with animal traction, mulches (Hyparrhenia rufa) of varying thickness (0.03-0.06 m), planting on the upper or lower part of the ridges at a density of 250,000 plants/ha, chemical fertilization after

planting, and weeding twice. Since precipitation was above the mean of 1970-77, there were no significant differences among treatments; however, the use of mulches improved the conservation of soil moisture and prevented erosion. The use of dry, nonseeded H. rufa, as mulch, as well as residues from previous crops is recommended. (Summary by EDITEC. Trans. by L.M.F.) D02

0257

19765 SMIT, J.J.; OKONGO, A.O.; FLOOR, J. 1983. Dry bean agronomy; improvement of farming practices through agronomic research. Kenya Farmer 1983(August. Special issue: Food beans in Kenya):18,20. Engl., Illus. [Grain Legume Project, National Horticultural Research Station, P.O. Box 220, Thika, Kenya]

Phaseolus vulgaris. Intercropping. Planting. Timing. Weeding. Spacing. Fertilizers. Yields. Nitrogen fixation. Rhizobium. Kenya.

Recommended agronomic practices for beans in monoculture or in association with maize in Kenya are indicated. These include planting time, cropping systems, weeding, and fertilization. Beans planted 1 mo. after maize yield much lower that if planted at the same time or earlier. In intercrops, alternating rows of beans and maize should be spaced 25 cm apart; in low rainfall areas a wider spacing should be adopted for maize. Weeding at 3-4 wk. after plant emergence is considered to be sufficient for intercrops since both maize and bean plants ensure a quick and efficient soil cover if good quality seed is used. Pure stands often need 2 weedings due to the greater planting distance. It is important to plant in rows to facilitate weeding (60 cm between rows if animal-drawn implements are used). A fertilizer rate of 100 kg DAP/ha should be used in associated cropping. DAP increases bean yields by 500 kg/ha when applied at 200 kg/ha; however, the fertilizer should not come into direct contact with the seed since it affects germination and kills young plants. Research is being carried out on a special method of hand application of DAP, and on the use of manure and filter mud, a waste product from the sugar industry. N fixation by Rhizobium, estimated at 55 kg N/ha in 120 days at Kabete, was studied as well as the use of N-fixing legumes in associations. (Summary by EDITEC. Trans. by L.M.F.) D02

0258

19899 STANTON, W.R. 1966. Phaseolus vulgaris L. In _____. Grain legumes in Africa. Rome, Food and Agriculture Organization of the United Nations. pp.107-111,113. Engl.

Phaseolus vulgaris. Melanagromyza phaseoli. Uromyces phaseoli. Isariopsis griseola. Colletotrichum lindemuthianum. Xanthomonas phaseoli. Elsinoe phaseoli. Intercropping. Climbing beans. Dwarf beans. Land preparation. Spacing. Weeding. Harvesting. Africa.

Data on pests, diseases, and place in the cultural system of Africa of snap beans are given, with particular emphasis on Canadian Wonder, the most widespread on the continent. Canadian Wonder and Rosco are inferior in yield to Herbert Spragett, a new introduction, at lower alt. The bean fly Melanagromyza phaseoli, an important pest in Kenya, is controlled by seed-dressing with 22 g of 40% WP aldrin/100 kg seed. In Uganda, Acanthomia rorida, Nezara viridula, and Alcidodes leucogrammus have been successfully controlled by the use of 2.5 g of 0.04% BHC dust/kg beans. Major diseases are those caused by Isariopsis griseola and Xanthomonas phaseoli, regarded in many parts of Africa. In Rhodesia, mosaic, anthracnose (Colletotrichum lindemuthianum), halo blight (Pseudomonas

phaseolicola), rust (Uromyces appendiculatus), and scab caused by Elsinoe phaseoli are recorded; in Uganda there are P. medicaginis var. phaseolicola and U. appendiculatus. In Rhodesia and Kenya, intercropping is practiced. In Malawi, Uganda, and Kenya, bush var. are grown commercially and also as a sole crop under market-gardening conditions. Climbing var. are planted as a market-garden crop (under irrigation) or they are allowed to grow up the compound fence, around trees, or in small patches where the ground has been burnt around a large tree. Bush var. are grown for seed, although there are types suitable for eating green. Recommendations on soil preparation, fertilizer requirements, planting distances, weeding, and harvesting are included. (Summary by EDIFEC. Trans. by I.M.F.) D02

0259

19934 TEASDALE, J.R.; FRANK, J.R. 1983. Effect of row spacing on weed competition with snap beans (Phaseolus vulgaris). Weed Science 31(1):81-85. Engl., Sum. Engl., 21 Refs., Illus. [Dept. of Agriculture, Beltsville Agricultural Research Center, Beltsville, MD 20705, USA]

Phaseolus vulgaris. Snap beans. Spacing. Weeding. Yields. Canopy. USA.

In field trials in 1979 and 1980, Phaseolus vulgaris was grown in rows 15, 25, 36, 46, and 91 cm apart, but with intrarow spacing increasing as the distance between rows decreased, to give a constant density of 43 plants/m². Compared with the conventional spacing of 91 cm, there was an increase in weed suppression of 18% with row spacings of 15-36 cm when weeds were allowed to emerge with the crop, and of 82% when weeds were controlled by hoeing and hand weeding for the 1st half of the season. The effect of the 46 cm spacing on weed growth was variable. The rate of canopy closure, measured as the % of soil surface covered by P. vulgaris vegetation, was greater in the less wider rows. Seed yields were similar at spacings of 15-46 cm and were, on av., 23% higher than yields produced at 91 cm spacing. (Summary by Horticultural Abstracts) D02

See also 0201 0239 0260 0261 0268 0277 0315 0333 0334

D03 Cultivation Systems: Intercropping, Rotational Crops

0260

19246 ALMEIDA, I.F. DE; PEREIRA, A.V. 1983. Mandioca, no sistema de fileiras duplas, em consórcio com feijao - avaliacaó de espacamentos. (Evaluation of spacing in cassava planted in double rows and intercropped with beans). Campo Grande, Cariacica-ES, Brasil, Empresa Capixaba de Pesquisa Agropecuária. Pesquisa em Andamento no.13. 4p. Port., Illus.

Phaseolus vulgaris. Intercropping. Manihot esculenta. Spacing. Yields. Brazil.

Partial results are given of 2 expt., one in the municipality of Pinheiro where cassava cv. Manjari (branched growth habit with harvest at 17 mo.) was planted on a red-yellow distrophic Latosol, and the other in Conceicao da Barra, where cassava cv. Pao do Chile (erect, with harves at 12 mo.) was planted on a red-yellow podzolic soil. A randomized block design was used with 12 treatments and 3 replications. In both trials bean cv. Rio Tibagi was used, spaced at 0.5 m between rows, 5 plants/m. Cassava was planted in Jan. and beans in March, 1982. In Pinheiro soil was amended by liming.

NPK (40-80-60) was applied to the bean row. Results of the bean harvest are given; however, cassava has not yet been harvested. Yields of 679.67 kg beans were obtained per hectare in Pinheiro with 5 rows inserted in double rows of cassava spaced at 3.0 x 0.7 x 0.7 m. In Conceicao da Barra, the highest yields were 597.67 kg beans/ha with 5 rows of bean inserted in cassava spaced at 3.0 x 0.5 x 0.5 m. A tendency of increasing bean productivity as the no. of inserted rows increased was observed. (Summary by I.B. Trans. by L.M.F.) D03

0261

19012 EMPRESA BRASILEIRA DE ASSISTENCIA TECNICA E EXTENSAO RURAL. 1980. Sistemas de producao para culturas alimentares: arroz, feijao, mandioca e milho. Microrregiao: Bragantina, Guajarina, Salgado e Vizeu. (Production systems for the food crops rice, beans, cassava, and maize, for the microregions of Bragantina, Guajarina, Salgado, and Vizeu). Braganca-PA, Brasil. 31p. Port., Illus.

Phaseolus vulgaris. Rotational crops. Intercropping. Manihot esculenta. Zea mays. Land preparation. Planting. Spacing. Harvesting. Brazil.

Production systems in the regions of Bragantina, Guajarina, Salgado, and Vizeu are described. Available technology and receptivity to innovations were considered for the following: (1) maize + rice (1st phase), cassava + beans (2nd phase); (2) rice (1st phase), cassava + beans (2nd phase); and (3) maize + cassava. Each microregion is characterized as to soils, temp., RH, rainfall, climate, water balance, and economic importance. The description of each system includes farmer characteristics, operations making up the system, and technical recommendations (selection of area, land preparation, planting, cultural practices, harvest, processing, and commercialization). In the 1st system beans were planted during the 2nd phase, after cassava. Selected seeds should be planted 3-5 cm deep at a distance of 0.50 x 0.30 m intrarow. Chemical pest control, manual harvest, sun drying, and the separation of seeds and pods are included. In the 2nd system the same instructions of the 1st are followed, except that 4 rows of beans are planted between cassava rows. The spatial arrangement, planting and harvesting schedule, and technical coefficients of the systems are annexed. (Summary by EDITEC. Trans. by L.M.F.) D03

0262

20618 FARIS, M.A.; BURITY, H.A.; REIS, O.V. DOS; MAFRA, R.C. 1983. Intercropping of sorghum or maize with cowpeas or common beans under two fertility regimes in northeastern Brazil. Experimental Agriculture 19:251-261. Engl., Sum. Engl., 7 Refs., Illus. [Forage Crops Section, Ottawa Research Station, Central Experimental Farm, Ottawa, Ontario, K1A 0C6, Canada]

Phaseolus vulgaris. Sorghum bicolor. Zea mays. Intercropping. Fertilizers. N. P. K. Yields. Yield components. Brazil.

Expt. in NE Brazil have shown that a sorghum-pulse (cowpea or common bean cv. IPA 7419) intercrop system yielded more grain than the monocrop system and produced a LER greater than 1.00 even though rainfall was limited. Sorghum competed less than maize with the associated pulse when competitive ratios were considered. Sorghum grain size increased significantly when intercropped with common bean and at Caruaru, in 1977, unfertilized common beans produced significantly more pods/plant in the intercrop systems as compared with the pure stands. The 2 crops in the intercrop systems were responsive to fertilizer application. Thus, improved management

(fertilizer usage) was appropriate without the loss of the advantageous effects realized from intercropping. (Author's summary) D03

0263

20667 FRANCIS, C.A.; PRAGER, M.; TEJADA, G. 1982. Density interactions in tropical intercropping. 1. Maize (Zea mays L.) and climbing beans (Phaseolus vulgaris L.). Field Crops Research 5(2):163-176. Engl., Sum. Engl., 15 Refs., Illus. [Dept. of Agronomy, Univ. of Nebraska, Lincoln, NE 68583, USA]

Phaseolus vulgaris. Intercropping. Spacing. Climbing beans. Yields. Yield components. Income. Zea mays. Colombia.

In field trials at CIAT-Palmira, Colombia, over 2 growing seasons, maize densities from 1.5 to 10.5 plants/m^2 were combined with Phaseolus vulgaris densities from 5.6 to 37.5 plants/m^2 and yield components were measured and compared with those of each crop grown singly. Maize yields were positively correlated with maize density and ears/plant. P. vulgaris seed yield was positively correlated with pods/m^2 and pods/plant, but not with plant density. Bean yields and yield components were consistently and negatively correlated with maize yield and yield components. Yield/plant was reduced in both intercrop components by increased density of either crop. One additional maize plant/m^2 reduced grain yield/plant 5-6 times more than one additional bean plant, while seed yield/P. vulgaris plant was reduced 2-3 times more by addition of 1 maize plant than by addition of 1 P. vulgaris plant/m^2. Max. protein and grain yields were obtained with a semidwarf maize cv. at 2-4 plants/m^2 combined with climbing bean at 5-20 plants/m^2. (Extracted from author's summary) D03

0264

20668 FRANCIS, C.A.; PRAGER, M.; TEJADA, G. 1982. Density interactions in tropical intercropping. 2. Maize (Zea mays L.) and bush beans (Phaseolus vulgaris L.). Field Crops Research 5(3):253-264. Engl., Sum. Engl., 16 Refs., Illus. [Dept. of Agronomy, Univ. of Nebraska, Lincoln, NE 68583, USA]

Phaseolus vulgaris. Intercropping. Zea mays. Spacing. Dwarf beans. Yields. Yield components. Income. Colombia.

In field trials at CIAT-Palmira, Colombia, over 2 seasons to determine whether optimum density combinations existed for intercropping, maize densities of 1-10 plants/m^2 were combined with Phaseolus vulgaris densities of 10-40 plants/m^2. Yield and yield components were measured and compared with those of each crop grown singly. Max. P. vulgaris yield when grown singly was 2100 kg seed/ha each season. Highest yields of intercrops were attained with maize densities of at least 3 plants/m^2 and a range of P. vulgaris densities of 11-15 to 35-40 plants/m^2. These densities gave higher total grain yield and higher protein yield than the best results with maize grown alone. Maize yield/plant was affected only by maize density while P. vulgaris yield/plant, but not yield/ha, was reduced by increase in both maize and P. vulgaris densities. One tall maize plant was equivalent in competition to 3.5-4 P. vulgaris plants and one semidwarf maize plant was equivalent to 2-3 P. vulgaris plants. Intercrop combinations showed up to 62% advantage over single crops in terms of biological efficiency. (Summary by Field Crop Abstracts) D03

0265

20669 FRANCIS, C.A.; PRAGER, M.; TEJADA, G. 1982. Effects of relative planting dates in bean (Phaseolus vulgaris L.) and maize (Zea mays L.) intercropping patterns. Field Crops Research 5(1):45-54. Engl., Sum. Engl., 10 Refs., Illus. [Dept. of Agronomy, Univ. of Nebraska, Lincoln, NE 68583, USA]

Phaseolus vulgaris. Intercropping. Zea mays. Timing. Planting. Dwarf beans. Climbing beans. Cultivars. Yields. Colombia.

In field trials at CIAT-Palmira, Colombia, during 2 successive seasons, 4 Phaseolus vulgaris cv. of various growth habits from bush to climbing were intercropped with maize. Sowings of P. vulgaris were 5 or 10 days before and after maize, or both crops were sown on the same day. The crops were also grown in monoculture. Densities of P. vulgaris and maize were 160,000 and 40,000 plants/ha, resp. Maize and P. vulgaris yields were negatively correlated across cv. and dates of sowing, the least yield reduction in P. vulgaris compared with monoculture being with the 1st sowing date and the greatest reduction being in climbing beans compared with the nonclimbing cv. Maize yields were reduced by early competition from an advanced sowing of each of the 4 P. vulgaris cv. and the reduction was greatest with the climbing P. vulgaris cv. In all combinations except climbing P. vulgaris sown 10 days before maize, the intercrops were superior in efficiency compared with the species grown in monoculture. (Summary by Field Crop Abstracts) D03

0266

18723 GARCIA, S.; DAVIS, J. 1981. Algunos conceptos de metodología de la investigación aplicada a la asociación fríjol-maíz. (Some methodological concepts of applied research to bean/maize association). In Curso Intensivo de Adiestramiento Post-Grado en Investigación para la Producción de Fríjol en el Perú, La Molina, 1981. Trabajos presentados. Lima, Instituto Nacional de Investigación y Promoción Agropecuaria. pp.1-7. Span.

Phaseolus vulgaris. Intercropping. Zea mays. Crossbreeding. Climbing beans. Germplasm. Technology evaluation. Plant breeding. Colombia.

Agronomic and statistical methods are summarized for different types of trials carried out by CIAT's climbing bean improvement program. Five stages are described: (1) Germplasm evaluation, the performance of a large no. of material is assessed over several sites for adaptation and yield. (2) 300 crosses/yr should be obtained from selected parents. (3) Generations up to F_6 are multiplied; in F_1 an attempt is made to obtain 100 seeds/cross, in F_2 and F_4 plants are selected with resistance to noninoculated diseases, in F_3 and F_5 they are tested for yield and adaptation by families, and in F_4 and F_6 the Bean Team Nursery and the Uniform Yield Trials are carried out. In the latter trials screening is based on the response to adverse factors (diseases, pests, drought, photoperiod, low soil P, and others) and yield and adaptation. Clean seed multiplication for distribution to other countries is done in stage 4 whereas the material is evaluated in the International Bean Yield and Adaptation Nursery (IBYAN-climbers) in stage 5. Other methods used to compare treatments in maize/bean associations and maize-beans associations with the respective monocrops of each species are also mentioned. (Summary by EDITEC) D03

0267

20004 GUNASENA, H.P.M. 1982. Performance of a maize-legume intercrop system in Sri Lanka: summary. In Keswani, C.L.; Ndunguru, B.J., eds.

Symposium on Intercropping in Semi-Arid Areas, 2nd., Morogoro, Tanzania, 1980. Proceedings. Ottawa, Canada, International Development Research Centre. pp.72-73. Engl. [Dept. of Crop Science, Faculty of Agriculture, Univ. of Peradeniya, Peradeniya, Sri Lanka]

Phaseolus vulgaris. Snap beans. Intercropping. Zea mays. Fertilizers. N. Yields. Sri Lanka.

Six expt. were conducted during 1977-78 to evaluate N utilization in some locally important maize-legume (mainly soybean) intercropping systems and to compare their nutritive value and economics with corresponding monocrop systems, located at the university farm, Kundasale, and Peradeniya (Sri Lanka). An augmented exptl. design was used to include several systems of local importance, in 6 treatments replicated 3 times. In maize-French bean cv. Wade intercropping, maize yield was higher in the intercropping system while legume yield decreased. (Summary by EDITEC. Trans. by L.M.F.) D03

0268

18475 LEIHNER, D. 1983. Yuca en cultivos asociados: manejo y evaluación. (Management and evaluation of intercropping systems with cassava). Cali, Colombia, Centro Internacional de Agricultura Tropical. Serie CIAT 90SC-1(83). 80p. Span., 69 Refs., Illus.

Also in English.

Phaseolus vulgaris. Intercropping. Zea mays. Manihot esculenta. Planting. Timing. Spacing. Nutritional requirements. N. P. K. Ca. Mg. S. Insect control. Disease control. Weeds. Weeding. Herbicides. Economics. Colombia.

The management of cassava intercropping and its evaluation are described. Multiple cropping systems are defined: consecutive cropping and intercropping (mixed intercropping, row intercropping, strip intercropping, and relay intercropping). Basic biological and nutritional aspects of multiple cropping are analyzed and cassava intercropping systems practiced throughout the world (Latin America, Africa, and Asia) are described. Improved technology for cassava intercropping is discussed regarding the selection of plant types for association (cassava, grain legumes, and other crops); relative planting time; planting density (cassava, grain legumes, and maize); spatial arrangement of the crops (cassava, grain legumes); mineral nutrition and fertilization (nutritional requirements of cassava and intercrops, selection of crops for intercropping, response to fertilization in monoculture and in association, competition for nutrients in intercropping systems, and methods of fertilizer application); pest, disease, and weed management. Intercropping systems are evaluated on the basis of their biological efficiency (relative planting time, planting density, response to fertilization, and competition between crops) and their economical evaluation (comparison between systems and determination of profitability in intercropping systems). (Summary by EDITEC. Trans. by L.M.F.) D03

0269

19961 LOMBARDI, A.C.; MORGADO, I.F.; CRUZ FILHO, D.J. DA; ROSA, J.F.C.; GODOY, O.P.; MINAMI, K. 1981. Agricultura energética e producao de alimentos: avaliacao preliminar da experimentacao de cana de acucar rotacionada com milho, feijao, quiabo e abóbora na regiao norte fluminense-RJ. (Energy agriculture and food crop production: preliminary evaluation of experiments with sugar cane in rotational cropping with maize, bean, okra, and cushaw in the northern Fluminense region of Rio

de Janeiro). Brasil Acucareiro 98(6):27-33. Port., Sum. Port., Engl., 22 Refs., Illus.

Phaseolus vulgaris. Rotational crops. Saccharum officinarum. Yields. Intercropping. Zea mays. Income. Brazil.

The performance of sugar cane var. CB45-3 when cultivated in rotation with maize cv. AG-401, bean cv. Venezuela-350, okra cv. Chifre de Veado, and cushaw cv. Casca Grossa was analyzed in expt. conducted in Oct. 1980 in an area belonging to sugar cane growers in the municipality of Sao Joao da Barra, in the north region of the state of Rio de Janeiro, Brazil. The following treatments were used: beans, maize, maize + beans, okra, cushaw, and control (uncropped area). The preliminary discussion of results takes into consideration production, productivity, and economic results of these crops planted in areas of cane field renewal, where sprouting and tillering of the sugar cane installed after harvesting the other crops were observed. Conclusive analyses will be made after the sugar cane is harvested in June-July 1982. (Author's summary) D03

0270

20001 MAGHEMBE, J.A.; REDHEAD, J.F. 1982. Agroforestry: preliminary results of intercropping Acacia, Eucalyptus, and Leucaena with maize and beans. In Keswani, C.L.; Ndunguru, B.J., eds. Symposium on Intercropping in Semi-Arid Areas, 2nd., Morogoro, Tanzania, 1980. Proceedings. Ottawa, Canada, International Development Research Centre. pp.43-49. Engl., Illus. [Division of Forestry, Univ. of Dar es Salaam, P.O. Box 35091, Morogoro, Tanzania]

Phaseolus vulgaris. Intercropping. Eucalyptus melliodora. Eucalyptus camaldulensis. Leucaena leucocephala. Acacia albida. Yields. Tanzania.

The results from the 1978 trial and initial results from new trials established to study the interaction of trees (Eucalyptus melliodora, E. camaldulensis, Leucaena leucocephala, and Acacia albida) for fuel, poles, and fodder, with food crops (maize, beans, and sorghum) are given. Agroforestry in Africa is discussed as well as village requirements related to the selection of suitable tree species. In the 1978 trial a Latin square design was used with each plot containing 5 trees x 5 trees. The center core (3 trees x 3 trees) was measured periodically. E. melliodora seedlings were spaced at 2.5 x 2.5 m, intercropped with maize, sorghum, and bean var. Canadian Wonder (30-40 cm in height, spacing 40 x 20 cm). Trees in the bean and clean-weeded plots were more robust and more heavily branched than the trees among sorghum and maize. The survival rate of trees was excellent, except in the unweeded plots. Bean yields were 100 kg/ha in the 1st yr due to the attack of a fungus, 150 kg/ha in the 2nd yr, and an insignificant yield in the 3rd yr. In research work carried out with Leucaena (for fodder), normal bean yields (401 kg/ha) were obtained, possibly since planting coincided with the heavy rains. (Summary by EDITEC. Trans. by L.M.F.) D03

0271

20007 MUKIIBI, J.K. 1982. Effect of intercropping on some diseases of beans and groundnuts: summary. In Keswani, C.L.; Ndunguru, B.J., eds. Symposium on Intercropping in Semi-Arid Areas, 2nd., Morogoro, Tanzania, 1980. Proceedings. Ottawa, Canada, International Development Research Centre. pp.116-117. Engl. [Dept. of Crop Science, Makerere Univ., P.O. Box 7062, Kampala, Uganda]

Phaseolus vulgaris. Intercropping. Arachis hypogaea. Uromyces phaseoli. Isariopsis griseola. Whetzelinia sclerotiorum. Growth. Uganda.

Disease incidence in bean and groundnut monocultures and in intercrops of 2/3 beans-1/3 groundnut, 1/3 beans-2/3 groundnut with 3 populations (11, 22, and 44 plants/m^2). Intercropping beans with groundnuts had no effect on the incidence or severity of leaf rust (Uromyces phaseoli), angular leaf spot (Isariopsis griseola), or white mold of bean (Whetzelinia sclerotiorum), because groundnuts had little influence on the microclimate of the bean components. Beans grew much faster and partially covered the groundnut with its canopy. A brief discussion on different topics (use of the no. of spots as disease index, K deficiency on angular leaf spot incidence), carried out by several interlocutors, is included. (Summary by EDITEC. Trans. by L.M.F.) D03

0272

20008 NADAR, H.M.; RODEWALD, G.E. 1982. Interaction between agronomic research and agricultural economic analysis to develop successful dryland cropping systems in Kenya. In Keswani, C.L.; Ndunguru, B.J., eds. Symposium on Intercropping in Semi-Arid Areas, 2nd., Morogoro, Tanzania, 1980. Proceedings. Ottawa, Canada, International Development Research Centre. pp.146-154. Engl. 4 Refs. [Dryland Cropping Systems Research Project, Agency for International Development, Kenya Agriculture Research Inst., P.O. Box 30148, Nairobi, Kenya]

Phaseolus vulgaris. Technology evaluation. Economics. Mathematical model. Income. Yields. Intercropping. Zea mays. Labour. Kenya.

A cooperative effort between the research agronomist and the agricultural economist, using a farming-system approach, to develop and evaluate improved cropping systems for the marginal rainfall areas of Kenya is reported. In 1977 production problems and research priorities were identified for the program that began during the long rains season of 1978 and the expt. of the short rains season of the same year. Exptl. data were statistically analyzed and significant results were evaluated economically to test their feasibility. For the economic analysis, a computer model was developed to determine the effect of the introduction of new cropping technologies on the farmer's net income. In addition to the basic representative farm, 10 other farm models were studied. The technologies analyzed are simple and can be easily integrated into the farmers' existing farming systems. With these technologies av. yields of 4299 t maize and 0.949 t beans can be obtained per hectare, planted in the same row; 4023 and 0.812 t of maize and beans/ha, resp., when planted in alternate rows; and 1907 and 1917 t/ha for beans in monoculture with 1 and 2 plants/hole, resp. Net income would increase more than 800% and intercropping would reflect the use of improved technologies in both seasons. It is shown that depending on the labor situation, it is necessary to use one or more of these technologies in the cropping pattern. Credit policy should change so that farmers may widely adopt new technologies. (Summary by EDITEC. Trans. by L.M.F.) D03

0273

20002 NADAR, H.M. 1982. Intercropping under marginal rainfall conditions in Kenya. In Keswani, C.L.; Ndunguru, B.J., eds. Symposium on Intercropping in Semi-Arid Areas, 2nd., Morogoro, Tanzania, 1980. Proceedings. Ottawa, Canada, International Development Research Centre. pp.50-55. Engl. 12 Refs., Illus. [Dryland Cropping Systems Research Project, Agency for International Development, Kenya Agriculture Research Inst., P.O. Box 30148, Nairobi, Kenya]

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

The results are given of 4 intercropping trials conducted during rainy seasons of differing rainfall intensities and durations (short rains 1978, long rains 1979, short rains 1979, and long rains 1980) at the Dryland Farming Research Station in Katumani, Machakos District (Kenya). The soil is rich in biotite, with a total water storage capacity of 100 mm. Bean yield in the maize/bean intercrop was consistently reduced. Yield reduction due to the no. of pods/plant was 12-18%, whereas reduction due to reduced population was 36% compared with the monoculture (1-2 plants/site). When the intercropped bean population was equal to that of monoculture, yield reduction was mainly due to a decrease in the no. of pods/plant. The antagonistic competitive effect is greatly increased beyond the levels where intercrop competition is at a min. (Summary by EDITEC. Trans. by L.M.F.) D03

0274

20005 OSIRU, P.S.O. 1982. Genotype identification for intercropping systems: summary. In Keswani, C.L.; Ndunguru, B.J., eds. Symposium on Intercropping in Semi-Arid Areas, 2nd., Morogoro, Tanzania, 1980. Proceedings. Ottawa, Canada, International Development Research Centre. pp.91-92. Engl. [Dept. of Crop Science, Makerere Univ., P.O. Box 7062, Kampala, Uganda]

Phaseolus vulgaris. Cultivars. Intercropping. Spacing. Maturation. Yields. Zea mays. Genotypes. Kenya.

A series of expt. was conducted at the U. of Nairobi field station (Kenya) during the end of the 2nd rains in 1978 and during the 1st rains of 1979 to evaluate the performance of some promising bean var. under intercropping. Three bean var. were used: Mwesi Moja, Canadian Wonder, and a black var. with early, medium, and late maturity, resp. Maize var. Katumani Composite, which matured within 130 days under Kabete conditions, was used. Intercrops consisted of 2/3 maize-1/3 beans and 1/3 maize-1/3 beans; monocultures of maize and beans, sown at 60 x 30 and 60 x 30 cm spacing, were also included. Normal weeding and fertilizing practices were followed. Early-maturing beans (erect and determinate) maintained better yields in association than medium- or late-maturing var. The highest increase in total yield corresponded to maize intercropped with early beans (2/3 maize-1/3 beans). (Summary by EDITEC. Trans. by L.M.F.) D03

0275

20006 RHEENEN, H.A. VAN; HASSELBACH, O.E.; MUIGAI, S.G. 1982. Bean production in monoculture and in association with maize: the effect of diseases and pest incidence: summary. In Keswani, C.L.; Ndunguru, B.J., eds. Symposium on Intercropping in Semi-Arid Areas, 2nd., Morogoro, Tanzania, 1980. Proceedings. Ottawa, Canada, International Development Research Centre. pp.115-116. Engl. [Grain Legume Project, National Horticultural Research Station, Ministry of Agriculture, P.O. Box 220, Thika, Kenya]

Phaseolus vulgaris. Intercropping. Zea mays. Pseudomonas phaseolicola. Bean common mosaic virus. Colletotrichum lindemuthianum. Xanthomonas phaseoli. Isariopsis griseola. Whetzelinia sclerotiorum. Phoma. Biological control. Kenya.

Results of field observations on diseases and insects in Kenya, initiated in 1976 and continued over a 5-yr period, are given. Data are included of breeding and agronomic trials carried out at 7 research sites with bean var. K-74 and maize both in monoculture and in association (alternate rows of 50 x 10 cm or 25 x 10 cm when 2 bean rows were planted for each maize

row as in 1979). Severity of disease and pest incidence was scored according to a symptoms scale from 0 to 5. Compared with monoculture, beans grown in association with maize had a lower incidence of halo blight (Pseudomonas phaseolicola), BCMV, anthracnose (Colletotrichum lindemuthianum), common blight (Xanthomonas phaseoli), scab, Phoma spp., bollworm, mildew, and to a lesser extent, angular leaf spot (Isariopsis griseola). However, higher incidence of white mold (Whetzelinia sclerotiorum) and Systates sp. was observed. The incidence of rust (Uromyces phaseoli) and aphids was erratic. Apparently, maize-bean intercropping exerts a certain type of biological control. (Summary by EDITEC. Trans. by L.M.F.) D03

0276

20003 URIYO, A.P.; SINGH, B.R.; MSAKY, J.J. 1982. Evaluation of phosphorus placement methods and nitrogen carriers under conditions of maize-bean intercropping: summary. In Keswani, C.L.; Ndunguru, B.J., eds. Symposium on Intercropping in Semi-Arid Areas, 2nd., Morogoro, Tanzania, 1980. Proceedings. Ottawa, Canada, International Development Research Centre. pp.65-66. Engl. [Dept. of Soil Science, Univ. of Dar es Salaam, P.O. Box 35091, Morogoro, Tanzania]

Phaseolus vulgaris. Intercropping. Zea mays. Fertilizers. P. N. Yields. Tanzania.

The results of a series of expt. conducted during the 1977 and 1978 cropping seasons with maize and beans grown in monoculture and in associated systems are summarized. Trials took place at Mafiga Farm of the U. of Dar es Salaam (Tanzania) on an Oxisol (Typic Acrorthox) to evaluate 3 P placement methods (broadcasting, side-dressing, and drilling) and 3 N carriers (ammonium sulphate, urea, and calcium ammonium nitrate). A split plot design replicated 3 times was used in the P placement expt. with 2 rates (10 and 20 kg P/ha). Each N carrier was applied at 3 rates: 0, 20, and 40 kg/ha. Planting distances were 75 x 30 cm and 35 x 15 cm for maize and bean, resp. Bean was planted between the maize rows. The application of P increased the yield of monocropped maize but not that of intercropped maize or monocropped beans. Results suggest that for Oxisols, P fertilizer should be banded on the surface just after sowing or drilled into the soil a few centimeters below the seeds in the same furrow. N increased maize and bean yield in both monoculture and intercropping systems. Calcium ammonium nitrate is preferred on acidic soils because it results in no residual activity. A discussion held by different interlocutors on the utilization of additional elements in using N sources and the possibility of confounding results is included. (Summary by EDITEC. Trans. by L.M.F.) D03

0277

19762 ZOEBL, D. 1983. Scope for GLP seeds: the views of a farming systems economist. Kenya Farmer 1983(August. Special issue: Food beans in Kenya):24-25. Engl., illus. [Grain Legume Project, National Horticultural Research Station, P.O. Box 220, Thika, Kenya]

Phaseolus vulgaris. Seed. Intercropping. Zea mays. Planting. Kenya.

The scope for improved bean seed of the Grain Legume Project (GLP) in Kenya is analyzed. Most of the beans cultivated by small-scale farmers, using several traditional methods, is found in the coffee-banana-Cynodon plectostachyus zone located at 1400-1900 m.a.s.l. Improved cultural practices should reach women, who are the ones that cultivate this crop. Beans are randomly sown between maize rows, fertilizers are not applied,

and 1-2 weedings are done. Beans are harvested in the yellow pod stage, and then dried, threshed, and cleaned for family consumption; surpluses are sold to the markets. The following cropping system is recommended: maize in rows, beans randomly distributed between maize rows; hybrid or composite maize, beans from the farm; maize provided with fertilizer and/or manure, beans without fertilization. The small farmer invests in maize and not in beans, due to the favorable prices and higher returns of maize seeds. GLP bean seed has possibilities of being used by commercial growers in Kenya in the future, by using adequate technology and by producing in regions most suited for this crop. Small farmers could therefore spend more time on growing vegetables, potatoes, or dairy farming, representing less effort and higher profitability than traditional bean cultivation. (Summary by EDITEC. Trans. by L.M.F.) D03

See also 0254 0256 0258 0363 0364

D04 Seed Production

0278

20648 FERNANDES, G.M.P.; SOUZA FILHO, B.F. DE; PARENTE, F.C. 1982. Consideracoes sobre a qualidade da semente de feijao utilizada no Norte Fluminense. (Considerations on the quality of bean seed used in northern Fluminense). Campos-RJ, Brasil, Empresa de Pesquisa Agropecuária do Estado do Rio de Janeiro. Estacao Experimental de Campos. Comunicado Técnico no.104. 3p. Port. [Empresa de Pesquisa Agropecuária do Estado do Rio de Janeiro, Av. Francisco Lamego, 134, 28.100 Campos-RJ, Brasil]

Phaseolus vulgaris. Seed vigor. Seed characters. Cultivars. Germination. Mycoses. Bacterioses. Seed production. Brazil.

Ninety-two seed samples from different locations of the northern Fluminense region were analyzed for germination, vigor, field emergence, and diseases. Most of the samples were of black bean var. Rio Tibagi, Venezuela 350, Uberabinha, Rico 23, and Pururuca. Some seeds were infected by bacteria and fungi, mainly Fusarium, Pennicillium, Aspergillus, Rhizopus, Macrophomina, Phoma, and Rhizoctonia. Recommendations on how to produce high quality bean seed are given. (Summary by EDITEC) D04

0279

18719 POLANIA F., F. 1981. Guías y requisitos para la producción de semilla. (Guidelines and requisites to produce seed). In Curso Intensivo de Adiestramiento Post-Grado en Investigación para la Producción de Fríjol en el Perú, La Molina, 1981. Trabajos presentados. Lima, Instituto Nacional de Investigación y Promoción Agropecuaria. pp.1-6. Span.

Phaseolus vulgaris. Seed production. Legal aspects. Peru.

Tables are presented which include information on how to obtain and guarantee high quality bean seed production. Three types of seed can be distinguished: basic seed, 1st generation seed (registered), and certified commercial seed. Aspects that should be considered include: type of producers, seed origin, multiplication areas and their characteristics, planting dates, planting densities, isolation, surface area of the fields, pest and weed control, control of seed-borne diseases, tolerance of out-of-type plants, MC at harvest, moisture % for threshing, drying temp.,

treatment, storage conditions, and postharvest control. (Summary by EDITEC) D04

0280

18721 SCHEUCH, F. 1981. Estrategias para mejorar un programa de semillas a nivel nacional. (Strategies to improve seed programs at the national level). In Curso Intensivo de Adiestramiento Post-Grado en Investigación para la Producción de Fríjol en el Perú, La Molina, 1981. Trabajos presentados. Lima, Instituto Nacional de Investigación y Promoción Agropecuaria. pp.1-5. Span.

Phaseolus vulgaris. Seed production.

A brief analysis is made of the reasons why bean seed production in Peru has decreased and strategies are proposed to improve seed supply to farmers. The main limiting factors are the high cost of improved seed, price fluctuations of harvested product, and problems of commercialization. The promotion of seed production is proposed through government mechanisms allowing for credit with low interest rates to produce and buy seed by seed industries and producers. Also proposed is the possibility of taking advantage of the infrastructure existing in seed enterprises to process, store, and commercialize bean seeds and allow farmers with an adequate technology level to produce seed under the supervision of technicians working for the government; in this case, the steps to be followed during the 1st 2 yr are indicated. (Summary by EDITEC) D04

E00 PLANT PATHOLOGY

0281

20067 LOPEZ R., J.H. 1975. Annual report on improvement of tropical production of beans and cowpeas through disease and insect control, January 1-December 31, 1974. Washington, D.C., Department of State. Agency for International Development. 193p. Engl., Sum. Engl.

Phaseolus vulgaris. Cucumber mosaic virus. Jatropha mosaic virus. Xanthomonas phaseoli. Uromyces phaseoli. Nematodes. Resistance. Empoasca fabae. Acanthoscelides obtectus. Adaptation. Cultivars. Disease control. Insect control. USA. Puerto Rico.

A summary of the accomplishments of the project of improvement of tropical production of beans and cowpeas through disease and insect control is given. The new bean strain of cucumber mosaic virus (CMV) was characterized fully. Electron microscopy studies indicated that, ultrastructurally, the new bean virus was related to CMV. A previously unreported mosaic virus of Canavalia maritima was characterized using criteria such as host range, indicators, serology, physical properties, vector specificity, and electron microscopy. The causal agent seems to be new, although perhaps related to one aphid-borne cowpea mosaic virus studied by Zettler in Florida (USA). The whitefly-transmitted mosaic virus of Jatropha gossypifolia was found to affect beans, soybeans, and Jacquemontia tamnifolia. however, Bemisia tabaci race jatrophae, the vector, will not survive on the leguminous hosts and Jacquemontia. A new virus, discovered affecting Poinsettia geniculata in the Isabela area, will affect beans, soybeans, tobacco, and Datura stramonium but is not capable of infecting Rhynchosia minima. It seems to be related to the Brazilian mosaic virus of Euphorbia prunifolia. Both basic copper sulfate and copper

hydroxide controlled common bacterial blight of beans (Xanthomonas phaseoli). Bean rust (Uromyces appendiculatus) was controlled by mancozeb, oxycarboxin, and triforine. The last 2 fungicides are systemic and were applied every 14 days. Isolates of Xanthomonas from beans and cowpeas displayed the following types of pathogenicity to these 2 crops: virulent-virulent, virulent-avirulent, avirulent-virulent, and avirulent-avirulent. Isolates of X. phaseoli var. fuscans when inoculated to cowpeas and beans very frequently lost their capacity to produce pigment. A Xanthomonas culture, virulent to cowpea and with capacity to produce a distinct blackish pigment, was isolated from a cowpea seedling inoculated with a nonpigment producing culture. Phaseolus vulgaris cv. mainly developed leaf blight symptoms when inoculated with the same Xanthomonas culture. Soil and root samples taken to determine the nematodes associated with beans and cowpeas indicated the presence of a no. of known and suspected plant-parasitic species, among which Rotylenchulus, Helicotylenchus, Meloidogyne, Pratylenchus, Tylenchus, Aphelenchus, and Aphelenchoides were the most common nematode genera found. Additional data is needed to determine the degree of resistance or susceptibility of the var. or accessions examined to any of the above mentioned nematodes. Field tests were performed with beans and cowpeas to determine the effectiveness of promising insecticides. Twenty-six cv. or lines of beans and cowpeas were planted to observe differences on susceptibility to destructive insects. No conclusive results were obtained with the insecticides tested due, in part, to a low insect infestation and, in other occasions, possibly to heavy rains after application of treatments. Evidence of plant resistance to the bean leafhopper (Empoasca fabae) was found in 8 selections of the white bean cv. Bonita. Colored cv. (Rayada, Jamaica, Marca Diablo, and Pompadour) were very susceptible to leafhopper attack. Yields of susceptible cv. were very drastically reduced. A possible var. resistance was also found on bean cv. Sin Fibra and Galana to the bean weevil, Acanthoscelides obtectus. Rust-resistant bean lines were obtained through naturally occurring cross-pollination in the field. Some of these lines have proved resistant against a wide range of rust races endemic in the tropics. Bean cv. with multiple virus resistance were developed through field cross-pollinations. A no. of bean cv. have been selected for adaptability to warm humid lowland tropics, insensitivity to short daylength, multiple disease resistance, and yield. A central bank of seed of diagnostic plant species is being established at the Mayaguez Institute of Tropical Agriculture (Puerto Rico). Three dry bean hybrids with multiple disease resistance characteristics and 14 selected rust-resistant lines bean were released and seeds were sent to cooperators and interested researchers in 25 foreign countries, 9 states of the USA, and others in Puerto Rico. (Extracted from author's summary) E00

0282

20628 PLOPER, L.D.; RICCI, J.R.; DANTUR, N.C. 1982. Impresiones de la primera reunión técnica nacional de poroto. (Notes of the first national technical meeting on beans). Avance Agroindustrial 3(9):3-11,29. Span., Illus. [Estación Experimental Agroindustrial "Obispo Colombres", Tucumán, Argentina]

Phaseolus vulgaris. Bean chlorotic mottle virus. Xanthomonas phaseoli. Rhizoctonia solani. Colletotrichum lindemuthianum. Isariopsis griseola. Whetzelinia sclerotiorum. Disease control. Argentina.

The different activities carried out during the 1st technical meeting held in Argentina in collaboration with representatives of CIAT to identify bean production problems and make recommendations for bean research, production, and transfer of technology in the short, intermediate, and long term are described. Major diseases include bean chlorotic mottle virus, common

bacterial blight (Xanthomonas phaseoli), web blight (Thanatephorus cucumeris), anthracnose (Colletotrichum lindemuthianum), angular leaf spot (Isariopsis griseola), and white mold (Whetzelinia sclerotiorum) which occur depending on regional ecology, crop technology, and land use. The recommendations include the use of pathogen-free certified seed, crop rotation, use of var. resistant to insect pests and diseases, use of preventive and control methods, identification of seed production areas, and the development of regulations for the multiplication of registered and tested var. Research activities should be coordinated between official institutions and private industries producing bean seed. (Summary by EDITEC) E00

See also 0233 0316

E02 Bacterioses

0283

19877 ROSTON, A.J.; ISSA, E.; CAMPOS, T.B. DE 1982. Doencas e pragas do feijoeiro. (Bean pests and diseases). Campinas-SP, Brasil, Secretaria de Agricultura e Abastecimento. Coordenadoria de Assistencia Técnica Integral. Producao Prática CATI no.217. 15p. Port., Illus. [Coordenadoria de Assistencia Técnica Integral, Caixa Postal 960, 13.100 Campinas-SP, Brasil]

Phaseolus vulgaris. Symptomatology. Disease control. Colletotrichum lindemuthianum. Uromyces phaseoli. Pseudomonas syringae. Isariopsis griseola. Erysiphe polygoni. Bean golden mosaic virus. Plant injuries. Tetranychus desertorum. Polyphagotarsonemus latus. Epinotia opposita. Empoasca. Elasmopalpus lignosellus. Agrotis. Bemisia tabaci. Agromyza. Liriomyza. Diabrotica. Thysanoptera. Brazil.

The symptomatology (photos included) and major control measures (mechanical and chemical) recommended for the following bean diseases in Brazil are briefly described: anthracnose (Colletotrichum lindemuthianum), rust (Uromyces phaseoli), bacterial brown spot (Pseudomonas syringae), angular leaf spot (Isariopsis griseola), powdery mildew (Erysiphe polygoni), BGMV, and root rots. The type of damage caused and control measures for the most common pests are also given: red spider mite (Tetranychus desertorum), tropical mite (Polyphagotarsonemus latus), red mite, green mite, epinotia (Epinotia opposita), leafhopper (Empoasca spp.), stemborer (Elasmopalpus lignosellus), cutworms (Agrotis spp.), whiteflies (Bemisia tabaci), leafminers (Agromyza sp., Liriomyza sp.), aphids, thrips, and chrysomelids (Diabrotica spp.). (Summary by F.G. Trans. by L.M.F.) E02

0284

17457 SAÑUDO S., B.; PUMALPA C., N. 1982. Algunas consideraciones sobre el añublo bacterial de halo (Pseudomonas phaseolicola Burkh. Dows.) del fríjol en el departamento de Nariño. (Considerations on halo blight of beans in Nariño). Ascolfi Informa 8(2):19-21. Span.

Phaseolus vulgaris. Pseudomonas phaseolicola. Chemical control. Disease control. Yields. Colombia.

Pseudomonas phaseolicola is a factor limiting the production of bean var. Diacol Andino in Nariño, Colombia. In chemical control trials, copper oxychloride applied at planting, initiation of flowering, and pod fill at the rate of 4 g/l of water produced yields of 1706.67 kg/ha compared with

the control treatment (no chemical control) which produced 771.94 kg/ha. (Summary by EDITEC) E02

0285

19763 STOETZER, H.A.I.; OMUNYIN, M.E. 1983. Controlling bean pests and diseases. Kenya Farmer 1983(August. Special issue: Food beans in Kenya):22-24. Engl., Illus. [Grain Legume Project, National Horticultural Research Station, P.O. Box 220, Thika, Kenya]

Phaseolus vulgaris. Symptomatology. Disease control. Insect control. Pseudomonas phaseolicola. Xanthomonas phaseoli. Isariopsis griseola. Uromyces phaseoli. Bean common mosaic virus. Ophiomyia phaseoli. Kenya.

The incidence, symptomatology, and control measures (cultural and chemical) of the following major bean diseases in Kenya are detailed: halo blight (Pseudomonas phaseolicola), common blight (Xanthomonas phaseoli), angular leaf spot (Isariopsis griseola), rust (Uromyces phaseoli), and BCMV. The same information is given for the bean fly (Ophiomyia phaseoli) and the bruchids Zabrotes sp. and Acanthoscelides sp. (Summary by F.G. Trans. by L.M.F.) E02

See also 0275 0319 0324 0331 0335 0348

E03 Mycoses

0286

20091 GNANAMANICKAM, S.S. 1979. Isolation of isoflavonoid phytoalexins from seeds of Phaseolus vulgaris L. Experientia 35(3):323. Engl., Sum. Engl., 9 Refs.

Phaseolus vulgaris. Seed. Phytoalexins. Rhizoctonia solani. Resistance. India.

Phaseolus vulgaris seeds colonized by Rhizoctonia solani or exposed to natural microflora yielded the phytoalexins phaseollin, phaseollidin, phaseollinisoflavan, coumestrol, and kievitone. The data suggested that seed might have the major host-defense factors of a plant. (Author's summary) E03

0287

19938 HEATH, M.C. 1983. Relationship between developmental stage of the bean rust fungus and increased susceptibility of surrounding bean tissue to the cowpea rust fungus. Physiological Plant Pathology 22(1):45-50. Engl., Sum. Engl., 11 Refs. [Dept. of Botany, Univ. of Toronto, Toronto, Ontario M5S 1A1, Canada]

Phaseolus vulgaris. Uromyces phaseoli. Etiology. Snap beans. Canada.

Primary leaves of bean cv. Pinto were inoculated with the nonpathogenic Uromyces phaseoli var. vignae (U. vignae) on one surface and with the pathogenic U. phaseoli var. typica (U. appendiculatus) on the other. The pathogenic fungus was applied so that it would be at differing stages of development at the time that the cowpea rust should have attempted (normally unsuccessfully) to form its 1st haustorium. More infection hyphae of the cowpea rust produced haustoria at sites where the 2 fungi were in close proximity, but only where the 1st haustorium of the bean rust

was probably maturing, or had already formed, at the time of initiation of the haustorium of U. vignae. The presence of an infection hypha, without a haustorium, of the pathogen did not seem to enhance frequency of haustorium production by U. vignae, even though exudates from these hyphae have been shown to have such an effect when injected into bean tissue. These results suggest that the increased susceptibility of tissue detected by double inoculation expt. involving compatible and incompatible rust fungi is most likely to be the consequence of successful haustorium formation by the pathogen; apparently such expt. cannot be relied upon to detect types of induced susceptibility which are active before the 1st haustorium is initiated and which may be responsible for allowing this haustorium to form. (Author's summary) E03

0288

20020 INSTITUT DES SCIENCES AGRONOMIQUES DU RWANDA. 1982. Legumineuses: Essais comparatifs de fongicides contre les champignons maculicolles du haricot. (Legumes: comparative fungicide trial to control fungi in haricot beans). In _____. Compte rendu des travaux du Departement Amenagement du Milie et du Departement des Laboratoires en 1981. Rubona. pp.20-21. Fr. [B.P. 138, Butare, Rwanda]

Phaseolus vulgaris. Isariopsis griseola. Colletotrichum lindemuthianum. Ascochyta phaseolorum. Disease control. Chemical control. Snap beans. Rwanda.

Two fungicides, benomyl (WP 50%) applied at 1 kg/ha in 1000 l of water and triphenyltin acetate (WP 60%) applied at 0.5 kg/ha, were compared during the 2nd cropping season at Rubona, Rwerere, and Karama (Rwanda) to determine their efficiency of controlling Isariopsis griseola, Colletotrichum lindemuthianum, and Ascochyta phaseolorum. Dwarf, semiclimbing, and climbing var. were used at the 3 sites. Treatments were replicated 3 times. Triphenyltin acetate was eliminated due to its phytotoxicity. Fungi were not controlled and the check var. was not outyielded. (Summary by EDITEC. Trans. by L.M.F.) E03

0289

19894 KAMINSKYJ, S.C.W.; HEATH, M.C. 1983. Histological responses of infection structures and intercellular mycelium of Uromyces phaseoli var. typica and U. phaseoli var. vignae to the HNO_2-MBTH-$FeCl_3$ and the IKI-H_2SO_4 tests. Physiological Plant Pathology 22(2):173-179. Engl., Sum. Engl., 18 Refs., Illus. [Dept. of Botany, Univ. of Toronto, Toronto, Ontario M5S 1A1, Canada]

Phaseolus vulgaris. Uromyces phaseoli. Snap beans. Etiology. Analysis. Canada.

The IKI (0.2% I dissolved in 2% aqueous KI)-H_2SO_4 and the HNO_2-MBTH (3-methyl-2-benzothiazolinone hydrazone hydrochloride, MCB)-$FeCl_3$ staining reactions for chitosan, chitin, and hexosamine were examined in the rust fungi Uromyces phaseoli var. typica and U. phaseoli var. vignae. Identical reactions were seen for both organisms. No staining was observed in any fungal structure when treated directly with IKI-H_2SO_4. However, after autoclaving in alkali to convert chitin to chitosan, this test resulted in a pink-violet coloration of the walls of germ tubes, infection structures, and intercellular mycelium. In contrast, the walls of urediospores, germ tubes, appressoria, and intercellular mycelium, but not those of the substomatal vesicles, infection hyphae, or young secondary hyphae, turned blue with HNO_2-MBTH-$FeCl_3$ in the absence of alkali treatment. A comparison of the 2 staining reactions applied to particles of partially purified

chitin which had been deacetylated to different degrees, suggested that the fungal material reactive with HNO_2-MBTH-$FeCl_3$ was hexosamine which was not in the form of chitosan. Results suggest that while the walls of germ tubes, infection structures, and intercellular mycelium all contain chitin, there is a change in other wall components as the fungus enters the plant, and again as the intercellular mycelium becomes established. (Author's summary) E03

0290

20639 NIK, W.Z.W.; YAP, M.Y. 1979. Rhizoctonia solani, a seed-borne pathogen of French bean in Malaysia. Pertanika 2(1):11-15. Engl., Sum. Engl., Mal., 18 Refs., Illus.

Phaseolus vulgaris. Rhizoctonia solani. Disease transmission. Isolation. Etiology. Pathogenicity. Disease control. Chemical control. Snap beans. Malaysia.

Biology, pathogenicity, and chemical control of Rhizoctonia solani (the imperfect state of Thanatephorus cucumeris) were studied using an isolate from infected French bean seed. The fungus was found to be seed-borne on both imported and local bean var. Growth rate of fungus varied with temp. and culture medium used. Malt extract agar gave poor growth and lima bean agar supported fungal growth best at 28°C. The fungus infected aerial parts of bean plants. The strain had a wide host range. In vitro studies to test the efficacy of 5 fungicides (copper oxychloride, PCNB, benomyl, captan, and thiram) against the fungus showed that PCNB at 500 ppm gave good control. (Author's summary) E03

0291

20097 OKIROR, M.A.; GUPTA, V.K.; VAN BREUKELEN, E.W.M. 1982. Genetic and physiological variation among bean lines resistant and susceptible to bean anthracnose. Theoretical and Applied Genetics 62(4):355-359. Engl., Sum. Engl., 19 Refs., Illus. [Dept. of Crop Science, Univ. of Nairobi, P.O. Box 30197, Nairobi, Kenya]

Phaseolus vulgaris. Cultivars. Resistance. Colletotrichum lindemuthianum. Genetics. Analysis. Enzymes. Plant development. Selection.

Electrophoresis was used to determine genetic and/or biochemical variation, if any, among bean lines resistant and susceptible to anthracnose (Colletotrichum lindemuthianum). This was based on 2 enzyme systems: peroxidase and esterase. Resistant and susceptible plants differed in their band patterns and intensities. Band intensity differences occurred mainly among monomorphic bands with higher intensities expressed by susceptible plants, while band pattern differences were expressed both by resistant and susceptible plants. These differences appeared only at certain stages of development, identified as 3 and 40 days after emergence and considered as critical stages for screening purposes. The peroxidase isozyme A_5 and the esterase isozyme C_1 at 3 days, and the peroxidase band C_1 and esterase bands A_1 and A_2 at 40 days were important because these differences could be used as genetic/biochemical markers for screening the population for resistance. Thus, electrophoretic differences could be used as a screening aid and this could save time and effort in breeding programs. Comparisons between inoculated and noninoculated leaves of resistant and susceptible lines indicated that infection induced changes in both the amount and kind of peroxidases even before symptoms of the disease appeared. However, there were no specific differences between resistant and susceptible lines, indicating that these lines responded to infection in the same manner. (Author's summary) E03

0292

20810 VELEZ DE A., B. 1984. Componentes de resistencia del fríjol (Phaseolus vulgaris L.) a la roya (Uromyces phaseoli (Pers.) Unger. [Components of resistance in beans to rust (Uromyces phaseoli)]. Tesis Biol.Bot. Cali, Colombia, Universidad del Valle. Departamento de Biología. 82p. Span., Sum. Span., 69 Refs., Illus.

Phaseolus vulgaris. Uromyces phaseoli. Cultivars. Resistance. Statistical analysis. Colombia.

A trial was carried out at CIAT-Palmira, Colombia, to determine stable and/or lasting mechanisms of resistance to bean rust (Uromyces phaseoli). Sixteen bean lines were selected and classified into 6 categories on the basis of pustule diameter and the % of leaflet area infected with rust in previous evaluations. A split plot design was used with 3 replications and 3 treatments (inoculation, protection, and natural development). Data was recorded at 3-day intervals during 2 planting seasons. Certain components of resistance were analyzed, namely, pustule diameter, disease severity, plant growth stage, and disease development rate. The relationship between disease severity and decrease in production was studied. The epidemiological progress curve of rust was determined for each line using the Logistic and Gompertz equations and the area under the curve. Lines Mex 309, Línea 22, A 179, and BAT 1256 showed small pustules as well as a slow disease development. These lines, generally associated with lasting resistance, could be useful in a breeding program to increase horizontal resistance to U. phaseoli. Lines ExRico 23, Carioca, A 201, and BAT 41, classified as susceptible when their K values (infection rate in the Gompertz equation) were determined, also had the greatest area under the curve, and lines Mex 309, Línea 22, A 179, and BAT 1256, classified as resistant when K values were considered, were also found to be resistant when compared with the area under the curve. This shows that the determination of the area under the curve estimates moreless accurately the level of resistance that slows down disease development. (Author's summary. Trans. by L.M.F.) E03

0293

5764 WILKINSON, R.E.; KRIKUN, J.; WALLACE, D.H. 1983. Resistance to Thielaviopsis basicola in bean. Bean Improvement Cooperative Annual Report no.6:29. Engl.

Phaseolus vulgaris. Thielaviopsis basicola. Cultivars. Resistance. Fusarium solani phaseoli.

A breeding program for resistance to root rot (Fusarium solani sp. phaseoli), initiated in 1949, with the 2 sources of resistance N 203 (Phaseolus vulgaris P.I. 203958) and an interspecific cross with P. coccineus, is reported. It was discovered that both of these sources of resistance to F. solani were also resistant to Thielaviopsis basicola. Resistance to T. basicola seems to be more sharply defined and reactions are grouped into 4 categories: highly resistant (P. coccineus and some breeding lines), resistant (N 203 and many breeding lines), susceptible (Red Kidney, Contender, and some breeding lines), and very susceptible (Yellow Eye and Tendercrop). Although the culture employed was originally isolated from tobacco, the possibility of strains of the pathogen is recognized. (Summary by EDITEC. Trans. by L.M.F.) E03

See also 0271 0275 0283 0285 0318 0319 0323 0324 0331 0334 0335 0344 0348

0294

19898 BIRD, J.; LOPEZ R., J.H. 1973. Whitefly and aphid-borne viruses of beans in Puerto Rico. In Luse, R.A.; Williams, R.J., eds. IITA Workshop on Grain Legume Improvement, 1st., Ibadan, Nigeria, 1973. Proceedings. Ibadan, International Institute of Tropical Agriculture. pp.276-278. Engl.

Phaseolus vulgaris. Rhynchosia mosaic virus. Ipomoea quinquefolia mosaic virus. Jacquemontia mosaic virus. Bemisia tabaci. Disease transmission. Vectors. Resistance. Aphis gossypii. Puerto Rico.

Studies carried out to group, determine the incidence of, and characterize the diseases transmitted by the whitefly Bemisia tabaci and aphids to beans in Puerto Rico are reported. These are assumed to be caused by viruses. Among major diseases is Rhynchosia (mainly R. minima) which has primary affinity for leguminous hosts and is transmitted by B. tabaci race sidae. Resistance to this virus has been located on several high yielding lines of pigeon pea and on 2 bean var., La Vega and Santa Ana. BGYMV, from Phaseolus lunatus, is another important virus of high incidence on the island. No resistance has been located so far and it seems to be restricted to legumes. Its presence is indicated, even in mixed infections, by a bright golden yellow color component and resembles the golden yellow mosaic studied by Costa in Brazil. Ipomoea quinquefolia affects bean and tomato, causing leaf distortion and its symptoms, similar to those of Rhynchosia, are ephemeral. Host ranges of these 2 pests differ. The Jacquemontia mosaic virus has main hosts in Jacquemontia pentantha and J. tamnifolia, and unlike I. quinquefolia and Rhynchosia, does not form enations. Results of host range studies indicate that this virus is not related to the others. Attempts to transmit Sida carpinifolia to bean through B. tabaci have been unsuccessful. There is evidence that BGYMV can be transmitted by mechanical means using adjuvants (activated charcoal, NaDIECA, and phosphate buffer). Using sucrose, activated charcoal, and phosphate buffer as additives, the causal agent of R. minima was also transmitted. Whitefly-transmitted viruses also occur in the field. The Rio Piedras group of the Grain Legume Project finished a study on a new mosaic virus transmitted by Aphis gossypii. (Summary by FDITEC. Trans. by L.M.F.) E04

0295

19940 CARR, R.J.; KIM, K.S. 1983. Ultrastructure of mixed plant virus infection: bean yellow mosaic virus with cowpea severe mosaic virus or cowpea mosaic virus in bean. Virology 124(2):338-348. Engl., Sum. Engl., 30 Refs., Illus. [Dept. of Plant Pathology, Univ. of Arkansas, Fayetteville, AR 72701, USA]

Phaseolus vulgaris. Bean yellow mosaic virus. Cowpea mosaic virus. Cytology. Leaves. Serology. Analysis. USA.

Ultrastructural responses of bean leaf cells simultaneously infected with 2 morphologically distinct RNA viruses, cowpea mosaic virus (CPMV) and BYMV, or cowpea severe mosaic virus (CSMV) and BYMV, were studied in situ. The major effects on cells infected with 2 viruses included: association of virus group-specific cytoplasmic inclusions characteristic of each virus; close association of virions into specifically arranged aggregates in which CPMV or CSMV icosahedra were aligned along the long axes of the BYMV rods; and the induced formation of intranuclear inclusions, spheres (22-26 nm in diameter), and filaments (10-14 nm wide and of variable length) in mixed infections of CSMV and BYMV. Intracellular serological testing using ferritin conjugated with CSMV antibodies revealed no relationship between

the spherical intranuclear inclusions and CSMV capsids. Evidently, the ultrastructure of mixed infections could be used as another tool for identifying related plant viruses. (Author's summary) E04

0296

19946 KOPEK, J.A.; SCOTT, H.A. 1983. Southern bean mosaic virus in Mexican bean beetle and bean leaf beetle regurgitants. Journal of General Virology 64(7):1601-1605. Engl., Sum. Engl., 12 Refs.

Phaseolus vulgaris. Epilachna varivestis. Cerotoma trifurcata. Southern bean mosaic virus. Disease transmission. USA.

Induced regurgitants from Mexican bean beetles (Epilachna varivestis), and bean leaf beetles (Cerotoma trifurcata), fed on BSMV-infected Black Valentine bean, contained concn. of virus comparable with those in crude sap from infected leaf tissue. When beetles were fed on Pinto bean leaves dipped in purified virus concn. of 1 or 10 mg virus/ml buffer, the amount of virus in the regurgitants and serial transmission levels by both beetles were related to the concn. from which acquisition occurred. A reduction in transmission levels with time after acquisition feeding occurred at different rates for each species of beetle and was associated with decrease of virus in the regurgitant. Mexican bean beetles but not bean leaf beetles which had fed on bromophenol blue-impregnated leaf tissue produced blue-impregnated blue-colored regurgitant and deposited the dye on feeding areas. (Author's summary) E04

0297

20673 VETTEN, H.J.; ALLEN, D.J. 1983. Effects of environment and host on vector biology and incidence of two whitefly-spread diseases of legumes in Nigeria. Annals of Applied Biology 102(2):219-227. Engl., Sum. Engl., 25 Refs., Illus. [Biologische Bundesanstalt für Land- und Forstwirtschaft, Institut für Viruskrankheiten der Pflanzen, Messeweg 11/12, 3300 Braunschweig, West Germany]

Phaseolus lunatus. Bemisia tabaci. Lima bean golden mosaic virus. Cultivars. Resistance. Rainfall. Temperature. Disease transmission. Vectors. Nigeria.

Seasonal periodicity in the incidence of cowpea golden mosaic (CGM) and lima bean golden mosaic (LBGM), 2 whitefly-spread virus-like diseases, corresponded closely with fluctuations in population density of their vector, Bemisia tabaci, at 2 contrasting sites in southern Nigeria. Peak catches of the vector followed the onset of rains after high temp. during the dry season; populations declined abruptly with continuous, heavy rainfall. At Onne, B. tabaci infested legumes at emergence and remained and reproduced on them but at Ibadan infestation was delayed and there was no evidence of reproduction on legumes. B. tabaci preferred LBGM-susceptible lima beans (Phaseolus lunatus) to resistant ones and more pupae of B. tabaci occurred on CGM-susceptible cowpea cv. than on resistant ones but these observations did not relate to the yellow-sensitivity of whiteflies. Resistant to CGM in cowpea, and to LBGM in lima bean, was identified among germplasm exposed to natural infection. Resistance was, in each case, associated with lower disease incidence, slower spread and milder expression of symptoms relative to susceptible cv. Vector nonpreference for resistant cv. may have contributed to reduced secondary spread. (Author's summary) E04

See also 0275 0283 0285 0318 0319 0323 0331 0334 0335 0344

E06 Physiological Disorders

0298

19043 BUESCHER, R.W.; ADAMS, K. 1983. Basis for enhanced softening of snap beans (Phaseolus vulgaris L.) from postharvest exposure to carbon dioxide. Journal of the American Society for Horticultural Science 108(1):58-60. Engl., Sum. Engl., 25 Refs., Illus. [Dept. of Horticultural Food Science, Univ. of Arkansas, Route 11, Fayetteville, AR 72701, USA]

Phaseolus vulgaris. Pods. CO_2. Processing. pH. Snap beans. Plant injuries. Amino acids. Plant physiological disorders. USA.

Postharvest exposure of snap bean cv. Cascade to elevated CO_2 (40%), but not reduced O_2 (2.5%), enhanced softening when the pods were subsequently heated. Softening and solubilization of pectic substances induced by CO_2 were related to lowered hydrogen ion concn., which were caused by the depletion of malic acid. In contrast, high CO_2 stimulated succinic acid accumulation but did not alter citric acid levels. Blanching and boiling reduced the content of both succinic and malic acids in pods. Transelimination was effective in depolymerizing and solubilizing pectic substances in snap bean pods. The shift in pH induced by CO_2 increased the transelimination reaction and thus increased pod softening. (Author's summary) E06

0299

19947 GUMPERTZ, M.L.; TINGEY, D.T.; HOGSETT, W.E. 1982. Precision and accuracy of visual foliar injury assessments. Journal of Environmental Quality 11(3):549-553. Engl., Sum. Engl., 18 Refs., Illus.

Phaseolus vulgaris. Leaf area. Plant injuries. Ozone. Air pollution. SO_2. Statistical analysis. Plant physiological disorders.

Mean % leaf area injured of all leaves on the plant, mean % leaf area injured of the 3 most injured leaves, and the proportion of injured leaves:total no. of leaves were evaluated as methods of assessment of foliar injury. For the 1st method, variation caused by reader bias and day-to-day variations were compared with innate variations between plants. Plants of Phaseolus vulgaris cv. Pinto, pea cv. Little Marvel, radish cv. Cherry Belle, and spinach cv. Northland were exposed to 0.3 microliters/l O_3 or 3 microliters/l sulphur dioxide for 2 h. Three leaf readers visually assessed % injury on every leaf of each plant while a 4th reader used a transparent grid to make an unbiased assessment for each plant. There was a good correlation between the 1st 2 methods of assessment except when the 3 most injured leaves were completely injured. The proportion of leaves injured was not highly correlated with % leaf area injured of all leaves on the plant for any of the study plants. Variation between plants gave 44-97% of the total variance of visual assessments, while variation among readers accounted for 0-32%. Except for radish exposed to O_3, the day-to-day variation accounted for less than 18% of the total. Reader bias in assessment of O_3 injury was significant, but a method for adjustment of visual assessment against grid assessment using a simple linear regression was provided. (Author's summary) E06

F00 PEST CONTROL AND ENTOMOLOGY

See 0233

0300

20011 BERNARDI, J.M.; PIRINOTO, J.; PAULO, A.D.: AIZAWA, J.S.: CALAFIORI, M.H.; COELHO FILHO, A. 1981. Ensaio para controle químico de tripes, Caliothrips brasiliensis (Morgan, 1929), na cultura do feijao (Phaseolus vulgaris L.). (Chemical control trial of thrips, Caliothrips brasiliensis, in bean crops). Ecossistema (Brasil) 6(1):63-65. Port., Sum. Port., Engl., 1 Ref.

Phaseolus vulgaris. Thysanoptera. Insect control. Chemical control. Brazil.

The control of thrips (Caliothrips brasiliensis) in bean crops was studied in trials carried out in Espirito Santo do Pinhal, SP, Brazil. A randomized block design with 7 treatments and 4 replications was used. Treatments were carbofuran applied to the soil at 10 and 20 kg/ha, methyl parathion sprayed at 0.3, 0.75, and 1.0 l/ha, carbofuran soil applied in spraying of 2.0 l/ha, and a check. All products were equally efficient in controlling thrips. (Author's summary) F01

0301

20646 BORTOLI, S.A. DE; NAKANO, O.; PERECIN, D. 1981. Danos de Hedylepta indicata (Fabricius, 1775) (Lepidoptera-Pyralidae) em feijoeiro comum (Phaseolus vulgaris L.). [Damage caused by Hedylepta indicata (Lepidoptera:Pyralidae) in common bean]. Científica 10(1):113-118. Port., Sum. Port., Engl., 13 Refs., Illus. [Depto. de Defesa Fitossanitária, Facultade de Ciencias Agrárias e Veterinárias, Univ. Estadual de Sao Paulo, 14.870 Jaboticabal-SP, Brasil]

Phaseolus vulgaris. Hedylepta indicata. Plant injuries. Leaf area. Brazil.

Damage caused by Hedylepta indicata on bean cv. Carioca was assessed in 2 lab. trials. Leaf area consumed by H. indicata larvae was calculated in the 1st trial as the difference between the dry wt. of the leaves supplied as feed and the part not consumed. In the 2nd trial freshly hatched caterpillars were carefully transferred to plants, 20 days after germination, on which they passed through the larval phase. Leaf area folded by the larvae was then determined. Leaf area consumed by H. indicata larva was 34.70 ± 1.52 cm^2 and folded leaf area was not directly proportional to the no. of larvae/plant (x), using the equation $Y = -7.8124 + 39.5373x - 1.9952x^2$. (Author's summary) F01

0302

20614 CALIL, A.C.P.; CHANDLER, L.; MARTINS, M.C. DEL P.; MAFFIA, L.A. 1982. A broca da raiz (Conotrachelus phaseoli Marshall) do feijoeiro (Phaseolus vulgaris L.) — sua distribuicao e danos. (Conotrachelus phaseoli in bean: its distribution and damage caused). Revista Ceres 29(165):526-532. Port., Sum. Port., Engl., 17 Refs., Illus. [Depto. de Fitotecnia, Univ. Federal de Vicosa, 36.570 Vicosa-MG, Brasil]

Phaseolus vulgaris. Planting. Timing. Conotrachelus phaseoli. Plant injuries. Yields. Brazil.

In a series of expt. undertaken at Vicosa, MG, Brazil, during 1980-81 to determine the relationship between planting time of beans and the development of pest populations, significant damage was caused by Conotrachelus phaseoli. Described from specimens collected in the state of Bahia in 1927 where Bondar recorded 20-80% of the bean plants attacked and from 15 to 30% plant mortality, the species has received little consideration as a pest

since that time. Damage is expressed as plant mortality, reduced yield, or plants remain in flower for an inordinate time but without pod set and yield. It is suggested that the pest has a wider distribution than is presently known, and that it is overlooked because of the nocturnal habits of the adults. Young plant mortality could be attributed as being caused by a disease since the low, but damaging infestations, are not always externally discernable and stem boring is most often ascribed to Elasmopalpus lignosellus. In Vicosa, plant mortality was 36.3% in the heaviest infestation. (Author's summary) F01

0303

19830 DIAZ L., R.E. 1970. Evaluación de insecticidas en el control de la mosca blanca Bemisia tabaci (Genn.) en fríjol. (Evaluation of insecticides for controlling the whitefly Bemisia tabaci in beans). In Arias, C.L., eds. Reunión Anual del Programa Cooperativo Centroamericano para el Mejoramiento de Cultivos Alimenticios, 15a., San Salvador, El Salvador, 1969. Trabajos presentados: fríjol. Guatemala, Instituto Interamericano de Ciencias Agrícolas. Publicación Miscelánea no.68. pp.33-37. Span., 7 Refs.

Phaseolus vulgaris. Bemisia tabaci. Insect control. Insecticides. Chemical control. Yields. El Salvador.

The efficiency and residual effect of 5 systemic and 2 contact insecticides were evaluated for controlling the whitefly, Bemisia tabaci, at the Santa Cruz Porrillo Exptl. Station in El Salvador. Bean var. San Andres no.1 was used in a randomized block design with 8 treatments, including the control, and 3 replications. Insecticides were formothion, DDVP, trichlorfon, thiometon, methyl demeton, dimethoate, and mevinphos. Results indicated that there were no significant differences among treatments although the treatment of trichlorfon 80% showed better control after 24 h; however, yields with this insecticide were the lowest, apparently due to a toxic effect. Significant differences ($P < 0.01$ and $P < 0.05$) were found regarding the residual effect of the insecticides 24, 48, and 72 h after application. All treatments showed better control at 24 h. Other trials should be conducted to determine more accurately the causes of the yield reduction due to the application of trichlorfon. (Summary by EDITEC) F01

0304

20607 ENKERLIN S., D.; MEDINA M., R. 1978. Susceptiblidad de 99 líneas y variedades de fríjol Phaseolus vulgaris L., al ataque de Empoasca spp., y su adaptación a las condiciones ambientales de Apodaca, N.L. (Susceptibility of 99 bean lines and varieties to attack by Empoasca spp. and their adaptation to the environmental conditions of Apodaca, Nuevo León). Informe de Investigación no.16:93-95. Span.

Phaseolus vulgaris. Cultivars. Planting. Timing. Resistance. Empoasca. Yields. Yield components. Adaptation. Mexico.

Details are given of tests in Mexico in which 99 bean lines and var. (16 from INIA-ZAC and 69 from CIAT) were tested for resistance to attack by Empoasca spp. The seeds were sown on 4 or 19 July. Two lines with the greatest resistance to Empoasca yielded well when planted on the 1st date but not when planted on the 2nd. Of those lines yielding well when planted on the 2nd date, none showed resistance to Empoasca. Only 1 line, L-63, yielded equally well for both dates. (Summary by Review of Applied Entomology) F01

0305

19852 HODEK, I.; BONET, A.; HODKOVA, M. 1981. Some ecological factors affecting diapause in adults of Acanthoscelides obtectus from Mexican mountains. In Labeyrie, V., ed. International Symposium on the Ecology of Bruchids Attacking Legumes (Pulses), Tours, France, 1980. Proceedings. The Hague, Junk. Series Entomologica v.19. pp.43-55. Engl., 16 Refs., Illus. [Inst. Entomology, Czechoslovak Academy of Sciences, 12800 Prague, Czechoslovakia]

Phaseolus vulgaris. Acanthoscelides obtectus. Temperature. Photoperiod. Insect biology. Mexico.

The F_1 generation of a sample of Acanthoscelides obtectus, collected during the summer of 1979 in Tepoztlan, Mexico, was bred under 5 conditions of different temp. and photoperiods to attempt the prevention of diapause. Insects received water, a mixture of pollen and honey, and beans in containers (13 x 13 x 7 cm) with lids with holes; RH ranged between 50-70%. Moderately low temp. (14-15°C) and rolled paper shelters with a 0.5 mm diameter were used in the course of diapause development. Data on its life cycle in relation to abiotic factors are reviewed. In the 1st activation expt. (1979) to obtain descendants for crossing, oviposition was approx. 10 wk. before its occurrence in nature. In the activation of the winter 1979 sample the most important difference in the incidence of oviposition was obtained when samples were exposed to contrasting conditions (lower temp. and luminosity, larger space, and bean pods) and then returned to previous conditions; another group that was left constantly in the previous conditions, remained nonreproductive until death of beetles. Results indicated the possibility that some beetles can reproduce without diapause, although the intensity of oviposition is low. When an attempt was made to prevent diapause females of the winter 1980 sample responded in a strikingly different manner and had a lower reproduction rate. A different response of beetles to grains and to intact and punctured pods was observed. The presence of shelters diminished the av. intensity of oviposition. The effect of RH and diapause duration in F_1 was assessed. The hypothesis that the diapause intensity and/or incidence decreases with time within 5 mo. was not confirmed. On the other hand, RH shortened the min. preoviposition period, increased the av. intensity of oviposition, and lowered the incidence of nonreproductive females. Bean pods are necessary for oviposition of A. obtectus. It is probable that adult diapause be induced by alimentary signals and that diapause requires high humidity and post-diapause development, low humidity. A change in photoperiod such as the difference in day-length between winter and summer solstice is sufficient for the regulation of the year cycle of A. obtectus. It is indicated that polymorphism exists in relation to diapause. (Summary by EDITEC. Trans. by L.M.F.) F01

0306

19704 JARRY, M. 1981. Evolution of spatial pattern of attacks by Acanthoscelides obtectus Say (Coleoptera:Bruchidae) of Phaseolus vulgaris L. pods in South West France. In Labeyrie, V., ed. International Symposium on the Ecology of Bruchids Attacking Legumes (Pulses), Tours, France, 1980. Proceedings. The Hague, Junk. Series Entomologica v.19. pp.131-141. Engl., 20 Refs. Illus. [Université Francois Rabelais, Parc de Grandmont, 37200 Tours, France]

Phaseolus vulgaris. Acanthoscelides obtectus. Pods. Snap beans. Maturation. Plant injuries. France.

The frequency of attack of Acanthoscelides obtectus in snap beans was assessed in trials carried out in Aire sur Adour, SW France. Snap bean

were planted in rows 1.50 m apart in isolated lots in the middle of maize fields in a 1:10,000 acreage ratio and over 500 m away from possible sources of infestation. Two harvesting techniques were used: (a) harvesting pods 5 days after maturity, and (b) simultaneous harvesting of pods of 27 plants chosen at random. Attack was evaluated by the frequency of pods giving one emergence or more adults in the lab. Isolation of lots did not prevent 57 out of the 58 plants from being colonized by adult A. obtectus, implying that the insects must be present on the plants before pod maturity or they respond immediately after pod ripening and to the sensitive phenological stage reached. The rate of attack was remarkably constant in space and time, attributed to the reduced female reproductive activity during the test period. Harvesting technique did not seem to alter considerably the results. The implications of these results for methods of protection against A. obtectus are analyzed and the most promising line of research is indicated. (Summary by EDITEC. Trans. by L.M.F.) F01

0307

20664 JARRY, M.; CHACON, A. 1983. Influence de la durée d'exposition des gousses mures de Phaseolus vulgaris sur la distribution des pontes de Acanthoscelides obtectus en plein champ. (Influence of exposure time of ripe pods of Phaseolus vulgaris on the distribution of eggs of Acanthoscelides obtectus in the field). Entomologia Experimentalis et Applicata 33(2):213-219. Fr., Sum. Fr., Engl., 22 Refs., Illus. [Institut de Biocénotique Expérimentale des Agrosystemes, LA CNRS 340, Casino municipal, Parc Blaumont, 64000 Pau, France]

Phaseolus vulgaris. Acanthoscelides obtectus. Insect biology. Pods. France.

In the field in France, females of Acanthoscelides obtectus oviposit in dry pods of Phaseolus vulgaris, either through dehiscence holes or after perforating the pod's suture (usually the ventral suture) with their mandibles. Contamination rates were already very high (0.4) 2-3 days after the phenological stage vulnerable to egg laying had been reached. This stabilized after 5 days' exposure. However, the no. of eggs laid/contaminated pod regularly increased with exposure time. Some females concentrated their successive ovipositions in particular pods by using the same perforation hole. These results are discussed in relation to the lab.-derived hypothesis whereby A. obtectus would mark its egg-laying sites with a repulsive pheromone. (Author's summary) F01

0308

19854 JOHNSON, C.D. 1981. Relations of Acanthoscelides with their plant hosts. In Labeyrie, V., ed. International Symposium on the Ecology of Bruchids Attacking Legumes (Pulses), Tours, France, 1980. Proceedings. The Hague, Junk. Series Entomologica v.19. pp.73-81. Engl., 22 Refs. [Dept. of Biological Sciences, Northern Arizona Univ., Flagstaff, AZ 86011, USA]

Phaseolus vulgaris. Acanthoscelides. Seed. Insect biology. USA.

The history, importance, relationships with host plants, and potential to cause economic damage of the genus Acanthoscelides, considered to be the most important genus in the New World due to its numerous species, are reviewed. Most of the observations are based on the lists presented by Johnson (1981), considered the most precise. The incidence of bruchids in seeds of Phaseolus, the apparent original and still principal host, is indicated. Species of Acanthoscelides that feed on various host plants are mentioned; 85.5% prefer legumes (absolute no.), especially seeds of

papilionoid legumes (61%) and of Mimosoideae (36.6%). In terms of their availability, mimosoid legumes (approx. 2500 species) are preferred by Acanthoscelides spp. Host specificity is analyzed; approx. 50% of the species of Acanthoscelides have only 1 host and approx. 70% have 1-2 hosts. Life histories of Acanthoscelides are given. These indicate that most species (70%) oviposit on pod surface and that only 29% oviposit directly on seeds. Species with the greatest potential of causing economic damage include A. obtectus, A. obvelatus, A. argillaceus, and A. clandestinus, which all feed on seeds of Phaseolus. (Summary by EDITEC. Trans. by L.M.F.) F01

0309

20653 LIMA, C.P.F. DE 1979. Liriomyza trifolii (Diptera:Agromyzidae), an important new leaf-miner pest in Kenya. Kenya Entomologist's Newsletter no.10:8. Engl.

Phaseolus vulgaris. Liriomyza trifolii. Insect biology. Plant injuries. Insect control. Kenya.

Liriomyza trifolii was introduced into Kenya early in 1977 with unquarantined chrysanthemum cuttings from Florida, USA. The cuttings were commercially multiplied on an estate near Kibwezi, where important outbreaks occurred in mid-1977. By the end of 1977 some measure of control had been achieved, but through the latter parts of 1978 and 1979 the agromyzid became progressively more difficult to control and spread to other areas. It has been reported mainly from commercial farms and irrigation schemes where intensive agriculture is practiced and pest damage can result in important economic losses. In Kenya, L. trifolii has been recorded on sunflower, sweet melon, grams, cowpea, beans, and tomato. The biology, injuriousness, and control of the agromyzid are reviewed. (Summary by Review of Applied Entomology) F01

0310

20665 OLIVEIRA, A.M. DE; COELHO, R.G.; SUDO, S.; LEAL, N.R.; LIBERAL, M.T. 1982. Incidencia de Thecla jebus Godart, 1819 (Lepidoptera:Lycaenidae) em cultivares de feijao-de-vagem, no município de Itaguaí, Estado do Rio de Janeiro. [Incidence of Thecla jebus (Lepidoptera:Lycaenidae) on snap bean cultivars in the municipality of Itaguaí, state of Rio de Janeiro]. Anais da Sociedade Entomológica do Brasil 11(1):163-166. Port., Sum. Port., Engl., 4 Refs. [Empresa de Pesquisa Agropecuária do Estado do Rio de Janeiro, Estacao Experimental de Itaguaí, Estrada Rio Sao Paulo, km 47, 23.460 Seropédica-RJ, Brasil]

Phaseolus vulgaris. Thecla jebus. Cultivars. Snap beans. Insect biology. Plant injuries. Resistance. Brazil.

The incidence of Thecla jebus on snap bean cv. Campineiro, Kentucky Wonder, Macarrao, Namorada de Atiabia, Romano, and Teresópolis under field conditions was evaluated in the municipality of Itaguaí, RJ, Brazil. The % of pods attacked ranged from 2.67 to 4.27, with cv. Kentucky Wonder with the highest % and Romano and Macarrao with the lowest (2.75 and 2.67%, resp.). Larval stage averaged about 15 days and the pupal stage 8 days. (Summary by L.M.F.) F01

0311

19069 PENMAN, D.R.; CHAPMAN, R.B. 1983. Fenvalerate-induced distributional imbalances of two-spotted spider mite on bean plants. Entomologia

Experimentalis et Applicata 33:71-78. Engl., Sum. Engl., Fr., 17 Refs., Illus. [Dept. of Entomology, Lincoln College, Canterbury, New Zealand]

Phaseolus vulgaris. Snap beans. Tetranychus telarius. Mite control. Chemical control.

The pyrethroid fenvalerate-induced avoidance was repellent to adult female two-spotted spider mites, Tetranychus urticae, on treated French dwarf bean plants. With treatment of halves of primary leaves, T. urticae showed significant avoidance of fenvalerate-treated halves and significant spin-down to leave the plant when whole leaves were treated. Azinphosmethyl and water treatments had no effect on mite distribution. Proportional treatment of leaves of Vicia faba induced spin-down where any fenvalerate was added. No colonization took place on fenvalerate-treated leaves. Where the basal release leaf, on which the artificial colonization took place, was sprayed, mites either left the plant or located unsprayed leaves. Complete coverage of the plant with fenvalerate significantly reduced the remaining mite population. Implications of these distributional imbalances in understanding pyrethroid-induced spider mite outbreaks are discussed. (Author's summary) F01

See also 0214 0281 0283 0285 0296 0297 0316 0318 0323 0331 0385 0386 0387

G00 GENETICS AND PLANT BREEDING

0312

20655 INTERNATIONAL BOARD FOR PLANT GENETIC RESOURCES. 1982. Descriptors for Phaseolus vulgaris. Rome, Italy. AGPG:IBPGR/81/1. 37p. Engl., Illus. [Via delle Terme di Caracalla, 00100 Rome, Italy]

Phaseolus vulgaris. Genetics. Germplasm. Identification. Flowers. Pods. Flowering. Maturation. Seed characters. Plant development. Resistance. Diseases and pathogens. Injurious insects. Injurious mites.

A list of descriptors for Phaseolus vulgaris, developed by the International Board for Plant Genetic Resources (IBPGR), is presented. The list of descriptors is an international format and provides a universal language for all data describing plant genetic resources. The format includes 3 aspects: (1) passport data (accession identifiers and information recorded by collectors); (2) characterization that consists of recording those characters which are highly heritable, can be easily seen by the eye and are expressed in all environments; (3) preliminary evaluation, consisting of the recording a limited no. of additional traits thought desirable by a consensus of users of the particular crop, such as: seed shape, size, and appearance; resistance to pests, diseases, and adverse conditions; cytological characteristics and other identified genes. A brief literature review is included as well as a list of experts consulted by the IBPGR to compile the list of descriptors. (Summary by EDITEC) G00

G01 Breeding, Selection and Germplasm

0313

20649 BARLETA, H. 1981. ACACIA-4: nueva variedad de fríjol de alto rendimiento. (Acacia-4: a new high-yielding bean variety). Recursos no.9:7-11. Span., Illus.

Phaseolus vulgaris. Cultivars. Yields. Resistance. Bean common mosaic virus. Maturation. Spacing. Honduras.

The Secretaria de Recursos Naturales of Honduras released a new red bean var. named Acacia-4, which was produced in collaboration with CIAT. The var. was released to farmers to enhance bean production on the basis of its high yield potential, stability over different sites, and resistance to BCMV. The av. yield during both 1980 planting seasons was approx. 2100 kg/ha and some farmers obtained yields up to 3200 kg/ha in the 1st cropping season. A planting density of 250,000 plants/ha is recommended with 0.50 m between rows, and adequate weed control until 35 days after planting. Harvesting can take place at 78-80 days. The new var. is the result of the cross Jamapa x PI310 814. (Summary by EDITEC) G01

0314

19493 BERGANZA Y BERGANZA, J.R. 1980. Estabilidad del rendimiento de 15 cultivares de fríjol (Phaseolus vulgaris L.) en cuatro localidades para el suroriente de Guatemala. (Yield stability of 15 bean cultivars over four sites in southeastern Guatemala). Tesis Ing.Agr. Guatemala, Universidad de San Carlos. 46p. Span., 11 Refs.

Phaseolus vulgaris. Cultivars. Adaptation. Yields. Genotypes. Statistical analysis. Guatemala.

The degree of stability of 15 Phaseolus vulgaris genotypes was determined in 4 different environments corresponding to 4 sites in SE Guatemala (Monjas, Jutiapa, Atescatempa, and Jalpatagua). Cultural practices carried out are mentioned, namely, land preparation, fertilization, weed and pest control, and the region is described. Pluviometric data are included. Stability is assessed by combined variance analysis (Cochran and Cox) and regression analysis. Combined analysis showed significant differences for all variation components among the 15 cv. tested. Lines 78-26, 78-23, 78-24, 78-27, P006, and 78-22, all with statistically equal yields, outyielded var. Criolla Rabia de Gato and the improved check Suchitán, the latter by 16-31%. Stability was observed in all materials, except for 78-25, 78-27, Suchitán, and P006. Line 78-26, the highest yielder over all sites, showed stability and therefore is considered a desirable material. (Summary by EDITEC. Trans. by L.M.F.) G01

0315

18712 CAMARENA M., F. 1981. Mejoramiento genético en menestras. (Genetic improvement of edible grains). In Curso Intensivo de Adiestramiento Post-Grado en Investigación para la Producción de Fríjol en el Perú, La Molina, 1981. Trabajos presentados. Lima, Instituto Nacional de Investigación y Promoción Agropecuaria. pp.1-6. Span.

Phaseolus vulgaris. Plant breeding. Cultivars. Selection. Planting. Timing. Plant habit. Maturation. Resistance. Uromyces phaseoli. Bean common mosaic virus. Peru.

General concepts are given on the process of genetic improvement followed in Peru, with special emphasis on beans. Edible grain production has decreased considerably due to factors such as: (1) lack of improved seed, (2) increased phytosanitary problems, and (3) marginal crop planting. Tables are included that illustrate the general genetic improvement scheme and the most important agronomic characteristics (seed type, planting dates, growth habit, growth cycle, and reaction to diseases) of bean var. Canario LM-257, Canario Divex 8120 and 8130, Panamito Sanilac and Panamito Mejorado, Negro Chinchano, Caraota Negro LM-72, and Cocacho LM-57. Other

var. that are in the final evaluation stage are Línea 17, Redkloud, Bayito, Costa Rica 1-8, Porrillo Sintetico, E.U.I-546, and PI 309-804. (Summary by EDITEC) G01

0316

19949 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1981. The CIAT bean program. Research strategies for increasing production. Cali, Colombia. 88p. Engl., 127 Refs., Illus. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Phaseolus vulgaris. Germplasm. Production. Epidemiology. Resistance. Cultivars. Bean common mosaic virus. Uromyces phaseoli. Colletotrichum lindemuthianum. Isariopsis griseola. Xanthomonas phaseoli. Erysiphe polygoni. Pseudomonas phaseolicola. Bean golden mosaic virus. Empoasca kraemeri. Apion godmani. Epilachna varivestis. Acanthoscelides obtectus. Zabrotes subfasciatus. Adaptation. Selection. Colombia.

The production and consumption of dry beans in Latin America are briefly analyzed. The annual production increase of 1.2% resulted from expanding the area about 1.3% annually, since yields have been decreasing (-0.16%). Epidemiology and var. resistance identified for the following major diseases are discussed in detail: BCMV, rust (Uromyces phaseoli), anthracnose (Colletotrichum lindemuthianum), angular leaf spot (Isariopsis griseola), and common bacterial blight (Xanthomonas phaseoli). Resistance to insect pests such as leafhoppers (Empoasca kraemeri), the bean pod weevil (Apion godmani), the Mexican bean beetle (Epilachna varivestis), and bruchids (Acanthoscelides obtectus and Zabrotes subfasciatus), and other limiting factors including nematodes, P and N deficiencies, seed quality, drought, and cropping systems are also discussed. The major objective of the bean program at CIAT is to develop, in collaboration with national programs, technology that can lead to increased productivity of field beans through the following activities: (1) germplasm improvement, (2) development and validation of improved agronomic practices, (3) training of national program scientists, and (4) international collaboration. Germplasm improvement encompasses the collection, maintenance, and evaluation of germplasm, and the development and distribution of genetically improved germplasm. The CIAT germplasm bank currently stores around 30,000 accessions of Phaseolus spp., primarily P. vulgaris, obtained from more than 20 countries. The bean program conducts 2 uniform evaluations each year: the 1st uniform nursery (VEF) with materials provided by collaborators of national and international programs and from lines developed by CIAT, and the preliminary yield trial (EP), the 2nd stage of uniform testing of exptl. lines in which they are evaluated for yield and additional characteristics such as pest and disease resistance. Entries are selected for the International Bean Yield and Adaptation Nursery (IBYAN) where seed color and size preferences (consumer requirements), and agronomic requirements of the different cropping systems are taken into account. From CIAT Phaseolus germplasm bank accessions, sources of tolerance or resistance to BCMV, BGMV, rust, anthracnose, leafhoppers, common bacterial blight, angular leaf spot, halo blight (Pseudomonas phaseoli), powdery mildew (Erysiphe polygoni), and root rots have been identified. Future plans and program projections are briefly described. (Summary by F.G. Trans. by L.M.F.) G01

0317

19791 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1983. Germplasm screening and genetic improvement. In _____. Bean Program. Annual Report 1981. Cali, Colombia. Series 02EB(1)83. pp.9-24. Engl. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Phaseolus vulgaris. Germplasm. Selection. Plant breeding. Phaseolus lunatus. Phaseolus coccineus. Phaseolus acutifolius. Adaptation. Yields. Hybridizing. Dwarf beans. Climbing beans. Colombia.

During 1981, the germplasm bank continued the acquisition of Phaseolus germplasm. The total collection increased by 1754 accessions to complete 32,042; of these, 89% correspond to Phaseolus vulgaris and its wild types. The morphoagronomic evaluation of P. vulgaris continued at CIAT-Palmira with the description of 702 new materials. Evaluation of germplasm adapted to higher alt. was initiated in cooperation with breeders and is more oriented toward adaptation and yield potential. More than 1600 accessions of P. vulgaris were multiplied. A project is being carried out in collaboration with the U. of Gembloux (Belgium) to increase the variability of the common bean by interspecific hybridization with its wild relatives as well as with other species of the genus, especially P. coccineus. CIAT's germplasm bank has, in total, 332 accessions of wild forms of P. vulgaris. Germplasm preservation can be done through long-term or short-term storage. Stored germplasm is submitted to a germination test. To date, 5450 accessions have been tested for germination, of which 2437 have been processed for long-term storage (av. germination, 94% long term and 88% short term). All data concerning introduction, maintenance, evaluation, and distribution of germplasm have been organized in computer files for each of the 4 cultivated species. During 1981, a total of 20,988 bean germplasm accessions were distributed within and outside CIAT. The search for parental sources for both specific characters and commercial grain types of different production regions continued. Tables with information on the no. of crosses made for specific characters and bean production regions and on the no. of exptl. lines developed for production regions and submitted to VEF evaluation are included. A total of 814, 506, 235, and 303 climbing bean accessions were tested at CIAT-Palmira, Popayan, ICA-La Selva, and ICA-Obonuco, resp. Tables with the major characteristics of selected promising materials and on the no. of crosses made for grain type and production region are also included. (Summary by F.G. Trans. by L.M.F.) GOI

0318

19796 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1983. International cooperation. In _____. Bean Program. Annual Report 1981. Cali, Colombia. Series 02EB(1)83. pp.179-194. Engl., Sum. Engl. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Phaseolus vulgaris. Transfer of technology. Technology evaluation. Cultivars. Selection. Resistance. Rhizoctonia solani. Isariopsis griseola. Ascochyta fabae. Uromyces phaseoli. Colletotrichum lindemuthianum. Bean golden mosaic virus. Xanthomonas phaseoli. Ophiomyia phaseoli. Bean common mosaic virus. Caribbean. Peru. Colombia.

Research activities carried out by CIAT in collaboration with national research institutions for the improvement of bean production in the Central American and Caribbean region are analyzed. In 1981, preliminary trials (EP) were planted in Costa Rica and Guatemala in an effort to identify promising materials in terms of tolerance to web blight (Thanatephorus cucumeris), BGMV, angular leaf spot (Isariopsis griseola), rust (Uromyces phaseoli), anthracnose (Colletotrichum lindemuthianum), and Ascochyta leaf spot (Ascochyta fabae). The international web blight nursery was assembled, being distributed to, and planted in, Costa Rica, El Salvador, Guatemala, Nicaragua, and Panama. The 1st international Apion nursery was also established; this nursery was planted in Guatemala, Honduras, and Mexico to develop commercially acceptable bean var. with resistance to the bean pod weevil (Apion godmani). All nonblack materials of the EP nursery

were evaluated for resistance to BGMV in the Monjas site, Guatemala. By the end of 1981, the BGMV breeding program had the following materials in evaluation: (a) approx. 280 individual selections in F_2 to F_6 generations, (b) 5 highly promising, red-seeded materials obtained in Guatemala, and (c) 80 individual selections from the bean improvement program at CIAT. Throughout the year, the project assisted national programs in the further development of national yield nurseries. A new nursery, VICAR (Vivero Centroamericano de Rendimiento), was subdivided into black and red materials. A total of 4 new var. were released: (1) Costa Rica released BAT 304 under the name Brunca, (2) El Salvador released BAT 58 as Tazumal, (3) Honduras named line BAT 5678, Copan, and (4) Nicaragua released line A 40 as Revolución 81. A principal component of the project was to develop, through training, the manpower base in support of bean research and development in the region. The bean program participated in courses in Cuba, Guatemala, Nicaragua, and Peru. The outreach project in Peru identified lines Pirata 2 and Nep 2 as of special promise. Other more recent promising materials include BAT 1061, BAT 83, BAT 339, and Mich 78-03-27, all of which could replace the current commercial var. Muy Finca. The collaborative research project of CIAT with the Institute for Horticultural Plant Breeding tries to combine recessive gene resistance with dominant I gene resistance to BCMV in tropical adapted genotypes. Advances in research of this project are discussed in detail. A total of 370 CIAT accessions were screened in 2 lots, one in 1977 and one in 1978, at the Asian Vegetable Research and Development Center (AVRDC) in Taiwan for resistance to the beanfly (Ophiomyia phaseoli). Accession G 35023 is being used as a source of resistance in the CIAT breeding program and the F_2s are now being screened at AVRDC to select entries with desirable agronomic characters and beanfly resistance. (Summary by F.G. Trans. by L.M.F.) G01

0319

19793 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1983. National cultivar improvement. In _____. Bean Program. Annual Report 1981. Cali, Colombia. Series 02FB(1)83. pp.75-84. Engl. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Phaseolus vulgaris. Cultivars. Selection. Resistance. Bean common mosaic virus. Colletotrichum lindemuthianum. Seed characters. Xanthomonas phaseoli. Empoasca. Dwarf beans. Climbing beans. Transfer of technology. Latin America.

Data collected in 1981 on the improvement of national cv. for bean types and production regions are given. The progress in improvement of commercial bush bean var. for the Andean region has been very slow primarily due to susceptibility to BCMV of all parental materials from this region and difficulty in rapid recovery of desired grain colors and sizes. In Argentina 25 exptl. lines resistant to BCMV were developed. In 1981 approx. 200 new lines were bred in Brazil, bringing the total to over 500 developed lines for this country. In addition to BCMV resistance, an intermediate reaction to anthracnose (Colletotrichum lindemuthianum) became a common characteristic of the majority of bred lines. In Mexico one line, A 409, similar to Flor de Mayo in grain characteristics, was selected with resistance to BCMV. Several important advances were made in the improvement of small, red grain types for Central America. Regarding black grain var., CIAT is now emphasizing the selection of multiple disease-resistant lines, combining resistance to 2 or 3 diseases into single var. At least 1 family of the black opaque grain type with a high level of resistance to the common bacterial blight (Xanthomonas phaseoli) was selected. The size and brilliance of red-mottled grain types in the Caribbean were improved and common bacterial blight and Empoasca resistance

incorporated. Several canario and bayo breeding lines of commercially acceptable color with 1-gene resistance to BCMV have been developed. Var. Rojo 70, Rojo de Seda, Zamorano, and Compuesto Alajuela, and several var. selected from the germplasm collection, were included for improvement of climbing bean. The most promising climbing bean lines so far identified for international yield testing are V 7844, V 7910, V 7920, and V 79119. Climbing beans with black grains are important for relay and association with maize in the highlands of Guatemala and parts of Mexico. A total of 39 lines with black grains were entered into the bean team nursery; these were selected mainly for resistance to anthracnose and BCMV. A total of 76 new germplasm accessions were identified as promising for the Andean region, in particular G 12730 and G 12417 for relay, and G 8160, G 8216, G 8172, G 1226, G 12488, G 12289, and G 8169 for association. (Summary by F.G. Trans. by L.M.F.) G01

0320

19867 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1981. Progeny evaluation in uniform nurseries. In _____. Bean Program. Annual Report 1980. Cali, Colombia. pp.37-52,81-83. Engl., Illus. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Also in Spanish.

Phaseolus vulgaris. Technology evaluation. Adaptation. Cultivars. Resistance. Dwarf beans. Climbing beans. Uromyces phaseoli. Colletotrichum lindemuthianum. Xanthomonas phaseoli. Empoasca kraemeri. Bean common mosaic virus. Yields. Selection. Seed color. Latin America.

The Bean Team Nursery (VEF) is the 1st uniform and multidisciplinary evaluation for adaptation and disease and insect resistance and is composed of advanced, coded CIAT hybrid lines from various breeding projects, the germplasm bank, and national programs. Among the bush bean entries, 16% showed resistant reactions to rust (Uromyces phaseoli) and 20% were intermediate. Entries resistant and intermediate to anthracnose (Colletotrichum lindemuthianum) were 34 and 24%, resp. The frequency of lines combining important traits also increased in the 1980 VEF. For example, 103 entries combine resistance to BCMV and anthracnose with non-black grain color, factors necessary for acceptability in Africa. Preliminary yield trials (EP) consisted of 105 lines (91 bush and 14 climbing) selected from 594 evaluated in the 1979 VEF. All EP materials were resistant to the Florida and NY 15 strains of BCMV. Also, 68 materials, out of the 105 evaluated, possessed resistance to 3 or more diseases or insect pests. Tables are included with the results obtained in climbing bean and bush bean yield trials at CIAT-Palmira and CIAT-Popayan. Bush bean was generally better adapted than climbing bean in the 1980 VEP; good yielders in Palmira performed well in Popayan or vice versa, but in climbing beans, good yielders at Palmira often performed poorly in Popayan. The 1979 International Bean Yield and Adaptation Nursery (IBYAN) was the 1st to include selected lines through sequential evaluation system VEF-EP-IBYAN. Selected bush bean materials were tested in 2 trials, one for black-seeded lines and the other formed of lines with all other seed colors. The wide adaptation of some materials like BAT 304, which performed well in Brazil, Chile, Costa Rica, Cuba, Dominican Republic, El Salvador, and Venezuela, was showed. Other were more specifically adapted such as BAT 240 in Venezuela, BAT 445 in Brazil, and BAT 304, BAT 58, and Jamapa in Chile. The results of trials with other seed colors conducted at 16 sites in 12 countries showed var. Carioca and lines BAT 85 and BAT 561, all cream-seeded, to be the most outstanding in most sites. Trials were designed for climbing beans in association or relay with maize, or in monoculture, depending on local custom, and 3 grain types (small blacks,

small reds, and other colors) were tested. There was a yield improvement of the best var. over the local check of an av. of 38%; this yield was combined with earliness. Some of 1st breeding lines in these trials were promising. The growth habits of Phaseolus vulgaris are briefly described and the accessions of Phaseolus referred to in this report are listed. (Summary by F.G. Trans. by L.M.F.) G01

0321

20060 CID, A.R. DEL; LEMUS A., R.; TEJADA V., H.; HERNANDEZ S., A.; RIOS, E.; MONTERROSO, E. 1982. Ensayo de adaptabilidad de ocho materiales genéticos de fríjol común (Phaseolus vulgaris L.) y análisis de estabilidad en seis localidades de la franja transversal del norte. (Adaptability trial of eight bean breeding materials and stability analysis at six sites of the North Guatemalan cross section). Guatemala, Instituto de Ciencia y Tecnología Agrícola. 10p. Span., 4 Refs., Illus.

Paper presented at Reunión Anual del PCCMCA, 28a., San José, Costa Rica, 1982.

Phaseolus vulgaris. Cultivars. Adaptation. Uromyces phaseoli. Genetics. Resistance. Yields. Guatemala.

Adaptability and stability trials were carried out with promising materials at 6 sites of the North Guatemalan cross section, which has a high bean production potential. A randomized block design was used with 8 treatments and 4 replications, and included bean materials D-145, L80-10, L80-11, L78-23, L80-05, San Martin, Quetzal, and Tamazulapa. Data were recorded for disease incidence (rust, bacteriose, and viruses) and yield components. Var. L78-23 and San Martin were susceptible to diseases, whereas the remaining var. showed resistance to rust (Uromyces phaseoli) and tolerance to bacteriose and viruses. Var. Quetzal showed stability over all environments and together with Tamazulapa, L80-10, L80-11, and D-145, produced the highest yields; these var. showed good response in all environments but results were not consistent. Except for var. San Martin, the rest of the var. showed a statistically similar yield in all sites. Tables are included showing the parameters evaluated. (Summary by EDITEC) G01

0322

20642 DAINELLO, F.J.; HEINEMAN, R.R.; BURNS, E.E. 1981. Evaluation of dry edible beans for southwest Texas. College Station, Texas Agricultural Experiment Station. PR-3755. 8p. Engl., Sum. Engl., 2 Refs., Illus. [Texas Agricultural Experiment Station, Texas A&M Univ., College Station, TX 77843, USA]

Phaseolus vulgaris. Cultivars. Adaptation. Yields. Yield components. Seed. Seed characters. USA.

A total of 35 dry edible bean var., from 8 bean types, were evaluated during a 3-yr study at Uvalde, Texas (USA). Of the 8 types, the most productive were the great northerns and the pintos. The most consistent var. of great northern type were Tara, Valley, and Emerson, and of pinto type, UI-114, 3385, and 6R-410. Comparable 3-yr yield av. for the var. evaluated ranged from 13.4 cwt./ac for the great northern Tara to no yield with the small whites Alisal #38 and #59. Yields from var. of all types were significantly lower than desired for profitable bean production in SW Texas. (Author's summary) G01

0323

18566 FERREROSA, R.; GARVER, C. 1982. Desarrollo regional de tecnología de fríjol proporciona variedades para México, América Central y El Caribe. (Regional development of bean technology provides varieties for Central America, Mexico, and the Caribbean). CIAT Internacional 1(2):2-3,5. Span., 7 Refs., Illus. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Also in English.

Phaseolus vulgaris. Cultivars. Bean golden mosaic virus. Rhizoctonia solani. Apion godmani. Germplasm. Selection. Resistance. Central America. Mexico. Caribbean.

Advances in the development of new var. for Mexico, Central America, and the Caribbean in the fight against BGMV, web blight (Thanatephorus cucumeris), and the bean pod weevil (Apion godmani) are reported. The nutritive value of bean as a source of protein and its biological value are highlighted; its biological value can be increased with certain legume/cereal combinations in diets (beans and rice or beans and maize) by compensating amino acid deficiencies. The demand has exceeded the supply and in the late 1970s Central American and Caribbean countries imported over 100,000 t of beans. The Central American Bean Project, funded by the Swiss Development Cooperation with CIAT, is highlighted regarding regional research and training activities. The focus is on improved germplasm and technology with min. inputs, working hand in hand with national programs to develop self-reliance in bean breeding and production. Tables are included that list the collaborating national institutions and bean lines released or in process of seed multiplication by national programs. Future projects are stated as well as the importance of horizontal transfer of technology and national interdependence in research. Bean lines that have been collaboratively developed are Huetar, Chorotega, Corobici, ICTA Quetzal, ICTA Jutiapan, ICTA Tamazulapa, DOR 125, DR 6158, Acacias 4, Copan, and Negro Huasteco 81. (Summary by EDITEC. Trans. by L.M.F.) G01

0324

20650 FLESCH, R.D.; MONDARDO, E. 1983. Recomendacao da cultivar de feijao EMPASC 201-Chapecó para cultivo em Santa Catarina. (Bean cv. EMPASC 201-Chapecó, recommended for cultivation in Santa Catarina). Florianópolis-SC, Brasil, Empresa Catarinense de Pesquisa Agropecuária. Comunicado Técnico no.58. 12p. Port., 7 Refs., Illus. [Empresa Catarinense de Pesquisa Agropecuária, Estacao Experimental de Chapecó, Caixa Postal 151, Chapecó-SC, Brasil]

Phaseolus vulgaris. Cultivars. Agronomic characters. Yields. Yield components. Resistance. Uromyces phaseoli. Colletotrichum lindemuthianum. Xanthomonas phaseoli. Isariopsis griseola. Selection. Adaptation. Maturation. Technology evaluation. Brazil.

The most important characteristics of black bean cv. EMPASC 201-Chapecó, are described. This cv. was selected for its tolerance to pests and diseases, high quality seed, and adaptation to the different climatic zones prevailing in Santa Catarina, Brazil. The cv. was developed at the Instituto Colombiano Agropecuario (ICA) through the cross ICA Tui x S 219 N-I and was introduced into Brazil in 1976 as Line 38. Yields of this cv. were 1860 and 2165 kg/ha in agroclimatic zones I and III, Santa Catarina; no evaluations were carried out in zone II and in zone IV yields were lower than those obtained with the cv. recommended for this area. EMPASC 201-Chapecó showed resistance to Uromyces phaseoli and tolerance to Colletotrichum lindemuthianum and Xanthomonas campestris pv. phaseoli.

Slight infection by Isariopsis griseola was also observed. In the agroclimatic zones I, II, III, and IV, recommended cv. are Rio Tibagi, Turrialba 4, Iguacu, and Carioca; cv. Parana 1 is recommended for regions I, II, and IV, and cv. EMPASC 201-Chapecó for regions I and III. The new cv. has an indeterminate, erect growth habit, 14.8 pods/plant, 5.5 seeds/pod, and 20.1 g/100 seeds. The period between emergence and maturity is approx. 93 days. (Summary by EDITEC) G01

0325

19896 FRANCIS, C.A.; HERNANDEZ B., G. 1973. The Latin American program for increasing yields of dry beans. In Luse, R.A.; Williams, R.J., eds. IITA Workshop on Grain Legume Improvement, 1st., Ibadan, Nigeria, 1973. Proceedings. Ibadan, International Institute of Tropical Agriculture. pp.96-101. Engl.

Phaseolus vulgaris. Agricultural projects. Plant breeding. Latin America.

The CIAT bean program can be considered a Latin American cooperative effort, launched in 1973 to increase the productivity, quality, production, and consumption of beans to improve diets of low-income people and enhance the welfare of the subsistence farmer. Emphasis is placed on commercial beans and associated cropping systems. Program objectives are listed, being carried out by 8 research groups: agronomy, breeding, economics, entomology, microbiology, nutrition, pathology, and physiology. The objectives and research plans to be developed during 1973 and in the near future are indicated. Real benefits of CIAT's research and development will be expressed through advances and contributions of national research teams to individual farmers. Specific activities designed to give max. contact of CIAT's program with others in Latin America are listed, including possible topics of workshops to be conducted during 1974-76. Research priorities of the program are under continuous review. (Summary by EDITEC. Trans. by L.M.F.) G01

0326

20809 GONZALEZ G., C.P. 1983. Medición de la estabilidad temporal de líneas de fríjol del programa de leguminosas del ICA, seccional Palmira. (Measuring temporary yield stability of bean lines of ICA's legume program in Palmira). Tesis Ing.Agr. Palmira, Universidad Nacional de Colombia. Facultad de Ciencias Agropecuarias. 123p. Span., Sum. Span., Engl., 16 Refs., Illus.

Phaseolus vulgaris. Cultivars. Genotypes. Ecology. Climatic requirements. Statistical analysis. Seed color. Colombia.

Different methods of statistical analysis were applied and compared to estimate temporary yield stability in red- and black-seeded bean lines during the 1978-81 crop yr. These lines were planted in yield trials at the Centro Nacional de Investigaciones Agropecuarias of the Instituto Colombiano Agropecuario (ICA) in Palmira, Colombia. Five different methods were used: (1) a method that ranks the yield performance (high, intermediate, low) of each line under different environmental conditions; (2) a method that considers the effect of aleatory environments (type II model); (3) a method that considers the effect of fixed semesters (type I model); (4) the method of the interaction component proposed by Plaisted (1960); (5) Eberhart and Russell's regression model (1966). Results show that in general black-seeded lines have greater stability and higher av. yields compared with red-seeded lines. Some improved red-seeded lines, however, show higher yields and greater stability comparable with those of black-seeded lines. Among red-seeded material, improved lines ICA L-22 and

ICA L-24 gave the highest yields (1.42 t/ha) and had the greatest stability compared with the check var. Diacol Calima. Red-seeded line ICA L-23 had the highest av. yield (1.53 t/ha) but its stability varied in relation to the method used. Black-seeded lines had av. yields very similar among themselves, around 1.54 t/ha. Some lines showed greater stability than the check materials ICA Tui and ICA Pijao. The exptl. line 20561 M-3-1-M, from the cross Venezuela 44 M x Jamapa, specially showed good adaptation to unfavorable environments and the highest av. yield (1.62 t/ha). A description of the water balance of beans under contrasting environments is included. Tables and diagrams synthetizing line performance under different environments are also included. (Author's summary) G01

0327

20825 GUTIERREZ M., A.G. 1983. Selección de cultivares de fríjol común (Phaseolus vulgaris L.) en Cañas, Guanacaste. (Screening dry bean cultivars in Cañas, Guanacaste). Tesis Ing.Agr. San José, Universidad de Costa Rica. Escuela de Fitotecnia. 47p. Span., Sum. Span., 25 Refs., Illus.

Phaseolus vulgaris. Cultivars. Selection. Genetics. Adaptation. Yields. Yield components. Costa Rica.

Two trials were carried out simultaneously in Alajuela (Fabio Baudrit Moreno Exptl. Station) and in Cañas, Guanacaste (Hacienda Corobicí and the Enrique Jiménez Nuñez Exptl. Station), Costa Rica, in 2 different planting seasons. A total of 190 dry bean cv. from CIAT preliminary yield trials (EP 81) and 203 black and red bean cv. from the germplasm bank at the Fabio Baudrit Moreno Exptl. Station were assessed. Two field trials were carried out: the 1st was a preliminary trial and therefore did not use an exptl. design, and the 2nd evaluated yield potential and stability by location of the 30 cv. selected in the 1st trial. A randomized complete block design was used with 3 replications. Useful plot area consisted of a 3-m-long furrow, spaced at 1 m from the border furrows. Planting density was 125,000 plants/ha. Bean cv. tested showed a differential performance at both sites and planting seasons. Under Cañas conditions there was great genetic variability. Cv. that performed well at Cañas were not the same as those performing well at Alajuela, which is considered an optimum zone for bean cultivation. In Cañas the cv. that best adapted to the climatic conditions were PVN370, PVN484, PVN457, PVN469, and Talamanca. In Alajuela cv. with the highest production potential were BAC75, PVN458, PVN344, PVN446, VRA40, and Talamanca. (Author's summary. Trans. by L.M.F.) G01

0328

19758 HAWTIN, G.C.; RACHIE, K.O.; GREEN, J.M. 1977. Breeding strategy for the nutritional improvement of pulses. In Hulse, J.H.; Rachie, K.O.; Billingsley, L.W., eds. Nutritional standards and methods of evaluation for food legume breeders. Ottawa, Canada, International Development Research Centre. IDRC-TS7e. pp.43-51. Engl., 22 Refs., Illus.

Phaseolus vulgaris. Nutritive value. Backcrossing. Crossbreeding. Selection. Genetics. Genotypes. Inheritance.

Background information on a breeding strategy for the nutritional improvement of pulses is given. The most important objective in pulse improvement is the increase and stabilization of seed yields and the improvement of nutritional quality. Nutritional factors included in a breeding program will depend on their relative importance as determined by nutritionists,

the availability of suitable screening methods, and genetic considerations. The importance of handling large populations, at least 2 generations/yr, to advance as quickly as possible is recognized. Several more important genetic considerations are outlined: genetic variation, environmentally induced variation, genotype x environment interaction, heritability, major and minor genes, genetic linkages, transgressive segregation, correlations, breeding methods, and germplasm. Although the objective of breeding is not to improve nutritional quality, the nutritional level should not be allowed to fall below an acceptable standard. The scheme followed in a conventional breeding program is outlined. Breeding methods to increase nutritional quality are indicated: pedigree breeding, backcrossing, and population improvement. Future trends in nutritional improvement in pulses are included; these will enable greater quantities of material to be handled with greater accuracy. (Summary by EDITEC. Trans. by L.M.F.) G01

0329

12656 HIDALGO H., R. 1980. Evaluación y utilización del germoplasma del fríjol común (Phaseolus vulgaris L.) de la colección mundial del CIAT. (Evaluation and utilization of common bean germplasm from CIAT's world collection). Cali, Colombia, Centro Internacional de Agricultura Tropical. Seminarios Internos Serie SE-17-80. 11p. Span., Sum. Span.

Phaseolus vulgaris. Germplasm. Phaseolus lunatus. Phaseolus coccineus. Phaseolus acutifolius. Agronomic characters. Adaptation. Yields.

The formation and handling of the Phaseolus vulgaris germplasm collection at CIAT are briefly described and the results of the evaluation of 10,000 bean accessions carried out in Palmira, Colombia, are analyzed. The collection includes more than 26,000 accessions of which less than 20% correspond to other species such as P. lunatus, P. coccineus, and P. acutifolius. All the information is computerized in an independent file for each species. P. vulgaris has 3 files: (1) probasic register that includes all the introductions (approx. 20,000); (2) basic register that includes the introductions that are multiplied with information on identification, origin, and source of seed (approx. 10,000); and (3) evaluation data bank that records seed characteristics, morphoagronomic evaluation, diseases and pests (10,000 accessions). Evaluation takes place in 2 stages: one under lab. conditions (identification, local register, origin, source, primary and secondary seed color, seed size, shape and brilliance) and the other under field conditions (days to emergence, hypocotyl length and color, leaflet length and width, stem thickness, flower color, days to flowering and duration, nodes at flowering, reaction to photoperiod, plant height and coverage, growth habit, racemes and pods/plant, seeds/pod, DM, yield/plant, HI, pests and diseases). Germplasm is classified according to seed type (color) and growth habit. Black, white, cream, red, and yellow are the most frequent colors with 30, 17, 15, 14, and 11%, resp. Colors white and yellow appeared more frequently in growth habits I and III, black in growth habit II, and growth habit III has a high % of red. The size of seed from South America is smaller than that from Central America. The characteristics most evaluated are: adaptation, days to flowering and duration, nodes on the stem, yield, yield components, and resistance to Empoasca. The function of germplasm handling is to preserve it and inform researchers of its usefulness. (Summary by EDITEC. Trans. by L.M.F.) G01

0330

20017 INSTITUT DES SCIENCES AGRONOMIQUES DU RWANDA. 1982. Legumineuses: Haricot (Phaseolus vulgaris L.). (Legumes: haricot beans). In _____. Compte rendu des travaux du Département Production Végétale. Exercise 1981. Rubona. pp.4-9. Fr. [B.P. 138, Butare, Rwanda]

Phaseolus vulgaris. Cultivars. Germplasm. Selection. Yields. Snap beans. Climbing beans. Colletotrichum lindemuthianum. Bean common mosaic virus. Ascochyta. Isariopsis griseola. Ophiomyia phaseoli. Agrotis. Rwanda.

In 1981, 160 rurally planted var. and 9 foreign var. were included to complete a total of 524 var. in the germplasm bank of the Institut des Sciences Agronômiques du Rwanda. In screening dwarf var. in Rubona, 10 var. showed better performance than the check Bataaf in season A (e.g., Ni 555, Ni 572, IRW8), and Tostado performed best in season B. Var. Actoran, Tostado, and M. Jaune (season A) and Actoran, Richmond nandos (outyielding the check during both growing seasons), and Baron (season B) were outstanding at Rwerere. Actoran was also outstanding at Karama after Sornel, which occupied the 1st place (season A); during season B only Raido grado outyielded the check (var. 1/2). Seven snap bean var. outyielded Saxa during the 1st season; however, no var. outyielded the check during the 2nd. Th kly treatment with mancozeb increased dwarf bean yields in Rwerere by 60% (season A) and by 39% (season B). Twenty-three semiclimbing bean var. outyielded Kicaro during season A and 39 var., during season B, among which were Caru 27, Gikara, Ikinimba Blanc, Nsuzumirurushako, and Muhondo. The treatment increased semiclimbing bean yields by 48% (season A) and by 17% (season B). Among the best var. are Sabres a rames (season A) and Nyiramushahi (season B) in Rubona; Gisenyi (A) and Urunyumba (B) in Rwerere, and Urunyumba (A) and 7211 (B) in Karama. In a comparative var. trial with 14 dwarf bean var., Actoran, var. 11, and Mutiki 2 gave the highest yields (121, 117, and 111% over the yield of check Bataaf, resp.). Other outstanding var. were Tostado, Nsuzumirurushako, and Rwerere II, the latter 2 yielding 145 and 134% over the check. Wood stakes were better than maize stumps. Stakes (50 cm) increased climbing bean yields by 40%; however, the use of 1-m-long stakes is recommended. Several diseases were reported: anthracnose (Colletotrichum lindemuthianum), BCMV, Ascochyta leaf and pod spot, and angular leaf spot (Isariopsis griseola). The bean fly (Melanagromyza phaseoli) and Agrotis sp. were also reported. (Summary by EDITEC. Trans. by L.M.F.) G01

0331

20019 INSTITUT DES SCIENCES AGRONOMIQUES DU RWANDA. 1982. Legumineuses: Occurrence des principales maladies et ravageurs dans les stations. (Legumes: major diseases and pests occurring at different experimental stations). In _____. Compte rendu des travaux du Département Amenagement du Milieu et du Département des Laboratoires en 1981. Rubona. pp.17-20. Fr. [B.P. 138, Butare, Rwanda]

Phaseolus vulgaris. Isariopsis griseola. Colletotrichum lindemuthianum. Ascochyta phaseolorum. Ramularia phaseoli. Uromyces phaseoli. Pseudomonas phaseolicola. Xanthomonas. Ophiomyia phaseoli. Bean common mosaic virus. Cultivars. Resistance. Selection. Rwanda.

In 1981 observations tending to identify major diseases and pests occurring at the exptl. stations of Rubona, Rwerere, and Karama (Rwanda) were carried out to make selections for resistance. In beans the fungi Isariopsis griseola, Colletotrichum lindemuthianum, Ascochyta phaseolorum, Ramularia phas li, and Uromyces phaseoli were identified only in dwarf, green, and semiclimbing var. Bacterias identified included Pseudomonas phaseolicola and Xanthomonas sp. and the bean common mosaic was observed, especially in climbing bean, as well as the insect Melanagromyza phaseoli. Seeds collected from a diseased plant of var. Kalikabageni in Rwerere were planted in pots in Rubona. Symptoms of bacterios appeared and colonies of gram-negative bacteria, in form of rods and with flagella, were isolated. After artificially inoculating var. Bataaf, Melange Jaune, and Kalikabageni in Rubona (5 x 10^6 bacterias/ml), 3 wk. after planting, severely infected

leaves were observed to fall off without propagating the disease to new leaves; this could possibly be attributed to the high inoculum concn. or the high temp. of Rubona's sierra. (Summary by EDITEC. Trans. by L.M.F.) G01

0332

20658 INTERNATIONAL BOARD FOR PLANT GENETIC RESOURCES. 1982. Lima bean descriptors. Rome, Italy. AGPG:IBPGR/82/5. 41p. Engl., Illus. [Via delle Terme di Caracalla, 00100 Rome, Italy]

Phaseolus lunatus. Genetics. Germplasm. Identification. Flowers. Flowering. Maturation. Pods. Seed characters. Plant development. Resistance. Diseases and pathogens. Injurious insects. Injurious mites.

A list of descriptors for Phaseolus lunatus, developed by the International Board for Plant Genetic Resources (IBPGR), is presented. The list of descriptors is an international format and provides a universal language for all data describing plant genetic resources. The format includes 3 aspects: (1) passport data (accession identifiers and information recorded by collectors); (2) characterization that consists of recording those characters which are highly heritable, can be easily seen by the eye, and are expressed in all environments; (3) preliminary evaluation, consisting of the recording of a limited no. of additional traits thought desirable by a consensus of users of the particular crop, such as: seed shape, size, and appearance; resistance to pests, diseases, and adverse conditions; cytological characteristics and other identified genes. A list of experts consulted by the IBPGR to compile the list of descriptors is included. (Summary by EDITEC) G01

0333

20644 IRASTORZA, M.H. 1983. Aspectos teóricos e aplicados da descricao varietal do feijao (Phaseolus vulgaris L.). (Theoretical and applied aspects of varietal description of beans). Tese Mestrado. Pelotas-RS, Brasil, Universidade Federal de Pelotas. 153p. Port., Sum. Port., Engl., 37 Refs.

Also in Spanish.

Phaseolus vulgaris. Cultivars. Spacing. Genotypes. Ecology. Statistical analysis. Phenology. Colombia.

A var. description model that includes a measurement of the variability of common beans was evaluated in trials carried out by CIAT at expt. stations in Palmira, Santander de Quilichao, and Popayán. A split plot arrangement was used in a randomized block design. Three plant densities (266,000, 133.300 and 83.300 plants/ha) were used as main plots and 6 var., ICTA Quetzal, ICA Pijao, Bat 41 (Revolución 79), P-402 (Brasil 2), Diacol Calima, and Carioca, as subplots. Plant density was used to modify the environment. Twenty-five plants were selected at random in each subplot to evaluate 52 descriptors at seedling, flowering, physiological maturity, and harvest. Qualitative descriptors were evaluated on a frequency basis of the major phenotypic alternative, considering other secondary alternatives as descriptive elements. Quantitative descriptors were evaluated on the basis of the mean (X), standard deviation (SD), C.V. and the range (R). X and C.V. were used to describe characters and their relative variability, defining var. identity and/or uniformity. The SD and the range were useful for identifying individual off-type plants. Regression techniques between values of the descriptors and environmental indexes, estimated on individual mean plant yield, were used to study genetic environment interaction of

quantitative descriptors. The lack of linear relationship impeded valid interpretations. Variance analysis across environments showed, however, significant differences. Sample size to describe each character was determined by the variation of the character at given levels of precision and confidence. Model modifications allowed the identification of closely related var. It is recommended that the breeder make var. descriptions during the last stage of the agronomic evaluation; all descriptors measured should be used for a proper registration of the var., but only a selected no. of general and specific descriptors should be used by seed producers and inspectors. (Author's summary) G01

0334

20016 IYAMUREMYE, F. 1983. Legumineuses: Haricot (Phaseolus vulgaris). In _____. Synthese des acquis scientifiques et techniques de la recherche agricole du Rwanda. (Legumes: haricot beans). Rubona, Institut des Sciences Agronomiques du Rwanda. pp.1-14. Fr. [Institut des Sciences Agronomiques du Rwanda, B.P. 138, Butare, Rwanda]

Phaseolus vulgaris. Cultivars. Selection. Yields. Dwarf beans. Climbing beans. Resistance. Bean common mosaic virus. Colletotrichum lindemuthianum. Ascochyta. Isariopsis griseola. Spacing. Rwanda.

Research on var. selection, begun in 1957, at the stations of Rubona, Rwerere, and Karama (Rwanda), all with different ecological conditions, is described. The collection has approx. 1700 local and exotic var.; many of them are from CIAT and although they are relatively productive, they are susceptible to diseases causing wilt. Over 200 var. have been tested in var. competition trials and approx. 20 have been nominated for release. Dwarf var. gave av. yields of 1500-2000 kg/ha and climbing var., approx. 3000 kg/ha. Highest yields were obtained in Rubona and Rwerere in season A and in Karama in season B (rainy season). Results of comparative and multilocal var. trials (1967-82) and the sanitary conditions of selected var. are summarized in table form. Mutiki 2, var. II, and Rubona 5 (central, southern, and eastern Rwanda), Tostado, Inyumba, Jamapa Incremento (northern Rwanda), and Nsuzumirurushako (northern and south-central Rwanda) performed well in multilocal adaptation trials. Optimum planting distances were fixed at 30 x 20, 30 x 10, and 40 x 10 cm for dwarf, semiclimbing, and climbing bean, resp. However, a distance of 30 x 40 cm in continuous rows (approx. 5 cm) produced the highest yields. In climbing bean, a distance of 20 x 40 cm produced the highest yields. The use of stakes increased yields up to 200%. Results obtained with different types and lengths of tutors, as well as seed production and distribution activities by the Institut des Sciences Agronomiques du Rwanda at Rubona in 1978-82 are included. Major production constraints are mentioned. (Summary by EDITEC. Trans. by L.M.F.) G01

0335

19875 LIMA, P.R. DE A.; MENDES, M.C. 1981. Competicao de cultivares de feijao safra das águas em tres municípios do Mato Grosso do Sul, em 1980/81. (Competition between bean cultivars during the rainy season in three locations of Mato Grosso do Sul, in 1980-81). Dourados-MS, Brasil, Empresa Brasileira de Pesquisa Agropecuária. Unidade de Execucao de Pesquisa de Ambito Estadual de Dourados. Pesquisa em Andamento no.12. 5p. Port.

Phaseolus vulgaris. Cultivars. Selection. Yields. Resistance. Uromyces phaseoli. Xanthomonas phaseoli. Bean golden mosaic virus. Brazil.

Three expt. were carried out in the municipalities of Fatima do Sul, Deodapolis, and Dourados, Brazil, to determine cv. competition. Fifteen

cv. were used in a randomized block design with split plots and 4 replications. Cv. used were Carioca, Rio Tibagi, Mulatinho Vagem Roxa, Cuva 168 N, Tahyu, Iguacu, Rico 23, Turrialba 4, Roxinho, Roxao, IPA 7419, Mulatinho Paulista, Ricobaio 1014, Rico Pardo, and Costa Rica. Yield results were not obtained in Fatima do Sul because of the lack of rains and the strong prevailing winds. The most important pathogens detected were Xanthomonas phaseoli and Uromyces phaseoli. In Deodapolis, approx. 100 mm of rainfall destroyed most of the bean seedlings at emergence. In Dourados, evaluations were made of no. of pods/plant, no. of seeds/pod, wt. of 100 seeds, yield, and disease incidence. Cv. Carioca and small-seeded Rio Tibagi had outstanding performance: 594 and 545 kg/ha, resp. X. phaseoli was observed in all plants tested and affected leaf area from a min. of 26.7% in cv. Rio Tibagi to a max. of 42.5% in cv. Tahyu. U. phaseoli attacked most of the materials except for Rico Pardo, Ricobaio 1014, Cuva 168 N, Costa Rica, and Turrialba 4. The presence of golden mosaic was observed in all cv. but the [illegible] of affected plants varied according to the cv. (3.8% in Ricobaio 1014 and 28.4% in Mulatinho Vagem Roxa). Cv. Cuva 168 N was not affected by rust. (Summary by EDITEC) G01

0336

19880 MARECHAL, R. 1975. Studies in Phaseolinae. In Luse, R.A.; Rachie, K.O., eds. IITA Collaborators' Meeting of Grain Legume Improvement. Ibadan, Nigeria, 1975. Proceedings. Ibadan, International Institute of Tropical Agriculture. pp.35-37. Engl.

Phaseolus vulgaris. Nutritive value. Crossbreeding. Phaseolus coccineus. Amino acids. Hybrids. Phaseolus lunatus.

The possibility of improving the nutritional quality of the Phaseolinae subtribe was studied at the Faculty of Gembloux (Belgium); this depends upon the widening of the genetical variability of the cultivated species. The relationship between the genus Phaseolus (of American origin) and Vigna (Asiatic) is analyzed and an attempt in numerical taxonomy in view of the large quantity of data accumulated to date and based on a live collection of species is reported. Phaseolinae presents incompatibility barriers between species; cytological analyses of different hybrids, however, show acceptable chromosome affinity. It is almost certain that only intra-genomic hybrids have been made. Best chances of interspecific crossing are within Phaseolus or Vigna. Several hybrids related to P. coccineus and P. vulgaris show the possibility of introgressing 2 incompatible species by using an intermediate species. Attempts are being made to cross P. lunatus with other Phaseolus spp., mainly P. ritensis. Relatively small intrinsic variations between the different forms of a same species and between different species in a same genus have been observed. The variation due to growing conditions appears to be more important than that observed between different botanical forms grown in identical conditions; for example, they influence amino acid and protein balance, especially that of free amino acids peptides, and half-cystine which in turn is bound to antitrypsic factors. (Summary by EDITEC. Trans. by L.M.F.) G01

0337

19832 MIRANDA M., H. 1970. Resumen de los ensayos de fríjol en América Central. 1968-1969. (Summary of bean trials in Central America, 1968-1969). In Arias, C.L., ed. Reunión Anual del Programa Cooperativo Centroamericano para el Mejoramiento de Cultivos Alimenticios, 15a., San Salvador, El Salvador, 1969. Trabajos presentados: fríjol. Guatemala, Instituto Interamericano de Ciencias Agrícolas. Publicación Miscelánea no.68. pp.54-58. Span., 2 Refs.

Phaseolus vulgaris. Germplasm. Cultivars. Adaptation. Selection. Yields. Central America.

Regional trials were conducted at 7 sites of 5 Central American countries: Guatemala, El Salvador, Honduras, Costa Rica, and Panama. Two zones were delimited: a low alt. zone (0-600 m.a.s.l.) and a medium alt. zone (601-1200 m.a.s.l.). In a 1st trial (Almacigal) 83 introductions were evaluated: 66 black and 77 red and 4 controls (Jamapa, Porrillo No. 1, S-182-N, and a local check). Yield varied considerably among sites; in the medium alt. zone, av. yields over 5 sites ranged between 804-1888 kg/ha. In San Andres (El Salvador), black bean var. Preto 6-1, Costa Rica-2, and Guatemala 345 yielded 750, 345, and 450 kg/ha, resp. In Tocumen (Panama) the max. yield was obtained in var. 1-113 with 956 kg/ha. The highest yields (1920 kg/ha) were obtained in El Zamorano, Honduras, whereas the lowest yield (543 kg/ha) was obtained in Alajuela, Costa Rica. In a 2nd trial with black beans 16 var. were used; in the middle alt. zone the best var. was Honduras 35 with 2631 kg/ha in Turrialba, Costa Rica; in the low alt. zone, the best var. was Veranic 2 with 1456 kg/ha in San Andres. In a 3rd trial with 12 red bean var. and 4 controls, yields ranged between 213-2775 kg/ha for the different sites in the low and middle alt. zones. Var. Col. 1-63-A produced 2117 kg/ha in Turrialba; other outstanding var. were 27-R, Honduras 46, and Honduras 24 with 2046, 1861, and 1831 kg/ha, resp. The no. of red bean entries is low and should be increased considerably. (Summary by EDITEC) G01

0338

19764 MUIGAI, S.G.S. 1983. Breeding better beans. Kenya Farmer 1983(August. Special issue: Food beans in Kenya):20-21. Engl., Illus. [Grain Legume Project, National Horticultural Research Station, P.O. Box 220, Thika, Kenya]

Phaseolus vulgaris. Cultivars. Selection. Resistance. Drought. Adaptation. Plant breeding. Kenya.

The breeding program of the Grain Legume Project (GLP) initially concentrated on the systematic selection of the best bean types for each region and in 1979 offered the 1st seed stock of Rose Coco (GLP-2) which is well suited to wet regions of Kenya and with high yield potential, GLP-24 for medium rainfall areas, and Mwezi Moja (GLP-1004) for dry marginal areas. GLP-X.92 with wide adaptability, resistant to halo blight (Pseudomonas phaseolicola), and tolerant to drought will soon be released. Breeding for resistance is in advanced stages, with high priority given to tolerance to drought and heat (cv. Mwezi Moja and GLP-806, to be distributed soon). Work is being carried out on the identification of factors related to drought tolerance and the reduction of bean seed prices. (Summary by EDITEC. Trans. by L.M.F.) G01

0339

19833 PESSOA C., O.; HERNANDEZ B., F. 1970. Fertilización y producción de fríjol en Parrita, Costa Rica, 1968. (Bean fertilization and production in Parrita, Costa Rica, 1968). In Arias, C.L., ed. Reunión Anual del Programa Cooperativo Centroamericano para el Mejoramiento de Cultivos Alimenticios, 15a., San Salvador, El Salvador, 1969. Trabajos presentados: fríjol. Guatemala, Instituto Interamericano de Ciencias Agrícolas. Publicación Miscelánea no.68. pp.22-28. Span., Illus.

Phaseolus vulgaris. Cultivars. Yields. Adaptation. Seed color. Fertilizers. N. P. K. Germplasm. Costa Rica.

Two trials were carried out with red and black bean var.: one on fertilization and the other an evaluation of the seed collection at the Fabio Baudrit Moreno Exptl. Station, U. of Costa Rica, which has 616 introductions. The best black bean var. was Sal-264 with 2702 kg/ha followed by 91-N and Sal-211, both with 2480 kg/ha. The best red var. was Mex-81-R with 1593 kg/ha followed by Carne 27 with 1310 kg/ha. The results of the evaluation of the seed collection highlight the performance of black bean var. S-660-A (2985 kg/ha) and red bean var. 53 Retinto Dulce Nombre Copán (2118 kg/ha). In the fertilization trial with var. Jamapa, it was found that with rates of 100 and 120 kg N/ha yields of 1376 kg/ha were obtained. P and K applications did not produce significant differences; however, the interaction of both elements was significant ($P < 0.05$). (Summary by EDITEC) G01

0340

20815 QUINTERO F., E. 1982. Comportamiento de cuatro variedades de fríjol (Phaseolus vulgaris L.) en siembra de diciembre. (Performance of four bean varieties planted in December). Centro Agrícola 9(3):15-22. Span., Sum. Span., Engl., 17 Refs., Illus. [Facultad de Ciencias Agrícolas, Univ. Central de las Villas, Santa Clara, Las Villas, Cuba]

Phaseolus vulgaris. Cultivars. Adaptation. Yields. Yield components. Selection. Cuba.

An expt. to study the behavior of 4 bean var. (Cueto 25-9, ICA Pijao, V8, and Velasco Largo) was conducted on a red ferralitic soil in Dec. 1979, in the locality of Remedios, Villa Clara, Cuba. A randomized block design was used with 4 replications. The data obtained were submitted to variance analysis and the Duncan test was used to compare the averages. Differences between var. were obtained for the following parameters: nodes on the stem and branches, wt. of grain/plant and wt. of the total plant, no. of grain/pod and per plant, pods/plant, av. wt./seed, and yield. Significant differences were not registered between var. for the following parameters: branches and racemes/plant; height of plant and of the 1st pod; and HI. The highest yielding var. were Cueto 25-9 and ICA Pijao, and the lowest, V8. (Author's summary) G01

0341

20051 RICCI, J.R.; PLOPER, L.D. 1981. Hacia nuevas variedades de poroto negro. (Toward new black bean varieties). Avance Agroindustrial 2(6):21-23. Span., Illus.

Phaseolus vulgaris. Cultivars. Crossbreeding. Selection. Yields. Seed color. Adaptation. Plant habit. Argentina.

Trends of utilization of black bean var. in Argentina are analyzed. Bean production has increased over the last years. Var. Cerillos INTA of Alubia type, and other var. such as Bolita, Chaucha Colorada, and Great Northern which have been planted since 1975, have been progressively substituted by black bean var. from Brazil, Paraguay, and Chile. Var. Negro Común shows considerable variability in adaptation, production, growth cycle duration, growth habit and other characteristics, being a result of multiple crosses between different black bean lines. In 1978 a genetic improvement program was initiated in the Agroindustrial Obispo Colombres Exptl. Station, to take advantage from the variability existing between plants and to obtain genotypes with good adaptation, improved yield, and resistance to anthracnose (Colletotrichum lindemuthianum). Comparisons are made between the yields of selected materials and outstanding lines in CIAT's International

Bean Yield and Adaptation Nursery and some characteristics of the promising lines Tuc. 87, Tuc. 50, and Tuc. 103 are indicated. (Summary by EDITEC) G01

0342

20098 ROSARIO, M.; MONTILLA, B. 1980. Comportamiento de 14 variedades de Phaseolus vulgaris, tipos pinto y negro bajo condiciones de secano. (Performance of fourteen Phaseolus vulgaris varieties, pinto and black-seeded, under dry conditions). Investigación 6(1):3-8. Span., Sum. Span., Engl., 3 Refs., Illus.

Phaseolus vulgaris. Cultivars. Seed. Seed color. Adaptation. Yields. Dominican Republic.

The performance of 8 pinto and 6 black bean var. under dry upland conditions was studied at the Sabana Larga Expt. Station, San José de Ocoa, Dominican Republic. A randomized block design was used with 3 replications. Black var. proved to be superior to pinto var. There was a highly significant difference between black and pinto type beans and also among black beans. Black var. with the best performance were Jamapa, Venezuela 44, ICA-Tui, and Criolla, yielding 2426, 2276, 2125, and 1893 kg/ha, resp. Av. yield difference for black and pinto types was between 650-1058 kg/ha. (Author's summary) G01

0343

19895 RUBAIHAYO, P.R. 1973. The variability and correlations of some characters in the Makerere bean (Phaseolus vulgaris L.) germplasm. In Luse, R.A.; Williams, R.J., eds. IITA Workshop on Grain Legume Improvement, 1st., Ibadan, Nigeria, 1973. Proceedings. Ibadan, International Institute of Tropical Agriculture. pp.91-95. Engl., 4 Refs.

Phaseolus vulgaris. Germplasm. Snap beans. Determinate cultivars. Indeterminate cultivars. Maturation. Xanthomonas phaseoli. Yields. Uganda.

Two expt. were carried out with common bean (620 var.) and haricot bean (590 var.) to determine the amount of variability that exists in germplasm and the nature of interrelationships of some characters that have been used in selection at Kabanyolo U. Farm (Uganda). In each expt. the field was divided into 3 blocks and each block into sub-blocks. Sub-blocks were divided into single rows 3-m long and 60 cm apart (10 cm intrarow). Each maturity group of common bean was dominated by indeterminate var., whereas early maturity groups of haricot beans were dominated by determinate var. and late groups by indeterminate ones. However, there was more variability in indeterminate var. than in the determinate ones. Beans showed large variability when infected with blight (0-70%) compared with haricot bean (25-30%). Mean seed yield/plant was 12.7 and 11.5 g for common bean and haricot bean, resp., with C.V. of more than 45% in both. The variability in the characters in the different subpopulations underlines the risk of evaluating these characters on the whole population basis. Important differences between determinate and indeterminate growth habits in bean are suggested. Percentage blight had a significant negative correlation ($P < 0.01$) with each of the characters; maturity period also had a significant negative correlation with crop index in common bean ($P < 0.01$) and haricot bean ($P < 0.05$). Crop index was positively correlated ($P < 0.01$) with seed yield/plant. Partial correlation between maturity period and seed yield/plant at a fixed crop index was positively significant ($P < 0.01$). All multiple correlations were significant ($P < 0.01$). Partial and multiple correlations agreed with the relationship indicated by the simple correlations. (Summary by EDITEC. Trans. by L.M.F.) G01

0344

18711 SCHEUCH, F. 1981. Estado actual de la investigación en fríjol, Perú. (Present situation of bean research in Peru). In Curso Intensivo de Adiestramiento Post-Grado en Investigación para la Producción de Fríjol en el Perú, La Molina, 1981. Trabajos presentados. Lima, Instituto Nacional de Investigación y Promoción Agropecuaria. pp.1-5. Span.

Phaseolus vulgaris. Cultivars. Resistance. Adaptation. Bean common mosaic virus. Uromyces phaseoli. Colletotrichum lindemuthianum. Yields. Peru.

The situation of bean research in different Peruvian regions (North Coast, Central Coast, South Coast, and Sierra) in 1981 is briefly described. Research stations and exptl. fields where bean research is carried out are indicated as well as the most important advances in research obtained by the national program in collaboration with CIAT. Cv. are developed with seed color and size adequate for domestic consumption, and breeding activities concentrate on resistance to diseases such as BCMV and root rots, insect pests such as Epinotia and Empoasca, and problems such as drought and salinity. In the Sierra region, materials are selected for resistance to BCMV and anthracnose (Colletotrichum lindemuthianum), as well as for tolerance to low temp. (2800 m.a.s.l.). In the central and southern coastal areas a regional adaptation trial was established and materials resistant to Uromyces phaseoli giving high yields were found, namely, UA 105-1, Lima 1 (Cocacho), Promesa 2, and Bayo Claro. The large-seeded red var. Red Kloud and Línea 17 are produced for the summer planting. (Summary by EDITEC) G01

0345

19948 SGARBIERI, V.C.; WHITAKER, J.R. 1982. Physical, chemical, and nutritional properties of common bean (Phaseolus) proteins. Advances in Food Research 28:93-166. Engl., 328 Refs., Illus. [Univ. Estadual de Campinas, Cidade Universitaria, Barao Geraldo, Caixa Postal 1170, Campinas-SP, Brasil]

Phaseolus vulgaris. Proteins. Analysis. Amino acids. Digestibility. Nutritive value. Phytohaemagglutinins. Storage. Processing.

Aspects covered in this comprehensive review are: biosynthesis, identification and quantitation of storage proteins, protein body membrane proteins, and composition of the protein body storage proteins; amino acid composition of bean protein and of protein isolates and fractions, biological value and digestibility of bean proteins, biological availability of amino acids; toxicity associated with Phaseolus proteins, i.e. lectins (phytohemagglutinins), covering occurrence and nomenclature, distribution and physiological importance in the plant, composition and physicochemical properties in different Phaseolus spp., and nutritional and medical importance, and protein inhibitors of digestive enzymes (proteolytic enzymes and alpha-amylase). The influence of storage and processing on chemical and nutritional properties of bean proteins, and additional research needs are also discussed. (Summary by Food Science and Technology Abstracts)

0346

20659 SINGH, K. 1981. Rajma in Jammu as a rabi crop. Pulse Crops Newsletter 1(3):44. Engl. [Dryland Agricultural Research Station, Kishtwar, Jammu and Kashmir, India]

Phaseolus vulgaris. Cultivars. Yields. Adaptation. India.

Phaseolus vulgaris cv. JKRO 79, JKRO 56, Resista, and Him. No.1 sown in Feb. at Samba in the area of Jammu, India (alt. 335 m) gave seed yields of 469-580 kg/ha. (Summary by Field Crop Abstracts) G01

0347

18713 SINGH, S.P.; VOYSEST V., O. 1981. Conceptos básicos de la introducción y selección de las nuevas variedades de fríjol (Phaseolus vulgaris L.). (Basic concepts for the introduction and selection of new bean varieties). In Curso Intensivo de Adiestramiento Post-Grado en Investigación para la Producción de Fríjol en el Perú, La Molina, 1981. Trabajos presentados. Lima, Instituto Nacional de Investigación y Promoción Agropecuaria. pp.1-6. Span.

Phaseolus vulgaris. Cultivars. Selection. Adaptation. Plant breeding.

The most important steps for the introduction and selection of advanced lines in a bean improvement program are given: (1) sources of advanced lines such as introductions, germplasm banks, collections, and those obtained through genetic improvement; (2) trials for line selection including adaptation, preliminary evaluation, regional evaluation, and on-farm evaluation; (3) factors affecting line selection such as type and genetic value of the material, evaluation method, tools and equipment; (4) agronomic factors and practices including evaluation sites, planting seasons and densities, plot size and cropping system, among others. Other important stages include: alternatives to search for stability and wide adaptation; data recording (pest and disease incidence, agronomic characteristics and yield, and grain quality); evaluation and selection dates; seed multiplication; registration of the new var., and var. presentation. The model for the evaluation and distribution of advanced bean lines used by CIAT is presented. (Summary by EDTIEC) G01

0348

20058 VERMEULEN, J.; DAVIS, J. 1982. Informe de trabajos 1981/1982. Programa de fríjol. (Research report 1981/1982. Bean program). Obonuco, Nariño, Convenio ICA/CIAT. 84p. Span., Sum. Span., Illus. [Inst. Colombiano Agropecuario, Granja Experimental Obonuco, Apartado Aéreo 339, Pasto, Nariño, Colombia]

Phaseolus vulgaris. Cultivars. Selection. Technology evaluation. Adaptation. Yields. Resistance. Pseudomonas phaseolicola. Colletotrichum lindemuthianum. Erysiphe polygoni. Germplasm. Crossbreeding. Plant breeding. Colombia.

Activities carried out by the Instituto Colombiano Agropecuario (ICA)-CIAT collaborative project on beans for cold climates in ICA's regional center in Obonuco and in the dept. of Nariño (Colombia) are reported. On the exptl. farm, 6233 materials were evaluated in bush bean trials, of which 103 were selected for good adaptation, high yields, and resistance to major diseases. Although there was a severe attack of halo blight (Pseudomonas phaseolicola) during the 1st semester of 1981, it was possible to obtain 108 bush bean materials resistant or tolerant to the disease. Best lines were ICA-Tundama, ANT 8, L 33341, L 33411, and L 33462 with commercial-colored grains (red and red/cream). These were also selected for regional trials during the 2nd semester against the check DIACOL-Andino. Best climbing bean lines identified were improved along with cv. Mortiño to seek resistance to major diseases and higher productivity. In the evaluation of 393 new climbing bean collections, 41 belonging to the Ecuadorian and the Peruvian collections were considered promising. In a preliminary germplasm trial 11 high-yielding lines of growth habit IV A, and the majority with

commercial-type grain, were selected. Fifty-four percent of the planted materials yielded more than the check. In lots with crosses, the 52 commercial var. planted had good yields, except for var. E 1034 and Compuesto Chimaltenango 3 due to an attack of halo blight; 43 crosses formed pods for a total of 146 seeds and V 7987, V 7917, and G 5653 were used in most cases as sources of resistance. In F_2 single-plant selection nurseries, 550 single plants were selected as well as 2 populations, V 7302 and V 7423, from E 1036, with good adaptation. In the F_4 nurseries, 425 plants were selected. Six lines were selected in F_3 progeny tests, 26 in F_5 progeny tests, and 37 promising lines in advanced materials, all yielding above the check (Mortiño) with improved resistance and, in most cases, with commercial-type grain. When 8 promising climbing bean lines were intercropped with 3 maize lines, all had higher yields and matured earlier than var. Mortiño (check) and were more tolerant to anthracnose (Colletotrichum lindemuthianum) and powdery mildew (Erysiphe polygoni). Maize yields decreased when bean yields increased in associated cropping systems. Results indicate that the best combination of bean with maize was maize var. MB-521 and bean lines E 521 and E 605, with commercial-type grain. Thirteen regional trials were conducted in 6 municipalities of Nariño with the 5 aforementioned promising bush bean lines and 7 climbing bean lines, selected the previous year by ICA and CIAT: L 33003, L 32980-M(4), L 32980-M(8), L 32983, E 605, E 525, and E 521. These trials showed that the best promissory lines were bush bean L 33341 and climbing beans L 33003, L 32980-M(8), and E 521, for their good adaptation, yields higher than those of the checks, larger grains, early maturity, and tolerance to major diseases. (Author's summary. Trans. by L.M.F.) G01

0349

20040 ZAMUDIO, N.; VIZGARRA, O. 1982. DOR 41, una nueva variedad de poroto negro para el noroeste argentino. (DOR 41, a new black bean variety for northwest Argentina). Avance Agroindustrial 3(11):21-24. Span., Illus.

Phaseolus vulgaris. Cultivars. Yields. Technology evaluation. Resistance. Colletotrichum lindemuthianum. Bean chlorotic mottle virus. Maturation. Argentina.

In 1980 a new bean var. was introduced into Argentina from CIAT in Colombia, characterized by vigorous germination, indeterminate type II growth habit, large dark green leaves similar to those of soybean, a flowering period ranging from 38 to 42 days and maturity at 90-98 days, and a wt. of 100 seeds of approx. 20 g. Plant architecture allows for direct mechanized harvesting; yields have varied from 1936 to 2570 kg/ha over 6 tested sites. DOR 41 shows intermediate resistance to anthracnose (Colletotrichum lindemuthianum) and to bean chlorotic mottle virus. The Secretaria de Agricultura y Ganaderia of Argentina authorized the multiplication of DOR 41 seed within the seed supervision system. (Summary by EDITEC) G01

See also 0233 0241 0266 0274 0281 0291 0310 0355 0364

H00 NUTRITION

H01 Foods and Nutritive Value

0350

19500 ANZALDUA-MORALES, A.; BRENNAN, J.G. 1982. Relationship between the physical properties of dried beans and their textural characteristics

after processing. Journal of Texture Studies 13(2):229-240. Engl., Sum. Engl., 12 Refs., Illus. [National College of Food Technology, Univ. of Reading, St. Georges Avenue, Weybridge, Surrey, England]

Phaseolus vulgaris. Seed. Cooking. Seed characters. Canned beans. Processing.

To ascertain if the textural characteristics of baked beans can be related to mechanical properties of field dried bean, baked beans in brine and in tomato sauce were prepared using samples from 6 different bean var. Baked beans were tested by means of compression and puncture, shearing, back extrusion, and compression tests, as well as sensory evaluation of texture; dry beans were tested by means of compression and puncture. Scales chosen for scoring included firmness, chewiness, smoothness of skin, and general hedonic rating. For canned beans in brine, the max. forces for compression and back extrusion were found to be linearly dependent on the max. force for compression of the dry beans. In the case of beans canned in tomato sauce, only the max. force for back extrusion exhibited linear dependence. When tomato sauce was used, some softening was observed. The max. force for back extrusion was correlated to sensory firmness, and the energy for back extrusion to sensory chewiness. (Author's summary) H01

0351

20029 BRESSANI, R. 1983. Effect of chemical changes during storage and processing on the nutritional quality of common beans. Food and Nutrition Bulletin 5(1):23-34. Engl., 38 Refs., Illus. [Division of Agriculture & Food Sciences, Inst. of Nutrition of Central America & Panama, Apartado Postal 1188, Carretera Roosevelt, Zona 11, Guatemala, Guatemala]

Phaseolus vulgaris. Storage. Processing. Cooking. Germination. Nutritive value. Timing. Guatemala.

Examples of the effects of storage and processing (milling, cooking, germination, and fermentation) on the nutritional value of food legumes, in particular beans, are given. On the basis of current home practices in Guatemala (standard cooking hardness at g-force of 90), beans stored at 35°C and 85% RH for 6 mo. required over 210 min to soften with the subsequent decrease in protein quality and increased energy cost. High moisture in the grain favors hardening as storage time increases. Although the mechanism of the hard-to-cook condition is not fully understood, it is probably related to an increase in the bound protein in the seed coat and aleurone layer. Milling techniques have been developed to maximize the yield of edible fractions since milling of food legumes by both wet and dry methods has disadvantages. Roasted beans had a protein quality equal to or better than that of cooked bean (bed heat exchange dryer operated at 190-200°C for 20-30 s); a similar treatment was useful to preserve cooking characteristics of the product. In rat feeding trials protein quality was better when extrusion cooking or drum drying (in that order) was used than when beans were autoclaved. Germination increases the vitamin content of legumes but its effects on protein quality should be studied. Fermentation increases vitamin and protein contents, increases the availability of various nutrients, and removes antiphysiological factors. The role of polyphenolic compounds during cooking should be established. Areas that require further research to improve availability, utilization, and nutritive value of legumes are pointed out. (Summary by EDITEC. Trans. by L.M.F.) H01

0352

19760 BRESSANI, R.; ELIAS, L.G. 1977. The problem of legume protein digestibility. In Hulse, J.H.; Rachie, K.O.; Billingsley, L.W., eds. Nutritional standards and methods of evaluation for food legume breeders. Ottawa, Canada, International Development Research Centre. IDRC-TS7e. pp.61-72. Engl., 28 Refs., Illus.

Phaseolus vulgaris. Digestibility. Proteins. Nutritive value. Biochemistry. Heat treatment. Storage.

The low protein digestibility of legume grains is analyzed and possible reasons for this are discussed. Nutritional and biochemical studies carried out with legume grains have dealt mainly with antiphysiological substances (trypsin and amylase inhibitors, and hemagglutinins) and the deficiency of sulfur-containing amino acids. Studies on lab. rats and on human adults to evaluate fecal N excretion are reported. It is suggested that the low protein digestibility of legume grains may be a characteristic common to all or almost all vegetable protein sources. Antiphysiological factors could be partially responsible for this low digestibility. The effect of heat treatment on protein digestibility (different cooking processes, toasting, autoclave, and extrusion) and on protein quality as well as that of storage time were analyzed. Standard methods of processing these products are needed. The digestibility of the water-soluble N fractions was analyzed, being significantly lower than that of the insoluble N fraction. However, a better identification of these fractions is required. Proteins resistant to enzymatic hydrolysis and seed coat pigments are discussed. Black beans have the highest protein digestibility and red beans, the lowest. The role of the rate of passage of food residues through the alimentary tract and the effect of fractions on gastric pH are analyzed. It is concluded that at least 4 conditions control protein digestibility: antiphysiological factors; the effect of heat that inactivates trypsin inhibitors, hemagglutinin compounds, and others; heat or other treatment that would cause breakdown of heat resistant proteins, cell walls, and sugars; and the control of protein complexing substances as well as storage conditions. The efficiency of land utilization in terms of protein from bean is analyzed. (Summary by EDITEC. Trans. by L.M.F.) H01

0353

19759 BRESSANI, R.; ELIAS, L.G. 1977. Tentative nutritional objectives in the major food crops for plant breeders. In Hulse, J.H.; Rachie, K.O.; Billingsley, L.W., eds. Nutritional standards and methods of evaluation for food legume breeders. Ottawa, Canada, International Development Research Centre. IDRC-TS7e. pp.51-61. Engl., 21 Refs., Illus.

Phaseolus vulgaris. Nutritive value. Protein content. Amino acids. Diets. Methionine. Cystine. Tryptophan. Lysine.

Considerations that could serve as a basis for plant breeders in the nutritional improvement of basic food crops are given. Variability in nutrient content and cereal and legume consumption patterns are explained, on the basis of representative diets consumed by preschool children in rural Guatemala. Cereals amount to around 80% of the total diet and legumes to about 10%; these diets are consequently low in protein and deficient in amino acids, especially lysine. The characteristics of both types of foods are analyzed and nutritional goals should be established for a mixed diet (maize and bean). Nutritional benefits were obtained when maize with higher levels of lysine and tryptophan were used and when twice the level of beans was used in the diet (relative nutritive values of 66.7 and 56.8%, resp.; normal maize, 44.7%). Results were similar with high

protein maize. Results are clearly related to the amino acid values of these 2 foods. Nutritional benefits were also obtained by the isonitrogenous replacement of common maize by black bean nitrogen up to 50:50 protein ratio distribution level. Although the mixture of rice and beans has a protein quality higher than each component alone, improvement is possible if the amount of deficient amino acids is increased. The better performance of soybean and cowpea compared with common beans is due to their higher sulfur amino acid and tryptophan contents. In cereal grain-legume diets, there is little advantage in increasing met. content of beans; however, efforts to increase lysine and tryptophan content in common maize or lysine content in other cereal grains in mixed diets are clearly justified. Protein and amino acid levels in some basic foods are proposed. It is hoped that further research will be stimulated to obtain more precise values of limiting nutrients. (Summary by EDITEC. Trans. by L.M.F.) H01

0354

19960 DAVIS, D.R.; STRIEGLER, C.L. 1982. Effect of pre-processing variables and omission of salt on quality characteristics of canned snap beans. Arkansas Farm Research 31(4):3. Engl.

Phaseolus vulgaris. Snap beans. Canned beans. Heat treatment. Seed characters. Processing. USA.

Snap bean var. Gallatin Valley was classified into 3 sieve sizes; it was mechanically snipped into 1.5" pieces and blanched at 165°F for 4 min. The snap beans were then cooled in cold water (50°F) for several min, or filled hot in 303 x 406 "R" enamel cans (9 oz/can) and covered with boiling water. Salt at 2% was either added or excluded and the cans either exhausted in live steam for 8 min or not exhausted. After sealing, the cans were processed for 21 min at 242°F, cooled and stored at room temp. Samples were examined at 3 days, and at 8, 12 and 16 mo. of storage. None of the treatments showed a significant effect on the green color; salt omission had no effect on either the wt. or the color of the processed snap beans. However, samples with no salt showed increased firmness and significantly less sloughing than salted snap beans. These results indicate that exhausting snap beans should be avoided unless required to obtain satisfactory vacuum in the cans. (Summary by EDITEC) H01

0355

20651 GONZALEZ, A.R.; SISTRUNK, W.A. 1982. Snap bean studies, 1981. Fayetteville, University of Arkansas. Agricultural Experiment Station Mimeograph Series 299. 14p. Engl.

Phaseolus vulgaris. Snap beans. Cultivars. Processing. Climate requirements. Cultivation. Yields. Growth. Canned beans. Harvesting. Timing. Seed characters. Fibre content. USA.

Studies were carried out for several years on the quality attributes for processing snap bean cv. Gallatin Valley 50, NZ-385, BBL-92, Flo, Peak, Pirate, H-285, Blue Mountain, USDA-711, Epoch, Empress, and Paymaster. Climatic conditions and cultural practices carried out during the spring and fall cropping seasons at the Main Expt. Station in Fayetteville, AR, USA, are described. Parameters measured for the different cv. included days to harvest, yield, pod length, vegetative growth, canning characteristics such as % seed, fiber, shear resistance, and organoleptic evaluations for both cropping seasons. NZ-385 and Epoch produced thin pods whereas Pirate and Kentucky Wonder produced thick pods. Yields ranged between 6.7-14.8 t/ha in the spring and between 6.9-17.3 t/ha in fall. All cv. produced pods with low fiber % in both seasons; the small differences

observed between cv. had no effect on the overall quality. (Summary by EDITEC) H01

0356

19956 NESTER, S.; WOODBURN, M. 1982. Contamination and growth of Bacillus cereus and Clostridium perfringens in Mexican-style beans. Journal of Food Protection 45(7):638-642. Engl., Sum. Engl., 30 Refs., Illus. [Dept. of Foods & Nutrition, School of Home Economics, Oregon State Univ., Corvallis, OR 97331, USA]

Phaseolus vulgaris. Seed. Temperature. Storage. Bacillus cereus. Clostridium perfringens. Cooking. Human nutrition. USA.

Two major problems in production procedures used in Mexican restaurants, identified through interviews with managers, were failure to cool large quantities of beans rapidly and failure to reheat beans thoroughly before placement on the steam table. Expt. were designed to study the effects of varying temp., incubation time, and location in the product on growth of Bacillus cereus and Clostridium perfringens, singly and combined, in cooked mashed pinto beans. Growth of both B. cereus and C. perfringens was rapid at 37°C, with no. of cells associated with illness reached in 4 and 6 h, resp. B. cereus may present more of a health hazard, since obvious signs of spoilage did not occur in these beans until 12 h, whereas C. perfringens caused obvious spoilage of beans within 6-8 h. No. of B. cereus usually associated with illness were found at 12 h at 23°C. The beans appeared to be spoiled before this level was reached with C. perfringens at 24 h. Good growth of both species occurred in both top and botton locations. Of 42 restaurant samples of bean dip and mashed beans analyzed for contamination with B. cereus and C. perfringens, only 2 samples were found to contain either organism and these were present in low no. Two samples were, however, found to contain large no. of coagulase-positive Staphylococcus aureus (more than 100,000/g). (Author's summary) H01

0357

19422 WOLZAK, A.; BRESSANI, R.; GOMEZ B., R. 1981. A comparison of in vivo and in vitro estimates of protein digestibility of native and thermally processed vegetable proteins. Qualitas Plantarum Plant Foods for Human Nutrition 31(1):31-43. Engl., Sum. Engl., 14 Refs. [Inst. of Nutrition of Central America & Panama, P.O. Box 1188, Guatemala, Guatemala]

Phaseolus vulgaris. Digestibility. Proteins. Processing. pH. Enzymes. Guatemala.

Comparative studies were conducted (i) in vivo protein digestibility assay using rats, and (ii) rapid multi-enzyme in vitro assay using trypsin, chymotrypsin, peptidase, and Streptomyces griseus protease. With (ii) digestibility was evaluated on the basis of pH decline of the protein suspension. Numerous native and thermally-processed cereal, legume and oilseed proteins, and their blends were used. Tables and graphs of results are given. Regression analyses show the highest correlation between (i) and (ii) to be achieved when, for (ii), protein suspension pH was determined after 15 min of enzyme treatment. Differences were found between the different types of sample studied. Studies on Phaseolus vulgaris strains suggested that polyphenols may influence in vitro protein digestibility. The greatest difference between (i) and (ii) digestibilities was recorded for thermally-processed samples. Overall correlation coefficient between (i) and (ii) (60 samples) was r = 0.838. (Summary by Food Science and Technology Abstracts) H01

0358

20638 WYCKOFF, S.; VOHRA, P.; KRATZER, F.H. 1983. Improvement of nutritional value of common beans (Phaseolus vulgaris) by autoclaving or extraction. Journal of the Science of Food and Agriculture 34:612-618. Engl., Sum. Engl., 22 Refs. [Dept. of Avian Science, Univ. of California, Davis, CA 95616, USA]

Phaseolus vulgaris. Seed. Processing. Nutritive value. Cultivars. Diets. Protein content. Plant breeding. USA.

Larval wt. of Tribolium castaneum was used to evaluate 6 common bean var. (Small White 7799, Pink Gloria, Red Pinquito, Small White Auroa, Pinto UI-111, Black Turtle Soup). Beans incorporated into test diets were raw, autoclaved, or extracted with either water or 80% methanol. All treatments improved the nutritional quality of beans when compared with raw beans. Bean extracts were growth depressing. In another study heating of the freeze-dried water extract of black beans improved its nutritive value but not of the methanol extract. T. castaneum larvae may be used to evaluate the nutritional quality of Phaseolus vulgaris and different bean treatments. (Author's summary) H01

See also 0222 0230 0328 0336

I00 MICROBIOLOGY

I01 Rhizobium spp., Nitrogen Fixation and Nodulation

0359

20656 ABDEL-GHAFFAR, A.S.; EL-ATTAR, H.A.; EL-HALFAWI, M.H.; ABDEL SALAM, A.A. 1982. Effects of inoculation, nitrogen fertilizer, salinity, and water stress on symbiotic N_2 fixation by Vicia faba and Phaseolus vulgaris. In Graham, P.H.; Harris, S.C., eds. Biological nitrogen fixation technology for tropical agriculture, Cali, Colombia, 1981. Papers presented. Cali, Centro Internacional de Agricultura Tropical. pp.153-159. Engl., Sum. Engl., 14 Refs. [Dept. of Soil & Water Science, Faculty of Agriculture, Univ. of Alexandria, Alexandria, Egypt]

Phaseolus vulgaris. Inoculation. Salinity. Water stress. Fertilizers. N. Nitrogen fixation. Yields. Egypt.

The effects of inoculation, salinity, water stress, and N fertilization on N_2 fixation by Vicia faba and Phaseolus vulgaris are reported. Inoculation of P. vulgaris enhanced nodulation, N fixation, plant dry wt., N content, and final yield, with the granular inoculum being more effective than powder or liquid. N fertilizer (100 kg/ha) reduced nodulation and nitrogenase activity as well as yield. Salinity and water stress adversely affected nodulation, nitrogenase activity, and yield. Irrigation every 7-12 days produced the max. N fixation and yield. (Extracted from author's summary) I01

0360

20637 BAIRD, L.M.; SARATH, G.; WEBSTER, B.D. 1983. Effects of prevention of flowering on the growth of bean plants inoculated with an "ineffective" strain of Rhizobium phaseoli. Botanical Gazette 144(2):225-230. Engl., Sum. Engl., 42 Refs., Illus. [Dept. of Botany, Connecticut College, New London, CT 06320, USA]

Phaseolus vulgaris. Roots. Inoculation. Rhizobium phaseoli. Nodulation. USA.

Roots of Phaseolus vulgaris Light Red Kidney, inoculated with Rhizobium phaseoli strain 14c, produced ineffective nodules. Apex removal from inoculated plants prior to transition to flowering resulted in increased vegetative growth and nitrogenase (acetylene reduction) activity, delayed leaf and nodule senescence, and a greater accumulation of N in shoots of treated plants than in the ineffectively nodulated control plants. Nodule tissue from treated plants also appeared less disrupted cytologically than that of controls. The peribacteroid membrane was usually intact; few membrane fragments or vesicles were associated with it. The cytoplasm was homogeneous and electron opaque with few Golgi bodies and short segments of rough endoplasmic reticulum. Prevention of flowering in the ineffective association may make the symbiosis more effective by altering source-sink relationships within the plant. (Author's summary) 101

0361

20064 BATTHYANY, C. 1977. Legume inoculants for Latin America. In Workshop on Exploring the Legume-Rhizobium Symbiosis in Tropical Agriculture, Kahului, Maui, Hawaii, 1976. Proceedings. Honolulu, University of Hawaii. Department of Agronomy and Soil Science. College of Tropical Agriculture. Miscellaneous Publication no.145. pp.429-439. Engl., 9 Refs.

Phaseolus vulgaris. Rhizobium. Inoculation. Rhizobium leguminosarum. Rhizobium phaseoli. Nitrogen-fixing bacteria. Mexico. Panama. Costa Rica. Colombia. Peru. Ecuador. Brazil. Argentina. Chile. Paraguay. Uruguay.

Some aspects of the situation of inoculants in Latin America are described, including meetings of bacteriologists specialized in legumes held every 2 yr since 1964, the specialized institutions such as the Comité de Bacteriólogos de Leguminosas de América Latina, the Asociación de Fabricantes de Leguminosas de Brasil, and others. The most important legumes of this region are: Phaseolus vulgaris, Glycine max, Medicago sativa, and others such as Lens culinaris, Vicia faba, P. lunatus, P. coccineus, Leucaena leucocephala, Stylosanthes gracilis, and S. humilis. Information is presented on research work conducted in the different Latin American countries. In Colombia, research is carried out at CIAT on forage legumes such as Stylosanthes, Desmodium, and Centrosema, as well as on P. vulgaris. At the Instituto de Pesquisas Agropecuárias (IPAGRO), Brazil, a collection of different Rhizobium strains is kept, which includes R. meliloti, R. trifolii, R. leguminosarum, R. phaseoli, R. japonicum, and R. lupini. It is hoped that the present research centers can modify, in collaboration with international projects, the present situation and guarantee the production and utilization of inoculants in regions where legumes are planted. (Summary by EDITEC) 101

0362

20036 CAMARGO, R.A.L. DE; TURATI, J.A.; CAVASIN, P.L.; MORILHA, V.A.; CALAFIORI, M.H.; FRANCO, J.F. 1981. Influencia de sistêmicos granulados na nodulacao do feijao (Phaseolus vulgaris L.). (Influence of granular systemic insecticides on bean nodulation). Ecossistema 6(1):139-140. Port., Sum. Port., Engl., 1 Ref. [Facultade de Agronomia e Zootecnia "Manoel Carlos Goncalves", Caixa Postal 05, 13.990 Espirito Santo do Pinhal-SP, Brasil]

Phaseolus vulgaris. Insecticides. Nodulation. Inoculation. Rhizobium phaseoli. Brazil.

A trial was carried out under natural conditions with 2 seeds of bean var. Carioca/container to observe the effect of granular systemic insecticides on bean nodulation in a completely randomized design with 5 treatments and 4 replications. Seeds were treated with 200 g of Rhizobium phaseoli/50 kg seed. Treatments were aldicarb at 15 and 30 kg/ha, carbofuran at 30 and 60 kg/ha, and a control. There were no significant differences in wt. and no. of nodules between the control and the treatments, except for aldicarb at 15 kg/ha, with the lowest nodulation. (Author's summary) I01

0363

19869 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1981. Evaluation and improvement of agronomic practices. In _____. Bean Program. Annual Report 1980. Cali, Colombia. pp.63-68,81-83. Engl., Illus. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Also in Spanish.

Phaseolus vulgaris. Rhizobium phaseoli. Inoculation. Strains. Cultivars. Nodulation. Yields. Cultural control. Empoasca kraemeri. Storage. Prices. Spacing. Cerotoma facialis. Intercropping. Saccharum officinarum. Technology evaluation. Insect control. Zabrotes subfasciatus. Acanthoscelides obtectus. Selection. Colombia.

Testing of Rhizobium phaseoli strains continued in 1980 at CIAT with both glasshouse and field evaluations. Final results were obtained for the 1st International Bean Inoculation Trial (IBIT). Bean yield increases following inoculation were obtained in 5 of the trials: 56.3, 61.1, 48.3, 46.1, and 39.9% at La Selva (Colombia), Maui (USA), Piracicaba 1 and 2 (Brazil), and San Andrés (El Salvador), resp. Strains CIAT 632 and 640, in particular, showed consistency in N_2 fixation. The ability of some isolates of R. phaseoli to grow on synthetic media (pH of 4.6 and in the presence of excess Al and Mn) was reported. The survival of CIAT strains 640 (sensitive to low pH in media) and 899 (able to grow on modified Keyser's medium at pH 4.6) when inoculated into the unlimed soil at CIAT-Quilichao (pH 4.15) or into the same soil limed to either pH 4.5, 4.9, or 5.8 was showed. In a trial to evaluate the ability of some strains to function under high soil temp. it was found that most strains are relatively weak in N_2 fixation at the 34°/28° day/night temp. used. Expt. were carried out to determine if the assay methods used at Popayan were appropriate for CIAT-Quilichao. Peak N_2 fixation was observed 35 days after planting at CIAT-Quilichao and 40-50 days after planting in Popayan. Bean yields were satisfactory when intercropped with sugar cane and highest when both crops were planted at the same time. The no. of insect pests was lower in associated cropping; however, the association had no effect on insect populations of sugar cane or on biological control programs in this crop. Final studies on populations of Cerotoma facialis indicated that 4 adults/plant is a critical level during early bean growth stages (8-15 days) and, to a lesser extent, during the flowering period. Seven on-farm demonstration trials were established in Huila, Colombia, on the control of bruchids in bean by applying a low dosage of vegetable cooking oil to the seed before storage. After 4 mo. of storage no damage was observed and farmers were satisfied. High planting densities generally favored disease development in susceptible materials. Cropping systems influenced bean disease development in determinate and indeterminate materials grown in monoculture or associated with maize at CIAT-Palmira and Popayan. Growth habits of Phaseolus vulgaris are described briefly and CIAT accessions of Phaseolus referred to in this report are listed. (Summary by F.G. Trans. by L.M.F.) I01

0364

19795 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1983. Evaluation and improvement of agronomic practices. In _____. Bean Program. Annual Report 1981. Cali, Colombia. Series 02EB(1)83. pp.153-178. Engl., Illus. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Phaseolus vulgaris. Inoculation. Rhizobium phaseoli. Strains. Cultivars. Nodulation. Selection. Mineral deficiencies. P. Nitrogen fixation. Spacing. Intercropping. Empoasca. Cultural control. Timing. Fertilizers. Adaptation. Relay crops. Yields. Colombia.

Results have been obtained to date from 8 collaborating organizations in the 2nd International Bean Inoculation Trial (IBIT), distributed during 1980. Significant responses were obtained in 5 of the sites, with strains CIAT 166 and 407 outstanding. In 2 inoculation trials carried out at the CIAT station in Popayan, significant yield responses to inoculation were obtained in both trials despite the excess of 30% soil OM. Ten accessions of Phaseolus vulgaris were evaluated for ability to nodulate in acid soil conditions, using strains tolerant and nontolerant to acidity. Var. differed significantly in tolerance to acid soil conditions. Studies were undertaken to consider the effect of selection for tolerance to low soil P on nodulation and N fixation in bean cv. At 16 ppm P, N fixation and P accumulation in 2 var. (ICA-Tui and Iguacu) were found to be similar. The effect of maize plant density in a maize/bean association on Empoasca was studied. Adult population levels were consistently lower in plots with higher maize density (50,000 plants/ha). An expt. was carried out at the CIAT-Quilichao station on soil with 2 different P levels (25.6 and 4.3 ppm) to study the time of application of P fertilizers. The best date for P application for beans is at planting. The effect of depth of P fertilizer application (0 and 25 cm below soil surface) on bean yield was studied; deep P fertilizer application tended to give higher yields than superficial application. Studies on the use of alternative P sources for bean production indicated that bean yields were significantly related to the citrate solubility of the finely ground phosphate rock and that triple superphosphate was the most efficient source. Vigna sp., soybean, and Phaseolus bean were tested under nonstress, low P, and high Al and Mn stresses at the CIAT-Quilichao station. In general, stress to P reduced yield more than stress to Al and Mn for all species. The competition of beans of different growth habits was evaluated and yield reduction due to competition by growth habit was found to be statistically nonsignificant. Yield and adaptation of some advanced bush bean breeding lines when cultivated under monoculture, relay, and direct association with maize, were studied. Mean yield differed significantly among cropping systems; the highest yield was obtained using monoculture followed by those obtained from relay cropping. (Summary by F.G. Trans. by L.M.F.) I01

0365

19897 DART, P. 1973. Root nodule symbiosis and tropical grain legume production. In Luse, R.A.; Williams, R.J., eds. IITA Workshop on Grain Legume Improvement, 1st., Ibadan, Nigeria, 1973. Proceedings. Ibadan, International Institute of Tropical Agriculture. pp.185-197. Engl., 17 Refs., Illus.

Phaseolus vulgaris. Rhizobium. Inoculation. Nodulation. Temperature. Light. N. Soil fertility. Nitrogen fixation. Strains. Africa.

Data from different expt. conducted at the Rothamsted Exptl. Station, Harpenden, England, and a bibliographic review of tropical grain legume nodulation are given. The determination of the need of inoculation and the deficiencies in soil nutrients are analyzed as well as the efficiency of

Rhizobium strains in specific legumes; influence of temp. on nodulation (the importance of selecting Rhizobium strains at temp. likely to be encountered in the field is highlighted); carriers for Rhizobium in inoculants; effects of light, OM, and inorganic combined N on nodulation. In expt. with Phaseolus vulgaris cv. Canadian Wonder and other legumes, both short days and low light intensity limited nodulation and N fixation. Nodules on P. vulgaris grown in short days senesced at flowering, and new nodules formed during pod development, except for one Rhizobium strain used. The addition 10% by vol. of Kettering loam to the sand:grit mixture produced a marked increase in growth of bean var. Seafarer and other legumes, greater than that obtained by adding nitrate (50 mg N/pot). The prospects of plant breeding in legumes are given and the areas of research that need further studies are indicated: distribution and no. of Rhizobium in tropical soils; factors involved in the competition among strains for nodulation. (Summary by EDITEC. Trans. by L.M.F.) I01

0366

20662 DIATLOFF, A.; SAINT-SMITH, J. 1981. Failure of navy beans to respond to inoculation with Rhizobium. Queensland Journal of Agricultural and Animal Sciences 38(2):133-138. Engl., Sum. Engl., 3 Refs., Illus. [Plant Pathology Branch, Queensland Dept. of Primary Industries, Indooroopilly, Qld. 4068, Australia]

Phaseolus vulgaris. Inoculation. Rhizobium. Nodulation. Yields. Fertilizers. N. Australia.

Three field expt. were conducted at 4 sites in Queensland, Australia, to select a suitable strain of Rhizobium and to gauge the response of navy beans to inoculation with Rhizobium and to ammonium nitrate. Of the 7 plantings, only 2 had satisfactory nodulation despite the presence of effective naturalized rhizobia at all sites. Where nodulation was poor, there were no growth responses to ammonium nitrate. Soil moisture and nitrate levels seem to be implicated in the nodulation failure. Under N limiting condition with adequate moisture, growth differences occurred between Rhizobium strain treatments. There was a significant correlation between dry wt. of tops at 6 wk. and grain yield at maturity justifying the use of early vegetative growth as a criterion of final grain yields in Rhizobium strain trials. Although fast and slow growing strains were tested, no single strain was outstanding in performance. (Author's summary) I01

0367

20657 GRAHAM, P.H.; APOLITANO, C.; FERRERA-CERRATO, R.; HALLIDAY, J.; LEPIZ, R.; MENENDEZ, O.; RIOS, R.; SAITO, S.M.T.; VITERI, S. 1982. The International Bean Inoculation Trial (IBIT): results for the 1978-1979 trial. In Graham, P.H.; Harris, S.C., eds. Biological nitrogen fixation technology for tropical agriculture, Cali, Colombia, 1981. Papers presented. Cali, Centro Internacional de Agricultura Tropical. pp.223-229. Engl., Sum. Engl., 5 Refs.

Phaseolus vulgaris. Inoculation. Rhizobium phaseoli. Strains. Yields. Nodulation. Mexico. Peru. Bolivia. USA. Brazil. El Salvador. Colombia.

Results obtained in 1978-79 in a collaborative multi-location inoculation trial using 10 highly efficient strains of Rhizobium phaseoli are reported. Twelve IBIT trials were sown in 7 countries: Mexico, Peru, Bolivia, USA (Hawaii), Brazil, El Salvador, and Colombia. Significant yield responses (39-61% increase above control plants without N) were obtained at 5 sites (La Selva, Colombia; Maui, Hawaii; 2 sites in Piracicaba, Brazil; San

Andres, El Salvador). Strains CIAT 632 and CIAT 640 were generally the most effective. Extensive nodulation of uninoculated control plants occurred at several sites highlighting the problem likely to occur with native soil rhizobia in traditional bean-growing regions. (Author's summary) I01

0368

20610 PAZ, L.G. DA; RUSCHEL, A.P.; MALAVOLTA, E. 1979. Influencia do nitrato na nodulacao e fixacao do nitrogenio pelo feijoeiro (Phaseolus vulgaris L.), cultivado em solucao nutritiva. (Influence of nitrate on nodulation and nitrogen fixation in bean cultivated in nutrient solution). Anais da Universidade Federal Rural de Pernambuco 4:179-192. Port., Sum. Port., Engl., 26 Refs.

Phaseolus vulgaris. Cultivars. Fertilizers. Nutrient solution. N. Inoculation. Rhizobium phaseoli. Nodulation. Nitrogen fixation. Brazil.

Bean var. Carioca, Rico-23 and Venezuela-350 were cultivated in nutrient solution and submitted to increasing levels of N as $NaNO_3$ (0, 4.2, 8.4, 16.8, and 42.0 ppm). Plants were harvested at 25 and 45 days of the growth cycle. Treatments consisted of inoculation of a mixture of 3 strains of Rhizobium phaseoli (127 K_{14}, 127 K_{17}, and C_{13}). A substrate, vermiculite, was used during planting; transplanting to vases containing the nutrient solution occurred on the 10th day of the growth cycle. Applied N inhibited nodulation and N_2 fixation estimated by the nitrogenase activity. The need for a starter dose for initial plant development was confirmed. Highly significant differences were detected among treatments, var., and harvesting times for most of the studied parameters (no. and av. wt. of nodules, nitrogenase activity, DM wt., and total N absorbed). The interaction treatment x var. differed significantly regarding nitrogenase activity only. There was a correlation between the amount of fixed N and nodule mass and between total DM wt. and total N fixed and absorbed by the bean plant. (Author's summary) I01

0369

20075 RENNIE, R.J.; KEMP, G.A. 1983. N_2-fixation in field beans quantified by ^{15}N isotope dilution. 1. Effect of strains of Rhizobium phaseoli. Agronomy Journal 75:640-644. Engl., Sum. Engl., 29 Refs. [Research Station, Agriculture Canada, Lethbridge, Alberta, Canada T1J 4B1]

Phaseolus vulgaris. Nitrogen fixation. Rhizobium phaseoli. Strains. Inoculation. Cultivars. Temperature. Mineral content. N. Roots. Symbiosis. Canada.

Most soils sown to field beans contain indigenous Rhizobium phaseoli; thus, few studies have evaluated the effect of different strains of R. phaseoli on N_2 fixation and yield of bean cv. Since western Canadian soils contain no indigenous R. phaseoli, strains were screened for their ability to fix N_2 in 2 bean cv., Aurora and Kentwood. Initially, the N_2-fixing ability of 19 strains of R. phaseoli was determined in vitro. The best were then compared with 16 superior CIAT strains in a 2-yr International Bean Inoculation Trial in the field in association with the same 2 small white bean cv. ^{15}N isotope dilution at levels of ^{15}N natural abundance in the field showed the % Ndfa (% plant N derived from the atm.) averaged 50% for Aurora but only 32% for Kentwood over all 16 strains. The % Ndfa did not vary between the 2 exptl. years, but due to different levels of soil N, yield and actual amounts of N_2 fixed did vary. Aurora averaged 70 kg N/ha

and Kentwood 37 kg N/ha fixed. Some strains fixed more than 100 kg N/ha in Aurora, resulting in DM and N yields in excess of uninoculated treatments receiving 40 or 100 kg fertilizer N/ha. Strains of R. phaseoli from high temp. soils of L.A. fixed high amounts of N_2 in association with temperate bean cv. under conditions of low temp. growth (10-23°C). CIAT strains 632, 899, 640, and 904, and commercial Nitragin were highly efficient N_2 fixers with Aurora as were CIAT strains 952, 161, 166, and commercial Nitragin with Kentcwood. Thus, R. phaseoli is as efficient as other rhizobia in supplying fixed N_2 to their host plant and, in N_2-fixing mode, certain bean cv. can meet their genetic yield potential in the field without the addition of fertilizer N. (Author's summary) I01

0370

20076 RENNIE, R.J.; KEMP, G.A. 1983. N_2-fixation in field beans quantified by ^{15}N isotope dilution. 2. Effect of cultivars of beans. Agronomy Journal 75:645-649. Engl., Sum. Engl., 23 Refs. [Research Station, Agriculture Canada, Lethbridge, Alberta, Canada T1J 4B1]

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

The use of N balance in phytotron studies and ^{15}N isotope dilution in the field to determine the effect of Rhizobium phaseoli strains and mineral N levels on the expression of nis (N fixation supportive trait) in 26 cv. of field beans is reported. Evaluation for nis under N-free conditions in the phytotron forced total dependence on seed and atmospheric N and provided a useful screening technique before field experimentation. Ranking of cv. for nis was highly dependent on R. phaseoli strain, mineral N levels, growth habit, growth stage, and temp. regime during evaluation. R. phaseoli strains 3644 and 8215 resulted in higher N_2 fixation with temperate beans while strain 3605 was unique in high N_2 fixation with 2 tropical cv., Cargamanto and Sangretoro. The addition, in the field, of 40 kg fertilizer N/ha on a Typic Haploboroll soil caused a 10% reduction in % N derived from atm. (% Ndfa) in most cv. but had no effect on Redkloud. In contrast, Limelight suffered a 60% reduction in % Ndfa. This indicated a host-specific reaction in nis to mineral N and potential for breeding this resistance into other bean lines. Both in the phytotron and the field, climbing bean cv. had higher % Ndfa and thus superior nis than bush cv. Some cv. were superior when evaluated at anthesis but not at maturity, indicating a difference in the N_2-fixing span of the cv. In the field, % Ndfa of beans was approx. 50%, the other 50% being derived from fertilizer and or soil N. The actual amounts of N_2 fixed varied between 40 and 125 kg/ha depending on the cv. Thus, R. phaseoli may be considered as efficient as R. japonicum with soybeans in supplying atmospheric N_2 to the plant. (Author's summary) I01

See also 0224 0252 0257

J00 ECONOMICS AND DEVELOPMENT

0371

19787 ACOSTA N., M.A. 1983. Situación actual del fríjol poroto (Phaseolus vulgaris) en la República de Panamá. (Present situation of bean production in Panama). In Mesa Redonda sobre el Programa Cooperativo

Subregional de Producción de Leguminosas Alimenticias de los Países de Centroamérica y Panamá, San José, Costa, Rica, 1983. Trabajos presentados. Costa Rica, Ministerio de Agricultura y Ganadería. pp.80-86. Span.

Phaseolus vulgaris. Production. Yields. Panama.

The present situation of bean production and research in the different bean producing regions of Panama, located between 900-1000 m.a.s.l., is briefly described. Native var. such as Rosado, Mantequilla, Chileno, Chiguices, and Diacol Calima, are planted. The Caisan region produces 15% of the national consumption vol. and the remaining 85% is imported. The most limiting disease is web blight (Thanatephorus cucumeris). Research is oriented toward management practices such as zero tillage and breeding programs. Statistical tables are included that contain information on surface area, production, and yields at Chiriqui from 1975 to 1983, according to the type of bean producer. (Summary by EDITEC) J00

0372

20027 ARCIA, G. 1980. Risk, institutional change and technology adoption for low income farmers: an analysis of new bean alternatives for the southern Huila region of Colombia, South America. Ph.D. Thesis. Missouri, University of Missouri-Columbia. 212p. Engl., Sum. Engl., 108 Refs., Illus.

Phaseolus vulgaris. Technology evaluation. Prices. Income. Yields. Storage. Marketing. Colombia.

A technology adoption problem for the southern Huila region in Colombia is analyzed. Characteristics of the new technology, attitudes toward risk, the institutional setting for farmers, and quality of information on new technology and prices are examined as factors influencing adoption. Information on the new technology was developed from surveys by the CIAT Bean Team in southern Huila. These surveys generated input-output coefficients for on-farm trials as well as information on the characteristics of households and farm units. Additional primary information was collected from a survey to determine attitudes toward risk and perceptions of uncertainty. For the former, risk aversion coefficients consistent with those indicated in the recent literature were estimated. Low income farmers were found to be relatively risk averse. For the latter, substantial discrepancies were discovered between perceptions of researchers on one hand and the farmers on the other related to the uncertainty associated with yields and prices of beans and other crops. The instrument used to elicit this information was novel and appears to have substantial potential as a mechanism for better directing extension information programs and, as well, understanding attitudes toward adoption of new technology by low income farmers. The major hypothesis of the study related to the relative importance of institutional factors as compared with characteristics of new technologies for influencing adoption. The development of new technologies for low income farms is a process which requires time and substantial resources. At the same time, there may be institutions affecting farmers which can be altered with low political and economic costs. Two of these for southern Huila farmers related to bean price stabilization and improvement. On-farm storage options and marketing organizations were examined for their potential for altering characteristics of prices received by farmers adopting the new bean technology. Results indicated that the institutional factors could be altered so that risk averse farmers would find the existing new technology attractive for adoption. The adoption problem was found to be broader than traditionally perceived. New technologies should be developed incorporating available information about farming systems and the circumstances in which the farmer or farming system

is operating. Many times, alterations in these factors, traditionally avoided because of political sensitivity, can be as important in improving the economic lot of low income farmers as the development and distribution of new technologies. How the individual farmers are studied is emphasized. The referenced gambling instruments employed in eliciting risk attitudes and perceptions of uncertainty would appear to have important potential for better directing efforts at improving the adoption of the new technologies and identifying problems associated with low adoption rates for technologies which on the surface appear to be attractive for low income farmers. (Author's summary) J00

0373

19761 COMBES, R.G. 1983. Why are GLP seeds not planted more often?. Kenya Farmer 1983(August. Special issue: Food beans in Kenya):27. Engl. [Grain Legume Project, National Horticultural Research Station, P.O. Box 220, Thika, Kenya]

Phaseolus vulgaris. Seed. Prices. Cultivation. Consumption. Kenya.

Current demand of improved seed of the Grain Legume Project (GLP) is 55 t when if even as little as 5% of the area was planted with improved seed in any one season, the requirement would amount to 25,000 t. Possible constraints are analyzed: seed price which is high for the av. small-scale farmer; farmers are not familiar with agronomic practices and improved seed due to deficient excension services; little incentive of the rural community to change their system of subsistence; fluctuation in market prices and demand. It is concluded that farmers will respond to fair, reliable market prices and conditions by using certified seed. Heavy, continuous subsidies should be given to achieve a higher distribution of GLP seeds in the long term and its acceptance by the farmers, if the seed is of high quality. (Summary by EDITEC. Trans. by L.M.F.) J00

0374

19784 DIAZ, J.M. 1983. La producción de fríjol en Guatemala. (Bean production in Guatemala). In Mesa Redonda sobre el Programa Cooperativo Subregional de Producción de Leguminosas Alimenticias de los Países de Centroamérica y Panamá, San José, Costa Rica, 1983. Trabajos presentados. Costa Rica, Ministerio de Agricultura y Ganadería. pp.42-49. Span.

Phaseolus vulgaris. Production. Yields. Trade. Guatemala.

The problems encountered in bean production in Guatemala are examined within the context of 3 basic factors: (1) Beans are basically consumed by low income urban and rural populations. (2) Most of the producers are small farmers with scarce economic resources. (3) Farmers with higher productive potentials prefer more profitable crops. Consumption per capita decreased because of a supply deficit or substitution by other foods. Approx. 66% of the area planted to beans and 65% of bean production are found on farms with less than 6.5 ha. Most of the area planted is considered to be subsistence agriculture. Large-scale farmers tend toward mechanized bean planting, which is a 1st step to increase the domestic supply. Tables are included with information on surface area and regions planted to beans, production, yields, and import and export levels. (Summary by EDITEC) J00

0375

20652 INFANTE O., M.; PINSTRUP-ANDERSEN, P. 1975. Análisis agroeconómico del proceso de producción de fríjol en una zona altamente tecnificada:

Valle del Cauca, Colombia. (Agroeconomic analysis of the bean production process in a highly technified region: Valle del Cauca, Colombia). Cali, Colombia, Centro Internacional de Agricultura Tropical. 63p. Span., Illus.

Paper presented at Reunión Anual del Programa Cooperativo Centroamericano para el Mejoramiento de Cultivos Alimenticios, San Salvador, El Salvador, 1975.

Phaseolus vulgaris. Economics. Seed color. Income. Cultivation. Colombia.

Information is provided on the most important agronomic aspects of the black bean production process in 3 municipalities in the Valle del Cauca (Ginebra, Cerrito, and Tulua), Colombia. Thirty-one bean production units of varying surface area and technology level were visited. Factors involved in the process are described: land and capital; soil availability and characteristics; agrobiological aspects of pests, diseases and weeds; availability of human, credit, and technical assistance resources; and marketing facilities. The utility of an agroeconomic methodology to help establish research strategies and priorities and government policies oriented toward increasing bean production and productivity is demonstrated. Fifty-six percent of the farmers indicated that the main problem limiting bean production is water management or availability, whereas for large farmers find insect pests such as Empoasca, Trichoplusia, chrysomelids, and Bemisia tabaci, and diseases such as angular leaf spot (Isariopsis griseola), rust (Uromyces phaseoli), bacterial blight (Xanthomonas phaseoli), root rots, and viruses to be major problems. Yields ranged between 0-2000 kg/ha and a gross margin variation between -$3767 and $25,000/ha was noted. (Summary by EDITEC) J00

0376

18710 MORALES C., J. 1981. Situación actual del fríjol en el Perú. (Current situation of bean production in Peru). In Curso Intensivo de Adiestramiento Post-Grado en Investigación para la Producción de Fríjol en el Perú, La Molina, 1981. Trabajos presentados. Lima, Instituto Nacional de Investigación y Promoción Agropecuaria. pp.1-9. Span.

Phaseolus vulgaris. Production. Yields. Consumption. Peru.

Over the period 1970-80, the situation of bean production in Peru showed decreases in the area planted to the crop (from 65,780 to 46,355 ha), in production (from 53,259 to 40,926 MT), and in the consumption/capita/yr (from 3.96 to 2.30). Yields increased from 810 to 883 kg/ha and there was a 3% increase in population. Most of the area planted to beans is located in the Sierra region (27,986 ha in 1979) and the highest yields/unit are obtained in the coastal area. The jungle region produces 20% of the national production. The dept. of Cajamarca has the greatest area planted to beans and a yield/unit lower than the national av. since most of the beans are intercropped with maize. Some problems that occur in bean crops are: (1) low production potential of bean; (2) high susceptibility to pests and diseases (common mosaic, rust, fungi, nematodes); (3) low level of technology; (4) lack of improved seed; (5) insufficient credit facilities; (6) preference for light-colored grain types (Canario, Bayo, and Panamito); (7) deficient commercialization policies. Tables on price fluctuations and production goals for beans in 1981-82 are included. (Summary by EDITEC. Trans. by L.M.F.) J00

0377

20647 ORGANIZACION DE LAS NACIONES UNIDAS PARA LA AGRICULTURA Y LA ALIMENTACION. PROGRAMA COOPERATIVO DE PRODUCCION DE LEGUMINOSAS ALIMENTICIAS.

1982. Frejol (Phaseolus vulgaris L.). (Beans). In _____. Informe sobre la situación actual de las leguminosas alimenticias en Chile. Santiago de Chile. pp.14-54. Span., 200 Refs.

Phaseolus vulgaris. Production. Yields. Trade. Seed color. Bean yellow mosaic virus. Delia platura. Acanthoscelides obtectus. Epinotia aporema. Chile.

The situation of beans in Chile is described regarding (1) changes in area planted, production, and yield; (2) technical aspects: var., domestic consumption, exports, agronomic factors, pests and diseases, and research; (3) marketing and commercialization of beans for consumption and seed production. Bean production increased from 65,584 t in 1970 to 138,239 t in 1981; the surface area planted to beans also increased from 57,230 to 117,740 ha and av. yields rose from 1150 to 1170 kg/ha, resp. There are var. for fresh consumption (green pods and pods with grains), var. for dry bean production which satisfy the domestic demand with different seed colors (light grey, grey, white with yellow or brown spots, light brown, light brown with red spots, cream with brown spots, and yellow), and other black, white, and red bean var. for exportation. Viral diseases have the highest incidence, especially BYMV. Major insect pests include Hylemia cilicrura, Epinotia aporema, and Acanthoscelides obtectus. Research concentrates on increasing yields/unit area through plant improvement and cultural practices. The distribution of bean exports is presented based on buyer markets, its variation according to var. produced, commercialization channels, and seed marketing. A detailed literature review of bean cultivation in Chile is presented. (Summary by EDITEC) J00

0378

19049 PACHICO, D. 1983. Bean technology for small farmers in Latin America. In Centro Internacional de Agricultura Tropical. Trends in CIAT commodities. Cali, Colombia, Internal Document Economics 1.8. pp.29-65. Engl., 10 Refs., Illus. [CIAT, Apartado Aéreo 6713, Cali, Colombia]

Phaseolus vulgaris. Marketing. Technology evaluation. Economics. Climatic requirements. Latin America.

Technical, economic, and policy considerations orienting the technology development process toward the specific needs of small farmers, primarily in the tropical Americas, as a tool for planning a research strategy for the improvement of bean are given; 20% of total bean production comes from farms of less than 5 ha and 50% or more from farms of less than 20 ha. The economics of what constitutes a technology for small farmers is revised and some technical issues related to the feasibility of designing bean technology for small farmers and on bean production are discussed. The potential economic impact of new technology on small farmers and on bean production is considered. Available evidence suggests that the following factors can be included in the technology that favors small farm production: (1) selection under stress of associated cropping systems; (2) emphasis on plant types most suited for small farmer use; (3) selection under environmental stresses faced by small farmers and with appropriate input levels; (4) attention to grain quality and market characteristics that favor small farmers. Several aspects that influence decision making by national research institutions regarding technology are analyzed and the role that international research institutions could play is highlighted. (Summary by EDITEC. Trans. by L.M.F.) J00

0379

20061 PINCHINAT, A.M. 1977. The role of legumes in tropical America. In Workshop on Exploring the Legume-Rhizobium Symbiosis in Tropical Agriculture, Kahului, Maui, Hawaii, 1976. Proceedings. Honolulu, University of Hawaii. Department of Agronomy and Soil Science. College of Tropical Agriculture. Miscellaneous Publication no.145. pp.171-182. Engl., 27 Refs.

Phaseolus vulgaris. Production. Human nutrition. Uses. Central America. Brazil. Colombia. Mexico.

Economic aspects pertaining to the role of legumes, especially in farm production systems in tropical America, are described. Among the different types of legumes mentioned are: for human consumption, Phaseolus vulgaris, P. lunatus, Vigna sinensis, and Arachis hypogaea, among others; for forage use, Desmodium canum, Stylosanthes guianensis, Centrosema pubescens, and Canavalia ensiformis; and a large no. of legume trees including Tamarindus indica, Leucaena glauca, Acacia sp., Inga edulis, and Pithecolobium saman. The various uses and applications of the most important cultivated species are explained. Although the economic value of legumes is basic for tropical America, statistical data are only available for a few of them. In 1974, the largest Latin American bean producers were Brazil and Mexico, with 2,168,000 t and 896,000 t, resp. Colombia produced 73,000 t that same year. Several cropping systems and the technology used are indicated. All countries in tropical America have some kind of program dedicated to legume research and promotion. (Summary by EDITEC) J00

0380

19785 RODRIGUEZ, F. 1983. Situación actual del fríjol como principal leguminosa alimenticia en Honduras. (Present situation of beans as the main food legume in Honduras). In Mesa Redonda sobre el Programa Cooperativo Subregional de Producción de Leguminosas Alimenticias de los Países de Centroamérica y Panamá, San José, Costa Rica, 1983. Trabajos presentados. Costa Rica, Ministerio de Agricultura y Ganadería. pp.67-72. Span.

Phaseolus vulgaris. Cultivation. Trade. Production. Honduras.

Different aspects of the situation of bean production in Honduras are described such as its importance in the national economy, its role in nutrition, commercialization, crop agronomy (area, var. planted, planting systems, major pests and diseases, and seeds), and research. Consumption per capita in the urban and rural sectors is 47 and 64 g/day, resp. Bean exports decreased from 16,000 MT/yr in the 1960's to 6300 MT in 1975. This reduction was due to an increased domestic demand and to a reduced production. Research is oriented toward the production of var. with multiple resistance to diseases such as rust (Uromyces phaseoli) and bacteriose (Xanthomonas phaseoli), and pests such as the leafhopper (Empoasca kraemeri) and the bean pod weevil (Apion godmani). (Summary by EDITEC) J00

0381

19873 STABILE, M.F. 1979. Evaluation of a diversification scheme in a marginal coffee region of Colombia utilizing new bean technologies. Mag.Sc. Thesis. Ontario, University of Guelph. 131p. Engl., Sum. Engl., 25 Refs., Illus.

Phaseolus vulgaris. Technology evaluation. Economics. Cultivation. Colombia.

The problem of diversification away from coffee in low income farms of a marginal coffee region of Colombia (Restrepo, Valle) is analyzed. New bean technologies were designed and tested, and a methodology was developed for their evaluation within this context. A representative farm approach was used in applying linear programming models for the ex post analysis of observed technological changes in the area. The models are then utilized for the ex ante evaluation of the new coffee alternatives to generate short run and long run cropping strategies under different coffee prices and resource availability. The new coffee technology based on a much more productive var., Caturra, was found to be a lucrative long run investment especially at the previous high coffee prices and readily available credit. The availability of credit was a major factor in the introduction of Caturra and responsible for its higher adoption in larger farms which have more access to credit. Smaller farms appeared to have a comparative advantage for producing Caturra at high labor prices. Hence, providing they replaced their old coffee plantations with the more productive Caturra var., diversification away from coffee seemed unlikely to occur among the smallest group of producers. Yields and profits with the new bean technologies were substantially higher than those obtained with traditional bean practices. Chemical fertilizer, specifically P, appeared as a major limiting factor for producing beans and, therefore, the utilization of this input had a high payoff. When the coffee price fell from its 1978 high level of $55/kg to the price of $45/kg in 1979 in all 3 farm sizes, the new bean technology is substituted for coffee to the extent that the short and long run assumptions allow for this change. In the short run, except for a slight income increase in the small farm, the income effect of the new bean technology only partially compensated for the loss of coffee income. These income reductions were only eliminated in the long run where the most profitable bean technology entered in both semesters substituting coffee on all the land suitable for producing beans. The methodology developed in this study proved appropriate for economically assessing new agricultural technologies. The methodology is suitable for analyzing several enterprise alternatives in various types of contexts. Although simple, further improvements could be made to enhance its effectiveness. (Author's summary) J00

0382

19786 TAPIA B., H. 1983. Situación actual de las leguminosas de grano comestible en Nicaragua. (Present situation of edible grain legumes in Nicaragua). In Mesa Redonda sobre el Programa Cooperativo Subregional de Producción de Leguminosas Alimenticias de los Países de Centroamérica y Panamá, San José, Costa Rica, 1983. Trabajos presentados. Costa Rica, Ministerio de Agricultura y Ganadería. pp.73-79. Span.

Phaseolus vulgaris. Production. Trade. Nicaragua.

The situation of grain legumes for human consumption in Nicaragua are analyzed regarding research, ecology and technology for production, commercialization and government actions, in order to improve these aspects at a national level. Phaseolus vulgaris is the species showing the widest diversity of cv. compared with other legumes such as Vigna unguiculata, P. acutifolius, Arachis hypogaea, Glycine max, and Cajanus cajan. Research studies focus on var., fertilization, weed control, plant competition, pest management, mechanized harvesting, seed health, disease control, and storage. The area planted to beans is approx. 70,400 ha. Annual production is 41,250 MT and the deficit based on domestic demand is 3750 MT. Ninety percent of the commercial beans are red bean var.; however, white, pink, brown, cream, and black beans are also consumed. The Ministerio de Desarrollo Agropecuario and Reforma Agraria coordinates, through the Programa Alimentario Nicaraguense, the use of the available resources and

promotes bean production. Certified seed production in 1982 was 475 MT. (Summary by EDITEC) J00

0383

20010 ZAAG, P. VANDER; TEGERA, P. 1982. An experimental approach for improving present cropping systems in tropical Africa. In Keswani, C.L., Ndunguru, B.J., eds. Symposium on Intercropping in Semi-Arid Areas, 2nd., Morogoro, Tanzania, 1980. Proceedings. Ottawa, Canada, International Development Research Centre. pp.131-135. Engl., 9 Refs., Illus.

Phaseolus vulgaris. Technology evaluation. Cultivation systems. Yields. Rwanda.

The problem of increasing agricultural production through research of the cropping systems used by the African farmer is studied, as well as the farmer's involvement in research activities. Some of the reasons why the farmers remain using traditional technology are indicated. Traditional systems are misinterpreted and sometimes criticized because of the technology used. The exptl. results are presently used to provide information on improved crop combinations, densities, and planting dates. Yields obtained in Rwanda with beans, cassava, and maize are 0.8, 14.0, and 1.1 t/ha, resp., while under exptl. conditions the same crops yield 2.9, 30.0, and 1.5 t/ha. An exptl. approach for improving present systems, in which the farmer is the most important element, is suggested. (Summary by EDITEC) J00

See also 0263 0264 0269 0272

K00 FIELD PLOT TECHNIQUE

0384

20023 SMITH, F.L. 1958. Effects of plot size, plot shape, and number of replications on the efficiency of bean yield trials. Hilgardia 28(2):43-63. Engl., Sum. Engl., 6 Refs., Illus.

Phaseolus vulgaris. Experiment design. Plot size. Statistical analysis. Yields.

Uniform nurseries of Red Kidney (bush type) and Pink beans (viny) were grown in 1954 and 1955. In 1954 the unit plot size was 37.5 square feet; in 1955, 150 square feet. Wider and longer plots were made by adding adjacent plots laterally and in tandem. Upon these primary plots 4 var. were superimposed. In 1954, 4, 6, 8, and 12 replications were tested, while in 1955 only 4 and 6. After the yields were assigned by lot to each var., analysis of variance was made of each exptl. area in which the variance between replications and between var. was substracted from the total variance. Least significant differences (LSD) in lb/ac were calculated from the residual variances. In 1954, 19 plot sizes were tested with 4 replications; 14 with 6 replications; 11 with 8 replications, and 6 with 12 replications. In 1955, 20 plot sizes were tested with 4 and with 6 replications. Regression lines were calculated for the LSD for all plot sizes tested in both var. for both years. Results showed there was a reduction of the LSD with increasing plot sizes. An ideal LSD of 200 lb/ac, however, was seldom reached with 4 randomized replications. With 6 replications the 200-lb level was attained with even small plots less than

100 square feet. With 8 and 12 replications, the LSD were below 200 lb/ac with all plot sizes. In 1954 the 2-row plots of Red Kidney and the 8-row plots of Pinks remained high at all plot lengths. In the tests the following year similar but less extreme results were obtained for 2- and 8-row plots but the var. were reversed, indicating that the differences between plot widths were not due to var. characteristics. There was a slight but not significant advantage of narrow plots over wide plots with the same area. F values between replications showed that with 4 replications 2/3 were not significant at the 5% level, with 6 replications about 1/2, with 8 about 1/3, and with 12 about 1/4. Increasing replication no. improved the precision in detecting significant differences between the replications. Significant reductions of the LSD were obtained with 4 replications arranged in a Latin Square over the randomized plots. This was equivalent to the addition of 2 randomized replications. Comparisons were made with yield data from each of the 4 fields. The effects of changing the no. of replications, the area of individual plots, and the exptl. area of the field were compared. These comparisons showed that a greater reduction of least significant difference was obtained by simultaneously increasing plot size and exptl. area than was attained by either increasing plot size alone or increasing the no. of replications in a given exptl. area. It is recommended that if LSD of 200 lb/ac between var. or treatments are to be attained, 6 replications are necessary if randomized plot arrangements are used. Increasing the replication no. from 4 to 6 was more effective than increasing plot sizes. As many as 8 replications were not found necessary to attain this precision. (Author's summary) K00

L00 GRAIN STORAGE

L01 Stored Grain Pests

0385

19857 AJIBOLA T., T. 1981. Distribution, ecology and importance of bruchids attacking grain legumes and pulses in Africa. In Labeyrie, V., ed. International Symposium on the Ecology of Bruchids Attacking Legumes (Pulses), Tours, France, 1980. Proceedings. The Hague, Junk. Series Entomologica v.19. pp.199-203. Engl., 24 Refs. [Inst. of Agricultural Research & Training, Univ. of Ife, P.M.B. 5029, Ibadan, Nigeria]

Phaseolus vulgaris. Stored grain pests. Callosobruchus maculatus. Crop losses. Acanthoscelides obtectus. Zabrotes subfasciatus. Storage. Plant injuries. Nigeria.

Infestation of legumes by bruchids, characterized by its insidious nature since they attack in the field leaving the larva on seed for subsequent development after storage, reaches important levels in Africa where losses of 500,000-600,000 t cowpea/yr are estimated along with a 49-70% damage in legumes stored for 8 mo. In Africa at least 7 genera exist; of these, Callosobruchus is the most widespread. C. maculatus, C. phaseoli, C. subinnotatus, and C. rhodesianus are indigenous and C. chinensis, probably originating in Asia, widespread. Both Acanthoscelides obtectus and Zabrotes subfasciatus, originating from Central and South America, are also found. There are also other bruchids of minor importance. C. maculatus attacks nearly all species of food legumes, except some of Phaseolus; C. chinensis follows in importance. Temp., humidity, initial population density, larval density, seed MC, continuous darkness and continuous light have been associated with the production of active forms in C. maculatus,

probably the most primitive. Commercialization of the processing and fumigation combined with store hygiene are recommended. After harvest, fields should be fumigated with aluminum phosphide tablets in polyethylene protected sacks. (Summary by EDITEC. Trans. by L.M.F.) L01

0386

19856 HUIGNARD, J.; BIEMONT, J.C. 1981. Reproductive polymorphism of populations of Acanthoscelides obtectus from different Colombian ecosystems. In Labeyrie, V., ed. International Symposium on the Ecology of Bruchids Attacking Legumes (Pulses), Tours, France, 1980. Proceedings. The Hague, Junk. Series Entomologica v.19. pp.149-164. Engl., 34 Refs., Illus. [Université Francois Rabelais, Parc de Grandmont, 37200 Tours, France]

Phaseolus vulgaris. Acanthoscelides obtectus. Insect biology. Temperature. Stored grain pests. Colombia.

Two allopatric populations of Acanthoscelides obtectus, originating from 2 sites in Colombia (Buesaco, Nariño at 2000 m.a.s.l. and La Plata, Huila at 1000 m.a.s.l.) were studied under lab. conditions for 5 yr in relation to fecundity and ovarian production, presence of vitellogenin in hemolymph, histological study of ovarioles, level of juvenile hormones in hemolymph. Results of analysis carried out over several generations on the reproductive activity of virgin females, isolated or in the presence of Phaseolus vulgaris seeds or pods. Females from medium alt. areas developed slowly and their imaginal life was long. No mature oocytes were produced in the absence of host plant seeds or pods. The presence of pods and seeds stimulated vitellogenin synthesis and its incorporation. The acceptance of males depended on ovarian condition. Lower alt. females developed more rapidly and all virgin females formed mature chorionated oocytes even in the absence of host plant seeds. Oviposition followed copulation. The characteristics of these 2 populations persisted over several generations. Two hypotheses are proposed to explain the differences between these still interfecund populations; these are related to preimaginal development and to thermoperiodical conditions. The importance of this research for the control of A. obtectus prior to harvest and during storage is highlighted. (Summary by EDITEC. Trans. by L.M.F.) L01

0387

19855 PIERRE, D.; PIMBERT, M. 1981. Some data on the reproductive activity of Zabrotes subfasciatus in the laboratory. In Labeyrie, V., ed. International Symposium on the Ecology of Bruchids Attacking Legumes (Pulses), Tours, France, 1980. Proceedings. The Hague, Junk. Series Entomologica v.19. pp.113-123. Engl., 23 Refs., Illus. [Université Francois Rabelais, Parc de Grandmont, 37200 Tours, France]

Phaseolus vulgaris. Zabrotes subfasciatus. Insect biology. Stored grain pests.

The reproductive activity of Zabrotes subfasciatus (virgin isolated females; virgin females in presence of closed pods and seeds of Phaseolus vulgaris; isolated inseminated females; inseminated females in the presence of non-dehiscent pods, open pods, and seeds of P. vulgaris) was examined under lab. conditions approximating the thermo and photoperiodic regimes of Jaco, Costa Rica, place of origin of the biotypes studied. All expt. lasted 30 days and the influence of insemination as well as the effect of pods and seeds on the reproductive activity of females were studied. Ripe non-dehiscent pods of P. vulgaris have little effect on the sexual behavior

and oogenesis of Z. subfasciatus. Insemination slightly stimulates oogenesis but does not affect egg-laying. Free seeds or open pods induce copulation (0.86-0.93), egg-laying, and increase ovarian production. This suggests that in nature, populations of Z. subfasciatus maintain themselves on wild or subspontaneous legumes whose pods are partially or totally dehiscent. Oviposition is not a continuous phenomenom and alternates with intervals of rest. Studies which typify species in terms of av. fecundities, longevities, and optimum developmental temp. are criticized. Cultural methods designed to control wild dehiscent legumes which could act as reservoirs for this insect are recommended. The role of other phytophagous insects such as the Lepidoptera which can make bean seeds accessible to bruchids by perforating pods should also be considered. (Summary by EDITEC. Trans. by L.M.F.) L01

0388

19853 POUZAT, J. 1981. The role of sense organs in the relations between bruchids and their host plants. In Labeyrie, V., ed. International Symposium on the Ecology of Bruchids Attacking Legumes (Pulses), Tours, France, 1980. Proceedings. The Hague, Junk. Series Entomologica v.19. pp.61-72. Engl., 26 Refs., Illus. [Faculté des Sciences, Université de Tours, Parc de Grandmont, 37200 Tours, France]

Phaseolus vulgaris. Acanthoscelides obtectus. Stored grain pests.

The role of sense organs in bruchids is reviewed and the level of reaction of animals toward the complexity of the environment (behavioral, physiological, polymorphism) is illustrated. The role of the following factors is also highlighted: difficulty of studying insects in the field, necessary simplification of the environment, history of the animal, rhythms, memory, autonomous central patterning of motor acts, exact functional relations between sensory organs and the central nervous system, effects of pheromones, and other stimuli whose effects are unknown. The behavior of bruchids is analyzed during the main stages of their life cycle: emergence, take-off, discovery and recognition of host plant during which several chemical receptors are involved, oviposition during which the role of the ovipositor of detecting tactile and moisture information is highlighted, and choice of larva food base. The role of sensory organs in several behavior patterns is described and the role of sight in take-off behavior is outlined. Among chemical senses, the mechanism of olfactory orientation depends on anemotaxy and involves mechanical receptors located on antennae. Electroantennograms of female Acanthoscelides obtectus are included. Antennae not only transduce olfactory or mechanical stimulations but also exert an inhibitory tone on oogenesis. Contact chemoreception, considered a key step in the final recognition of the host plant, is discussed and the importance of palpation behavior is emphasized. Studies of taste in bruchids are difficult since almost nothing is known about specific secondary substances existing at the surface of the host plant and biological tests are lengthy. Data on tactile receptors are given. The importance and challenge that polymorphism represents is highlighted and illustrated with 2 examples: the effect of palp amputation on egg laying and the influence of host plant on oogenesis. (Summary by EDITEC. Trans. by L.M.F.) L01

See also 0363

ABBREVIATIONS AND ACRONYMS

A	Angstrom(s)
ABA	Abscisic acid
ac	Acre(s)
Afr.	Afrikaans
a.i.	Active ingredient
alt.	Altitude
AMV	Alfalfa mosaic virus
approx.	Approximate(ly)
atm.	Atmosphere
ATP	Adenosine 5'-triphosphate
av.	Average
BAP	6-Benzylaminopurine
BBMV	Broad bean mosaic virus
BCMV	Bean common mosaic virus
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
°C	Degrees Celsius (centigrade)
ca.	About (circa)
CAMD	Cassava African mosaic disease
CAMV	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
CLM	Cassava leaf meal
CLV	Cassava latent virus
CM	Cassava meal
cm	Centimeter(s)
COD	Chemical oxigen demand
concd.	Concentrated
concn.	Concentration
CP	Crude protein
CSL	Calcium stearyl lactylate
CSW	Cassava starch wastes
C.V.	Coefficient of variation
cv.	Cultivar(s)
2,4-D	2,4-dichlorophenoxyacetic acid
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
Engl.	English
expt.	Experiment(s)
exptl.	Experimental
°F	Degrees Fahrenheit
Fr.	French
ft-ca	Foot candles (10.76 lux)
FYM	Farmyard manure
g	Gram(s)
G	Giga (10^9)
GA	Gibberellic acid
gal	Gallon(s)
GE	Gross energy
Germ.	German
GERs	Glucose entry rates
GLC	Gas-liquid chromatography
govt.	Government
govtl.	Governmental
h	Hour(s)
ha	Hectare(s)
HCN	Hydrocyanic acid
HDP	Hydroxypropyl distarch phosphate (modified cassava starch)
HI	Harvest index
IAA	Indoleacetic acid
IBA	Indolebutyric acid
Illus.	Illustrated
in.	Inches
Ital.	Italian
IU	International unit
J	Joule
Jap.	Japanese
kat	Katal(amount of enzymatic activity that converts 1 mole of substrate/s)
kcal	Kilocalorie(s)
kg	Kilogram(s)
Kj	Kilojoule
km	Kilometer(s)
KNap	Potassium naphthenate
kR	Kiloroentgen(s)
l	Liter(s)
LAD	Leaf area duration
LAI	Leaf area index
lat.	Latitude
lb	Pound(s)
LD_{50}	Mean lethal dose
LER	Land efficiency ratio
LPC	Leaf protein concentrate
lx	Lux
M	Mega
M	Molar
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 from
NAR	Net assimilation rate
NCE	Net CO_2 exchange
NE	Northeast
NER	Net energy ratio
nm	Nanometer(s) (10^{-9} m)
no.	Number(s)
NPFs	Negative production factors
NPR	Net protein ratio
NPU	Net protein utilization
NW	Northwest
OM	Organic matter
oz	Ounce(s)
P	Probability
Pa.	Pascal(s)
PAN	Peroxyacetic nitrate
PCNB	Pentachloronitrobenzene
PDA	Potato dextrose agar
PER	Protein efficiency ratio
pH	Hydrogen ion concentration
pphm	Parts per hundred million
PPI	Pre-planting incorporation
ppm	Parts per million
PSA	Potato sucrose agar
pv.	Pathovar.
Ref(s).	Reference(s)
resp.	Respective(ly)
Rf	Retardation factor-chromatography
RGR	Relative growth rate
RH	Relative humidity
RNA	Ribonucleic acid
Rom.	Romanian
Russ.	Russian
s	Second
SBM	Soybean meal
SCN	Thiocyanate
SCP	Single cell protein
SDS	Sodium dodecyl sulfate
Sk.	Slovak
sp.	Species
Span.	Spanish
spp.	Species
SSL	Sodium stearyl-2-lactylate
Sum.	Summary
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	Tobbaco mosaic virus
TSH	Thyroid-stimulating hormone
UDPG	Uridine diphosphate glucose
UMS	Unmodified cassava starch
UV	Ultraviolet
var.	Variety(ies), varietal
VFA	Volatile fatty acids
vol.	Volume
VPD	Vapor pressure deficit
vpm	Volume per million
W	West
wk.	Week
WP	Wettable powder
wt.	Weight
YFEL	Youngest fully expanded leaves
yr	Year(s)
/	Per
%	percent(age)
>	More than, greater than
<	Less than
≤	Equal to or less than
≥	Equal to or greater than
±	Plus or minus

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Joachim Voss, PhD, Anthropology, Central Africa Bean Project (Postdoctoral Fellow, stationed in Rwanda)
Oswaldo Voysest, PhD, Agronomy
Jeffrey White, PhD, Physiology (Visiting Scientist)
Jonathan Woolley, PhD, Agronomy, Cropping Systems