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Abstracts on Field Beans

(*Phaseolus vulgaris* L.)

Centro Internacional de Agricultura Tropical

ABSTRACTS ON FIELD BEANS

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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.

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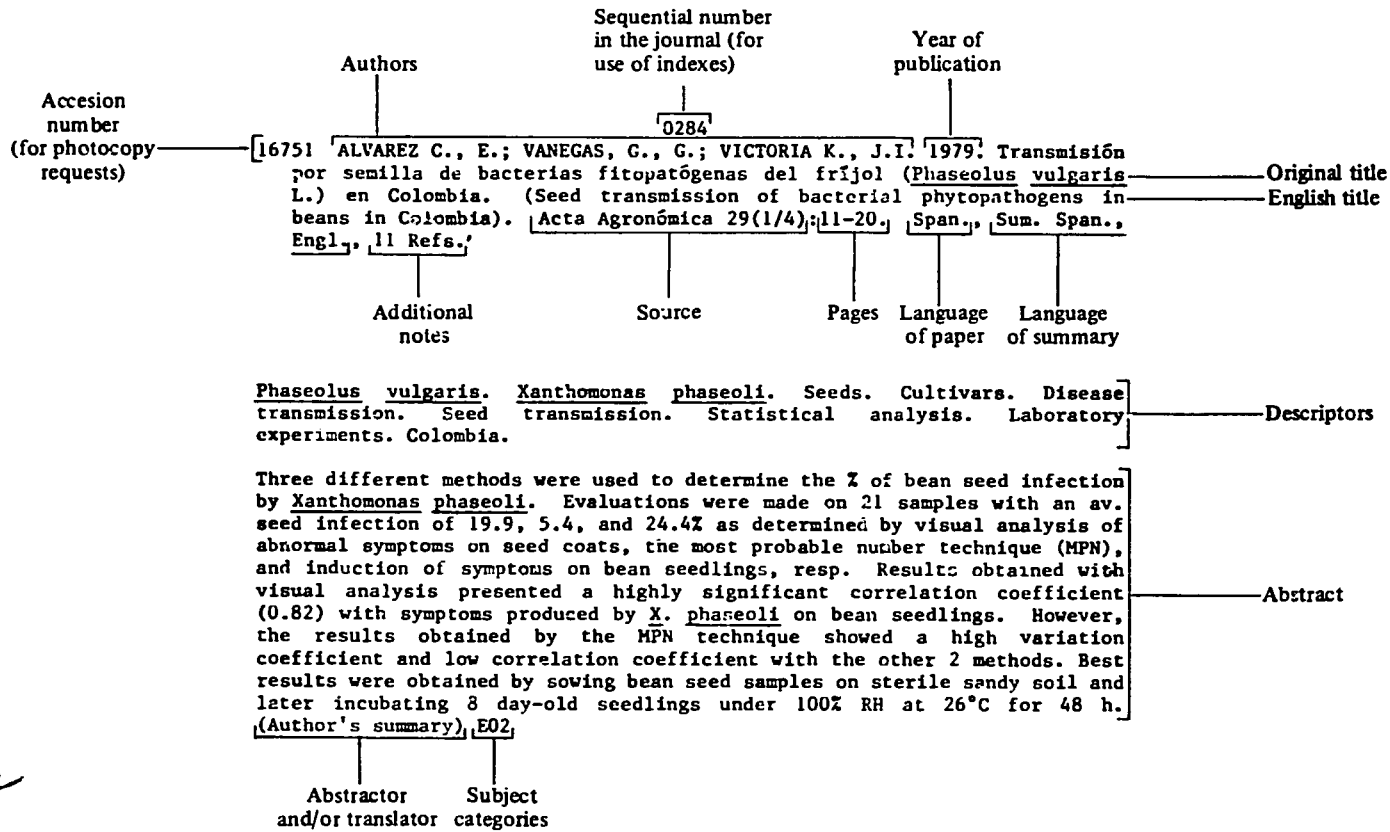
COMPONENTS OF AN ABSTRACT



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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.

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Author Index

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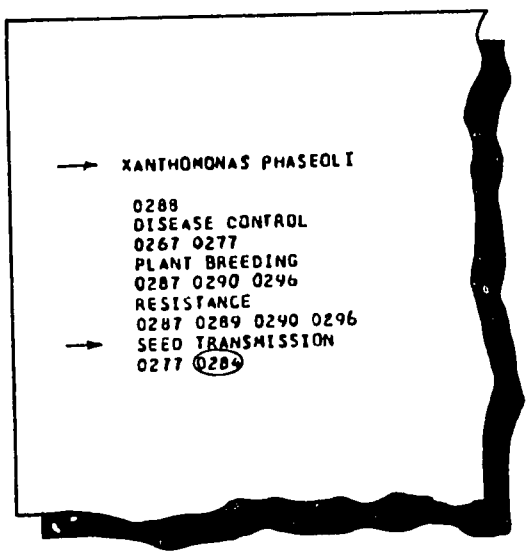

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A00 BOTANY, TAXONOMY AND GEOGRAPHICAL DISTRIBUTION

0202

18599 VILHORDO, B.W.; MULLER, L. 1981. Correlacao entre caracterizacao botânica e classificacao comercial em cultivares de feijao (Phaseolus vulgaris L.). (Correlation between botanical characterization and commercial classification of bean cultivars). Porto Alegre-RS, Brasil, Instituto de Pesquisas Agronomicas. Boletim Técnico no. 8. 61p. Port., Sum. Port., Engl., 21 Refs., Illus.

Phaseolus vulgaris. Cultivars. Agronomic characters. Developmental stages. Plant anatomy. Brazil.

The possibility that the characters normally utilized for the botanical description of the bean cv. would permit a classification, especially regarding the commercial groups established for Brazil, was studied. The following parameters were analyzed: seedling, stem, growth habit, flowering, inflorescence, infructescence and fruits, seeds, and phenology. Variance analysis of the observed characters revealed significant differences among cv. When comparing means, no subgroups were found which distinguish the different commercial groups. (Author's summary) A00

B00 PLANT ANATOMY, MORPHOLOGY AND CYTOLOGY

0203

16405 AVILAN R., L.A. 1975. Estudo do sistema radicular do feijoeiro (Phaseolus vulgaris, L.), var. Carioca. (Study on the root system of bean var. Carioca). Tese Ph.D. Piracicaba-SP, Brasil, Universidade de Sao Paulo. Escola Superior de Agricultura Luiz de Queiroz. 86p. Port., Sum. Port., Engl., 101 Refs., Illus.

Phaseolus vulgaris. Roots. Plant anatomy.

The root system potential of bean var. Carioca was studied under controlled conditions and root distribution was characterized under field conditions, with or without fertilization and according to planting distances. Conventional and radioisotope methods were compared. Root potential was studied in devices with lateral glass (22 cm high x 36 cm long) in order to observe root growth measured with photographies taken every 24 h during 11 days. Germinated seeds were placed on filter paper inside the devices and Hoagland & Arnon nutrient solution supplied. Three stages were characterized: appearance and development of the radicle; appearance of secondary branching; and growth of the existing root system and appearance of new branches. Total growth during the period of observation was 140.13 cm (0.48 cm/h) and the no. of secondary and tertiary roots was 82 and 87, resp. Characterization under field conditions was studied by comparing monolith, probe, and radioisotope methods. In general the results regarding root distribution determined by the 3 methods were similar, differing only in precision. The radioisotope method was the most precise; greater activity was found in the upper 10 cm of the soil and at lateral distances of 10 cm, max. depth of the root system being 50 cm and max. lateral distance, 25 cm. No differences were observed in root systems of fertilized and unfertilized soil. Root intercrossing of adjacent plants was observed at lateral distances of 10-20 cm and at depths of 20 cm in unfertilized soil and at lateral distances of 25 cm and at depths of 10 cm in fertilized soil. (Summary by EDITEC. Trans. by L.M.F.) B00

0204

16557 CHENG, S.S.; BASSETT, M.J. 1981. Chromosome morphology in common bean (Phaseolus vulgaris) at the diplotene stage of meiosis. Cytologia 46(3):675-684. Engl., Sum. Engl., 9 Refs., Illus.

Phaseolus vulgaris. Chromosomes. Cell division. Analysis.

Meiotic chromosomes of common beans were stained with 45% Fe propionic carmine to study changes in morphology during the condensation process at the diplotene stage. Chromosome morphology was studied with a stereo dissecting microscope at 20X using contact sheet prints of photomicrographs taken with a phase contrast system at 1000X. The banding patterns of each chromosome are unique and can be used to identify that chromosome at diplotene. The relative chromosome length can only be used to separate the chromosomes into long and short classes because of the differential condensation rates of chromatic and achromatic chromosome segments. A set of diplotene chromosome diagrams is provided. (Author's summary) B00

0205

16059 ELIEZER, J.; MORRIS, D.A. 1980. Cell length, light and ^{14}C-labelled indol-3yl-acetic acid transport in Pisum sativum L. and Phaseolus vulgaris L. Planta 149:327-331. Engl., Sum. Engl., 21 Refs., Illus.

Phaseolus vulgaris. Auxins. Cell structure. Light. IAA.

The putative auxin-transporting cells of the intact herbaceous dicotyledon are the young, differentiating vascular elements. The length of these cells was found to be considerably greater in dwarf (Meteor) than in tall (Alderman) var. of Pisum sativum, and to be greater in etiolated than in light-grown plants of P. sativum cv. Meteor and Phaseolus vulgaris cv. Mexican Black. Under given light conditions during transport these large differences in cell length did not influence the shapes of the transport profiles or the velocity of transport of ^{14}C-labelled IAA applied to the apical bud. However, in both etiolated and light-grown bean and dwarf pea plants the velocity of transport in darkness was ca. 25% lower than that in light. Under the same conditions of transport velocities in bean were about twice those observed in the dwarf pea. Exposure to light during transport increased the rate of export of ^{14}C from the labelled shoot apex in green dwarf pea plants but not in etiolated plants. The light conditions to which the plants were exposed during growth and transport had little effect on the rates of uptake of IAA from the applied solutions. Results indicate that the velocity of auxin transport is independent of the frequency of cell-to-cell interfaces along the transport pathway and it is suggested that in intact plants auxin transport is entirely symplastic. (Author's summary) B00

C00 PLANT PHYSIOLOGY

0206

18523 FISCUS, E.L. 1981. Analysis of the components of area growth of bean root systems. Crop Science 21(6):909-913. Engl., Sum. Engl., 4 Refs., Illus.

Phaseolus vulgaris. Roots. Leaf area. Light. Water absorption. Growth.

Root and leaf surface areas were measured on green bean cv. Ouray plants, with light intensity (photosynthetic photon flux density, PPFD) as the major growth variable, to determine how various sizes of roots are related to water transport and growth rates of whole-root systems. Plants were grown in aerated nutrient solution for 41 days in a greenhouse. Two light intensities were used: 425 and 320 microeinsteins/m^2/s. Leaf area:root area ratios, distribution of root sizes, and the fraction of the total root surface area of each root class were determined. All of these parameters remained stable for plants with leaf and root areas larger than 1000 cm^2 and they were unchanged by light intensity or growth rate. On the basis of previous data the mean root system hydraulic conductance (Lp) apparently was keyed to plant size rather than age. The conductance was very low in small plants, increased about 6-fold and peaked when the root systems reached approx. 1000 cm^2 surface area. For plants larger than 1000 cm^2 when the root size distributions were stabilized, conductance gradually declined probably because of suberization or some other growth-related factor. Plants grown at lower light intensity showed the same pattern of relationships between root system size, root size distribution, and hydraulic conductance except that the overall Lp was consistently lower for plants of similar sizes. (Author's summary) C00

0207

18306 LONERGAN, T. A. 1981. A circadian rhythm in the rate of light-induced electron flow in three leguminous species. Plant Physiology 68(5):1041-1046. Engl., Sum. Engl., 29 Refs., Illus.

Phaseolus vulgaris. Chloroplasts. Light. Biochemistry. Photosynthesis.

Pea, soybean, and Phaseolus vulgaris were grown in light-dark cycles and then maintained in constant dim light. During the constant conditions, chloroplasts were isolated throughout the day and assayed for various light-reaction activities. Similar results were found for all 3 species. The rate of whole-chain, light-induced electron flow (H_2O to methyl viologen) was rhythmic over a 24-h period provided an uncoupler of photophosphorylation was present. Chloroplasts varied in their response to uncouplers on a 24-h basis and the % stimulation of electron flow was rhythmic. Neither photosystem II (PSII) activity [H_2O to DCPIP (2,6-dichlorophenol-indolphenol) or light-induced pH changes in the presence of $K_3Fe(CN)_6$], PSI activity (DCPIPH$_2$ ascorbate to methyl viologen), or the rate of oxidation of hydroquinone [$TMQH_2$ (tetramethyl-p-hydroquinone) to methyl viologen] could be identified as a rate-limiting step for the rate of electron flow. The capability to photophosphorylate as measured by a photosynthetic control assay was also constant with time. The possible involvement of dynamic changes in the composition or configuration of the thylakoid membrane is discussed. (Author's summary) C00

0208

18512 WAIN, R.L. 1977. Chemicals which control plant growth. Chemical Society Reviews 6(3):261-275. Engl., 67 Refs., Illus.

Phaseolus vulgaris. Auxins. Gibberellins. Cytokinins. Inhibitors. Growth.

The synthesis and mode of action of chemicals which control plant growth are described. Beans are used, among other crops, to illustrate the effect of some of these substances: (1) auxins and their effects on enzyme activities and in selective weed control; (2) gibberellins; (3) cytokinins; (4) ethylene; (5) hormone inhibitors; and (6) promotion of root growth. (Summary by EDITEC. Trans. by L.M.F.) C00

See also 0324 0325 0328 0329 0353

C01 Plant Nutrition

0209

18504 ATMOWIDJOJO, S. 1978. Photosynthetic response of Phaseolus vulgaris L. varieties to low potassium nutrition. Ph.D. Thesis. Ithaca, N.Y. Cornell University. 149p. Engl., Sum. Engl., 183 Refs., Illus.

Phaseolus vulgaris. Cultivars. Mineral deficiencies. K. Photosynthesis. Transpiration. Chlorophyll. Leaf area. Dry matter. Mineral content.

Two of the so-called K-efficient bean var., one each from Germany and Italy, and 2 of the K-inefficient var., one each from Canada and Mexico, were compared in responses to K stress in terms of photosynthetic rate, transpiration rate, leaf chlorophyll content, leaf growth and expansion, and DM production in the preflowering stage of growth. The designation of efficient and inefficient var. had been based solely on the severity of deficiency symptoms under low K nutrition in previous studies. Plants were grown in sand culture in growth chambers under controlled conditions of temp., RH, and light period to minimize variation due to environmental conditions, and supplied with nutrient solutions containing low (0-0.5 mM), medium (2.3 mM), or high (5.0 mM) levels of K. The nutrient treatments were started with 13 or 15 day-old seedlings, and measurements of the parameters were taken when the 1st trifoliate leaves reached full expansion. The mean K contents of the 1st trifoliate leaves ranged from 0.95-1.31% and from 2.36-2.77% dry wt. under medium and high K nutrition, resp. Yet the photosynthetic and transpiration rates, leaf area and dry wt., and the plant dry wt. were more or less the same under both conditions, suggesting that the critical leaf K concn. for these characteristics was probably about 1%. The chlorophyll formation also seemed to be normal at this leaf K level. Under low K nutrition the mean leaf K contents ranged from 0.32-0.44%, with all other measurements lower than those of the control. The depressing effects of K stress were usually less in the Italian var. than in the others, although the differences were in general relatively small, except in chlorophyll content where a considerable difference was observed. Individual variation in response to K stress was observed within each var. About 6.67, 10.83, and 25.83% of the total low-K leaves of the 4 var. from one expt. had leaf areas, photosynthetic and transpiration rates falling within the control range, resp. The corresponding values from another expt. were approx. 2.78, 4.17, 25.0, and 34.72% for leaf areas, photosynthetic rates, transpiration rates, and chlorophyll contents, resp. Results thus suggest that leaf area and photosynthetic rate might be more sensitive to K stress than chlorophyll content and transpiration rate. The Italian var. had a markedly higher % of such leaves with regard to chlorophyll contents, the Mexican var. for leaf areas, while no great differences were observed among the 4 var. with respect to photosynthetic and transpiration rates. On the other hand, approx. 1.67 and 40.0% of the low K leaves from 1 expt. showed zero rates of transpiration and photosynthesis, resp. The corresponding values from another expt. were 3.47 and 15.28% for the zero transpiration and zero photosynthetic rates, resp. The Canadian and Mexican var. showed considerably higher % of such leaves than did the Italian var., while the German var. was intermediate. The effects of K stress on the 2nd trifoliate leaves were studied with the Canadian and Italian var. The depressing effects were less severe on the 2nd than the 1st trifoliate leaves, probably due to the higher K contents in the former (0.98 and 0.76% for the

Canadian and Italian var., resp.) than the latter (0.39 and 0.45%, resp.). All measurements were taken when the 1st trifoliate leaves had just reached full expansion. Up to this stage, the effects on the 2nd trifoliate leaves had been observed only in the photosynthetic and transpiration rates of both var., and leaf area and dry wt. of the Italian var. The depressing effects of low K nutrition on the 2nd trifoliate leaves were slightly milder in the Canadian than in the Italian var., probably due to the higher leaf K contents in the former than the latter. There was an indication that K redistribution from the older to the younger leaves might occur more readily in the Canadian than in the Italian var. The more chlorotic cotyledonary leaves under K stress in the former than the latter support this assumption. In view of the indication that leaf area and photosynthetic rate might be more sensitive to K stress than chlorophyll content, it is suggested that the 2 former characteristics might provide better criteria for screening plants for tolerance to K stress than would visual deficiency symptoms. Moreover, since leaf area and photosynthetic rate constitute the plant photosynthetic capacity, and hence DM production and yield, such screening would probably have a better chance for practical application than that solely based on visual deficiency symptoms. (Extracted from author's summary) C01

0210

17888 BARCELO, J.; POSCHENRIEDER, C. 1981. Efectos tóxicos del manganeso sobre el crecimiento y metabolismo de Phaseolus vulgaris. 3. Proteínas y pigmentos fotosintéticos. (Toxic effects of manganese on the growth and metabolism of Phaseolus vulgaris. 3. Proteins and photosynthetic pigments). Anales de Edafología y Agrobiología 40(5/6): 935-944. Span., Sum. Engl., Span., 24 Refs., Illus.

Phaseolus vulgaris. Nutrient solution. Mn. Toxicity. Growth. Metabolism. Photosynthesis. Chlorophyll. Protein content.

The pattern of different levels of photosynthetic pigments and soluble protein content was studied in 3 different series of expt. in pots with snap bean cv. Contender in order to relate the effect of Mn on the symbiotic N^2 nutrition of snap bean. Sampling took place during the crop growth cycle. Protein contents for all expt. and the Mn concn. applied increased until the preflowering phase; from then on and coinciding with flowering and leaf senescence, they decreased progressively. A marked reduction in protein content is evident with increasing concn. of applied Mn since a greater amount of Mn is accumulated as plant age increases. Root protein content is affected more than canopy protein content, coinciding with reduced nodulation. Differences were observed in the chlorophyll content regarding the different exptl. variants considered. In general, the pattern ascends up to preflowering but mobilization and senescence determines the reduction in values. The values obtained for chlorophyll b are similar to those of chlorophyll a. When the reduction of these 2 chlorophylls is compared, the levels of chlorophyll b are more affected than those of chlorophyll a for equally high Mn concn. (Summary by F.G. Trans. by L.M.F.) C01

0211

18524 BASTOS, A.R. 1980. Efeitos de fósforo, molibdenio e cobalto sobre a germinacao e vigor da semente de feijao (Phaseolus vulgaris L.). (Effects of phosphorus, molybdenum, and cobalt on seed vigor and germination in beans). Tese Mag. Sc. Lavras-MG, Brasil, Escola Superior de Agricultura de Lavras. 59p. Port., Sum. Port., Engl., 21 Refs.

Phaseolus vulgaris. P. Mo. Co. Germination. Seed vigor. Brazil.

The influence of P, Mo, and Co on seed germination and vigor (premature aging) of bean var. Ricobaio 1014 was studied under field conditions at the exptl. farm of the Empresa de Pesquisa Agropecuária de Minas Gerais (EPAMIG) in Tres Pontas, Brazil, during the 1976/77 crop year. Eight treatments were used, derived from the combinations of levels of P, Mo, and Co; 0 and 200 kg, 0 and 13 g, and 0 and 0.25 g of P, Mo, and Co, resp., were applied per ha. The seeds, after being cleaned and classified, were stored and analyzed at regular intervals (60, 120, 180, 240, and 300 days). Forty treatments resulted from 8 combinations of nutrients and 5 periods of time. A completely randomized design was used in the lab. Seeds from the replications of each field treatment were mixed homogeneously, resulting in 8 lots corresponding to the treatments. P caused a general increase in germination and was beneficial to vigor at all times. Co in the presence of Mo caused an increase in the % of seed vigor and germination. Co in the presence of P was detrimental to germination. Mo in the presence of P promoted seed vigor. (Author's summary) C01

0212

18307 HANISCH ten CATE, C.H.; BRETELER, H. 1981. Role of sugars in nitrate utilization by roots of dwarf bean. Physiologia Plantarum 52(1):129-135. Engl., Sum. Engl., 35 Refs., Illus.

Phaseolus vulgaris. Nutrient absorption. Sugars. Roots. Mineral deficiencies. N.

Nitrate uptake and in vivo nitrate reductase activity (NRA) in roots of Phaseolus vulgaris cv. Witte Krombek were measured in N-depleted plants of varying sugar status. Variation in sugar status was achieved at the start of nitrate nutrition by excision, ringing, darkness, or administration of sugars to the root medium. The shape of the apparent induction pattern of nitrate uptake was not influenced by the sugar status of the absorbing tissue. When measured after 6 h of nitrate nutrition (0.1 mol/m^3), steady- state nitrate uptake and root NRA were in the order intact more than dark more than ringed more than excised. Exogenous sucrose restored NRA in excised roots to the level of intact plants. The nitrate uptake rate of excised roots, however, was not fully restored by sucrose (0.03-300 mol/m^3). When plants were decapitated after an 18 h NO_3^- pretreatment, the net uptake rate declined gradually to become negative after 3 h. This decline was slowed down by exogenous fructose, while glucose rapidly (sometimes within 5 min) stimulated NO_3^- uptake. Presumably due to a difference in NO_3^- uptake, the NRA of excised roots was also higher in the presence of glucose than in the presence of fructose after 6 h of nitrate nutrition. The sugar-stimulation of O consumption as well as the release of $^{14}CO_2$ from freshly absorbed (U-^{14}C) sugar was the same for glucose and fructose. Therefore, a glucose-specific effect on NO_3^- uptake, that is due to the presence of glucose rather than to its utilization in root respiration, is proposed. A differential glucose-fructose effect on NRA independent of the effect on NO_3^- uptake was not indicated. A constant level of NRA occurred in roots of NO_3^- induced plants. Removal of nutrient nitrate from these plants caused an exponential NRA decay with an approx. half-life of 12 h in intact plants and 5.5 h in excised roots. The latter value was also found in roots that were excised in the presence of nitrate, indicating that the sugar status primarily determines the apparent rate of nitrate reductase decay in excised roots. (Author's summary) C01

0213

18563 KINNEAR, J.; E.; WALLACE, A.; ROMNEY, E. M. 1981. Frequency distribution of ^{241}Am in a population of bush bean plants grown in soil in a glasshouse. Soil Science 132(1):122-126. Engl., Sum. Engl., 15 Refs., Illus.

Phaseolus vulgaris. Minerals and nutrients. Mineral content. Nutrient absorption.

Thirty bush bean plants were grown in a glasshouse in soil contaminated with 14,000 dpm ^{241}Am/g soil. Another 30 were grown in similar soil, but with 100 micrograms DTPA (diethylenetriamine pentaacetate) chelating agent/g soil. The C.V. for ^{241}Am in the different kinds of leaves assayed varied from 54-124% within each treatment. The variability was not related to the presence of the chelating agent. The frequency distribution appeared to be $\log_e$ normal. (Author's summary) C01

0214

18540 KRAUSKOPF, D.M. 1978. Characterization of leucine uptake by roots of bean, Phaseolus vulgaris L. Ph.D. Thesis. Raleigh, North Carolina State University at Raleigh. 82p. Engl., 125 Refs., Illus.

Phaseolus vulgaris. Roots. Plant assimilation. Leucine. pH.

In 2-cm long secondary root tips from 5-day-old seedlings of Phaseolus vulgaris cv. Bush Blue Lake 274, the uptake of 0.002 and 2.0 mM leucine was linear over 2 h and the ratio of free leucine inside the root:leucine in the bathing solution (2 mM) was 1.9:1 after 1 h. Uptake rate was max. at 32°C and a Q_{10} of 2.1 was calculated for uptake between 23 and 32°C. Leucine uptake increased with decrease in pH down to pH 5.5 Anaerobiosis, chloroacetophenone, 2,4-dinitrophenol, and sodium arsenate oxide reduced leucine uptake. Arginine, glutamate, and isoleucine inhibited leucine uptake and the inhibition patterns were noncompetitive, mixed, and competitive, resp. (Summary by Horticultural Abstracts) C01

0215

18098 PATRICK, J. W. 1981. An in vitro assay of sucrose uptake by developing bean cotyledons. Australian Journal of Plant Physiology 8(2):221-235. Engl., Sum. Engl., 41 Refs., Illus.

Phaseolus vulgaris. Plant assimilation. Snap beans. Cotyledons. Sucrose.

An in vitro procedure, based on net rates of sucrose uptake from [^{14}C]sucrose solutions, was developed to determine the in vivo sucrose uptake rates of French bean cotyledons. Net rates of in vitro sucrose uptake exhibited saturation kinetics and temp. dependency with Q_{10} values in the range 1.5-2.0. Optimal rates of net sucrose uptake were obtained in unbuffered media containing sucrose alone. Under sink-limited growth conditions, where in vivo free-space sucrose concn. saturated (90-145 mM) the sucrose uptake process, the in vitro procedure could account for in vivo gains of sucrose by the cotyledons. (Author's summary) C01

0216

18080 POSCHENRIEDER, C.; BARCELO, J. 1981. Efectos tóxicos del manganeso sobre el crecimiento y metabolismo de Phaseolus vulgaris. 4.

Correlaciones entre Mn/Fe y pigmentos fotosintéticos. (Toxic effects of manganese on the growth and metabolism of Phaseolus vulgaris. 4. Correlations between Mn/Fe and photosynthetic pigments). Anales de Edafología y Agrobiología 40(5/6):945-954. Span., Sum. Engl., Span., 11 Refs., Illus.

Phaseolus vulgaris. Mn. Growth. Metabolism. Toxicity. Mineral content. Fe. Chlorophyll.

The accumulation of Mn levels in roots and upper parts of bean plants was studied for a large range of toxic Mn concn. (10, 40, 80, 160, 300, 500, and 1000 ppm). The expt. were conducted in hydroponic cultures under normal conditions. The possible influence of these toxic Mn concn. on the Fe content of plants was examined. Results indicate that there is no significant competition in the absorption of Fe and Mn. Increasing Mn concn. in DM was related with decreasing chlorophyll and increasing carotene contents. (Author's summary) C01

0217

18593 RATHERT, G.; DOERING, H.-W. 1981. Influence of extreme K:Na ratios and high substrate salinity on plant metabolism of crops differing in salt tolerance. 4. Ion-specific salinity effects on amylases in leaves of bushbean and sugarbeet plants. Journal of Plant Nutrition 4(3):261-277. Engl., Sum. Engl., 35 Refs., Illus.

Phaseolus vulgaris. Enzymes. Dwarf beans. Salinity. K. Na. Leaves.

K^+/Na^+ and Cl^- effects on amylase activity as well as on amylase isoenzyme pattern in leaves of bush beans and sugar beets at the beginning of salinity stress were studied in plants grown in water culture under controlled environmental conditions. Alpha- and beta-amylase activity in beans increased, particularly due to K^+ and Cl^- supplied. In sugar beets amylase activity remained unchanged as a result of K/Na treatment in combination with Cl^- and decreased using SO_4^{2-} as counterion. A direct correlation of amylase activity to the starch content of both species was not detectable. Particularly alpha- but also beta-amylase was most strongly inhibited by KCl in vitro. Independent on their origin, amylases from bush beans and sugar beets did not show any differences in ionic inhibition in vitro. The isoenzyme pattern of the species was different, but no clear ionic effect was detectable. Amylolytic activity is evidently not a causative factor for restricted starch mobilization in leaves under an early salinity stress. It is suggested that amylases are indirectly involved in starch formation via degradation due to a lack of a carbohydrate sink under salinity stress. Differences in salt tolerance of the investigated crops are obviously not related to different in vitro properties of amylases. (Author's summary) C01

0218

18305 STURGIS, J.N.; RUBERY, P.H. 1982. The effects of indol-3-YL acetic acid and fusicoccin on the kinetic parameters of sucrose uptake by discs from expanded primary leaves of Phaseolus vulgaris L. Plant Science Letters 24(3):319-326. Engl., Sum. Engl., 26 Refs., Illus.

Phaseolus vulgaris. Sucrose. Metabolism. Leaves. Indoleacetic acid. Plant assimilation.

Sucrose (10 mmol/dm^3) uptake by discs cut from expanded primary source

leaves of Phaseolus vulgaris cv. Canadian Wonder was linear for at least 3 h at pH 5.0. Thirty-min uptakes were routinely used over which time sucrose metabolism was negligible. The K_m-value was 11.9 ± 1.2 mmol/dm^3 and the V_{max}-value was 648 ± 33.2 nmol/m^2/s at pH 5.0, which was the pH optimum for 25 mmol/dm^3 sucrose uptake. IAA (1.0 micromol/dm^3) and fusicoccin (10 micromol/dm^3) significantly increased both K_m- and V_{max}-values for sucrose uptake for discs floated on KCl. For conventional Michaelis-Menten kinetics, in the case of auxin (1.0 micromol/dm^3) these altered parameters would increase the rate of sucrose uptake relative to controls if the extracellular sucrose concn. were greater than approx. 10 mmol/dm^3. For fusicoccin, the V_{max}-value increase relative to the K_m-value is sufficiently large that uptake is stimulated over the whole sucrose concn. range. (Author's summary) C01

0219

18088 WALLACE, A.; WALLACE, G.A. 1982. Effect of nitrogen source, iron and bicarbonate on pH of nutrient solution. Journal of Plant Nutrition 5(4/7):729-735. Engl., Sum. Engl., 24 Refs., Illus.

Phaseolus vulgaris. Nutrient solution. pH. N. Fe. Dwarf beans. Mineral deficiencies.

The pH of external nutrient solutions was plotted over a 29-day period when different sources and proportions of N were in the nutrient solution, with and without $CaCO_3$ and at low and moderate Fe levels, using bush bean plants cv. Improved Tendergreen. Characteristic changes were observed with time, in which NH_4^+ resulted in acidification and NO_3^- in alkalization. Fe deficiency resulted in acidification amounting to 0.5-1 pH unit over 20 days. Fe deficiency had the greatest effect for all-nitrate solutions. Solid phase $CaCO_3$ buffered changes to a certain degree (NH_4^+ tended to lower pH slightly). The $CaCO_3$ resulted in an increased solution pH. The effect is believed to be due to loss of CO_2 from bicarbonate to produce some hydroxyl ion during aeration. (Author's summary) C01

0220

18562 WALLACE, A.; ROMNEY, E.M.; MUELLER, R.T. 1981. Effect of various concentrations of DTPA chelating agent in soil on uptake and distribution of ^{241}Am in bush bean plants. Soil Science 132(1):120-121. Engl., Sum. Engl., 7 Refs.

Phaseolus vulgaris. Minerals and nutrients. Mineral content. Nutrient absorption.

Bush bean cv. Improved Tendergreen plants were grown in pots containing Yolo loam soil in a glasshouse for 15 days with a uniformly applied level of ^{241}Am in soil (14,000 dpm/g soil) and with various concn. of DTPA (diethylenetriamine pentaacetate) applied to the soil to demonstrate that the effects assigned to this chelating agent on uptake of ^{241}Am by plants will vary with concn. of the chelating agent. Under some waste management conditions, this could be of importance. On a concn. basis, the DTPA resulted in transport of much more ^{241}Am into primary leaves than into trifoliate leaves. The max. increase was about 2 orders of magnitude. The ratio of ^{241}Am in primary leaves to that in trifoliate leaves increased with increasing concn. of DTPA. The concn. ratios in each plant part also increased with increasing DTPA. Without DTPA, the concn. ratio values were around 0.03 for these young plants. (Author's summary) C01

See also 0241 0242

CO2 Plant Development

0221

18538 ADISESH, R. C. 1979. Effect of growth regulators on ethylene production, IAA oxidase and cellulase activity in abscission zones of Phaseolus vulgaris (L.). Ph.D. Thesis. Manhattan, Kansas State University. 60p. Engl., Sum. Engl., 66 Refs., Illus.

Phaseolus vulgaris. Plant-growth substances. Enzymes. Indoleacetic acid. Abscission. Ethylene production.

Growth regulators (ethephon, cycloheximide, chlorothalonil, GA, and kinetin) were applied to 30-day-old Phaseolus vulgaris cv. Blue Lake plants and ethylene evolution from leaves, IAA oxidase and cellulase activity in the abscission zones were measured 12, 24, and 48 h later. Ethephon significantly promoted ethylene evolution, IAA oxidase and cellulase activity; cycloheximide had no effect on ethylene production and IAA oxidase but inhibited cellulase activity; chlorothalonil promoted IAA oxidase activity after 48 h; chlorothalonil + ethephon promoted ethylene production and cellulase activity; GA inhibited but kinetin promoted ethylene production; kinetin inhibited IAA oxidase activity; and GA and kinetin promoted cellulase activity. (Author's summary) CO2

0222

18590 HAISSIG, B. E. 1982. Activity of some glycolytic and pentose phosphate pathway enzymes during the development of adventitious roots. Physiologia Plantarum 55(3):261-272. Engl., Sum. Engl., 32 Refs., Illus.

Phaseolus vulgaris. Enzymes. Roots. Soluble carbohydrates. Rooting. Plant development. Metabolism. Plant physiological processes.

Activities of (a) phosphofructokinase, (b) glyceraldehyde 3-phosphate (NAD) dehydrogenase, (c) glucose 6-phosphate dehydrogenase and (d) 6-phosphogluconate dehydrogenase were determined in Phaseolus vulgaris cv. Top Crop cuttings over 4 days, encompassing adventitious root primordium initiation and development. Effects of applied auxin and endogenous root-forming stimulus (ERS) on enzyme activities, concn. of reducing sugars, and primordium development were also determined during the 1st 4 days of propagation. Effects of auxin were determined through use of applied IAA or 2,3,5-triiodobenzoic acid. Effects of ERS were evaluated by means of decapitation of cuttings. Increased basipetal transport and increased metabolism of reducing sugars occurred in leafy cuttings in response to applied IAA and to ERS. Primordium development and activities of the 4 enzymes increased in leafy cuttings under conditions that simultaneously increased basipetal transport and metabolism of reducing sugars. Three types of enzyme activity response were found: (1) activity of (b) was increased with time by ERS and by applied IAA, (2) activity of (a) and (c) was increased with time by ERS but not by applied IAA, (3) activity of (d) was increased with time but not by ERS or applied IAA. Increases in activity of (a), (b), and (c) in leafy cuttings were positively related to primordium development. Activity of (d) increased in leafy cuttings during primordium development and may have supported it. However, equal increases

occurred in decapitated cuttings, in which the long-term development of primordia was suppressed. (Author's summary) C02

0223

18587 HOFFMANN, P.; SCHWARZ, Z. 1975. Characterization of regulative interactions between the autotrophic and heterotrophic system in Phaseolus vulgaris and Triticum aestivum seedlings. In Marcelle, R., ed. Environmental and biological control of photosynthesis, Diepenbeek, Belgium, 1974. Proceedings. The Hague, Junk. pp.191-200. Engl., Sum. Engl., 35 Refs., Illus.

Phaseolus vulgaris. Seedlings. Light. Growth. Photosynthesis. Metabolism. Plant respiration. Chloroplasts. ATP.

The transition from the heterotrophic to the autotrophic phase of development was characterized in seedlings of Triticum aestivum and Phaseolus vulgaris in the course of normal development as well as after illumination of etiolated seedlings. The activity of nicotinamide adenine dinucleotide phosphate (NADP)-GADPH increases (induced by light) to the same extent as the efficiency of the photosynthetic apparatus is developed. After initial stimulation, the activity of NAD-GADPH as well as that of the glucose-6-p-dehydrogenase/6-phosphogluconate-dehydrogenase (G6PDH/6PGDH) system decrease, an enzymatic compensation point indicating the autotrophic phase of development reached. Exptl. delays of the developmental course by NaCl or CCC [(2-chloroethyl)-trimethylammonium chloride] treatment shift the entry into the autotrophic phase of nutrition, the same ATP contents being ensured by a complex regulative mechanism between photosynthesis and respiration. (Author's summary) C02

0224

16038 MAAB, H.; KLAMBT, D. 1981. On the biogenesis of cytokinins in roots of Phaseolus vulgaris. Planta 151:353-358. Engl., Sum. Engl., 22 Refs., Illus.

Phaseolus vulgaris. Roots. Cytokinins. RNA. Analysis. Radiation. Plant physiological processes. Hydrolisis.

Roots of intact bean plants were supplied with [^{14}C]adenine by pulse-chase expt. The rate of incorporation of radioactivity into tRNA and oligonucleotides of roots as well as the content of radioactive labeled cytokinin nucleotides in these RNA fractions were determined. On the av., 1/70 of the radioactivity incorporated into tRNA was localized in $N^6(\Delta^2$ isopentenyl)adenosine. The half life of tRNA was estimated to be 65-70 h. Shortly after the pulse period, oligonucleotides contained zeatin riboside at a ratio of 1:800, on the basis of radioactivity. The half life of these oligonucleotides was determined to be approx. 8 h. The main free radioactive cytokinin of roots and leaves was zeatin. Comparing the rate of degradation of ^{14}C-labeled tRNA and the oligonucleotides of roots and the rate of appearance of radioactive cytokinins in roots and leaves, strong indications were found for their dependency. The results contradict the hypothesis of repeated synthesis of cytokinins in roots of intact bean plants. (Author's summary) C02

0225

18588 OBEN, G.; MARCELLE, R. 1975. The effects of CCC and GA on some biochemical and photochemical activities of primary leaves of bean

plants. In Marcelle, R., ed. Environmental and biological control of photosynthesis, Diepenbeek, Belgium, 1974. Proceedings. The Hague, Junk. pp.211-216. Engl., Sum. Engl., 18 Refs.

Phaseolus vulgaris. Growth. Plant-growth substances. Inhibitors. Leaves. Photosynthesis. Chloroplasts.

The growth inhibition induced by (2-chloroethyl)-trimethylammonium chloride (CCC) is paralleled by a decrease of apparent photosynthesis (APS), while an increase of it is coupled with the growth promotion caused by GA. Early work could not explain the APS changes by effects neither on stomatal regulation, nor on the activities of the carboxylating enzymes ribulose-1,5-diphosphate carboxylase and phosphoenol pyruvate carboxylase. The results obtained by measuring some key enzymes of the amino acid biosynthesis (glutamate dehydrogenase, aspartate aminotransferase, and alanine aminotransferase) are reported. These activities were found to parallel the modifications of protein and chlorophyll content, induced by both growth regulators. In isolated chloroplasts the activities of both photosystems were investigated as well as cyclic photophosphorylation. No significant differences could be found between treated and untreated leaves. It is suggested that the effects of CCC and GA on APS might be studied in the relation between chloroplasts and the rest of the cell as well as at the level of photosynthate transport. (Author's summary) C02

See also 0211 0216 0227 0234 0248 0249 0253 0274 0331 0333 0352

C03 Chemical Composition, Methodology and Analyses

0226

18732 ABU-JAWDAH, Y. 1982. Changes in the soluble protein patterns of bean leaves upon fungal or viral infections or after chemical injury. Phytopathologische Zeitschrift 103:272-279. Engl., Sum. Engl., Germ., 17 Refs., Illus.

Phaseolus vulgaris. Leaves. Colletotrichum lindemuthianum. Alfalfa mosaic virus. Proteins. Cultivars. Plant injuries.

Infection of leaves of French bean reacting with necrotic lesions to infection with Colletotrichum lindemuthianum, or alfalfa mosaic virus, induced 3 additional bands of soluble proteins (p1, p2, and p3). Treatment of the leaves with mercuric chloride induced band p1. Upon infection with peanut stunt virus, comparatively larger amounts of p2 and p3 protein components were induced in cv. Immuna (mosaic + vein necrosis) than in the cv. Brittle Wax (mainly mosaic). Evidence shows that the induced proteins are of host origin. (Author's summary) C03

0227

18708 BARBARO, A.; MESJASZ-PRZYBYLOWICZ, J.; PARCZEWSKA, J.; RADWAN-KAZNICA, M. 1981. Changes in ATP level in Zea mays L. and Phaseolus vulgaris L. leaves in the course of vegetation. Acta Physiologiae Plantarum 3(3):103-116. Engl., Sum. Engl., 23 Refs., Illus.

Phaseolus vulgaris. Leaves. ATP. Growth. Analysis. Morphogenesis. Flowers. Developmental stages.

The ATP level in leaves and growth apices of maize var. Golden Blanc and bean var. Bomba was determined during plant growth and development. The biochemical analyses were carried out by the bioluminescence method. The developmental phase of the tested plants was estimated on the basis of differentiation of shoot apices. In beans among the 11 development stages examined, beginning with primary leaves to full development of the 1st flowers, the lowest ATP values were noted in leaves in the period of transition of plants to the generative phase (about 550 micrograms ATP/g dry wt.) and in the period of flower primordia development to full inflorescence elements (about 400 micrograms ATP/g of dry wt.). In further phases, the ATP level was higher (up to 800 micrograms ATP/g of dry wt.) along with rhythmical fluctuations. The results obtained suggest that the decrease in the leaf ATP level in maize and beans could be associated with intensified generative organogenesis in plants. Data obtained in the expt. with maize suggest a significant role of ATP in the transition of plants from the vegetative to the generative phase. (Extracted from author's summary) C03

0228

15807 BEVAN, M.; NORTHCOTE, D. H. 1981. Subculture-induced protein synthesis in tissue cultures of Glycine max and Phaseolus vulgaris. Planta 152:24-31. Engl., Sum. Engl., 16 Refs., Illus.

Phaseolus vulgaris. Tissue culture. RNA. Cytokinins. Proteins. Analysis. Plant physiological processes.

The effects of subculture of tissue cultures on the levels of certain mRNAs have been investigated, and the action of cytokinins on the disposition of certain mRNAs between possible non-translating and translating pools has been determined. mRNA preparations were assayed by cell free translation with message-dependent reticulocyte lysate and the in vitro products resolved by polyacrylamide gel electrophoresis. Subculture of the cells caused a rapid stimulation of polysome formation. It also increased the translatable levels of a small group of mRNAs, one of which was present in both bean and soybean cultures. Cytokinins caused a slight increase in polysome levels after subculture, but had no effect on the levels of particular mRNAs, nor on the distribution of mRNAs between a non-translating and translating pool, nor on polysome levels in the absence of subculture. (Author's summary) C03

0229

18537 BROWN, J.W.S.; OSBORN, T.C.; BLISS, F.A.; HALL, T.C. 1981. Genetic variation in the subunits of globulin-2 and albumin seed proteins of French bean. Theoretical and Applied Genetics 60(4):245-250. Engl., Sum. Engl., 20 Refs., Illus.

Phaseolus vulgaris. Proteins. Analysis. Cultivars. Seed. Genetics. Snap beans.

Globulin-2 and albumin fractions of the seed protein of Phaseolus vulgaris were analyzed by 2-dimensional electrophoresis. These fractions had major polypeptides in common but differed in their minor components. Two groups of polypeptides were identified in 10 of the 11 cv. studied: Tendergreen G2 and Sanilac G2. Their presence in the seed was correlated with

hemagglutinating activity and at least some of these polypeptides corresponded to lectin proteins. (Extracted from author's summary) C03

0230

18533 CRIVELLI, G.; MAESTRELLI, A.; BERTOLO, G.; ALLAVENA, A. 1979. Ricerche sul comportamento alla congelazione degli ortaggi. 6. Nuovi contributi sull'idoneita varietale dei fagiolini. (Response of vegetables to quick-freezing. 6. New contributions on suitability of green bean cultivars). Annali dell'Istituto Sperimentale per la Valorizzazione Tecnologica dei Prodotti Agricoli 10:29-35. Ital., Sum. Ital., Engl., 3 Refs., Illus.

Phaseolus vulgaris. Cultivars. Snap beans. Seed characters. Organoleptic analysis.

Six green bean cv. (Stip, selections 1099, 1070, 1030, 1080, and 1033) were compared, with cv. Amboy as check, to determine their suitability for quick freezing. All were blanched, frozen, stored for 12 mo., and cooked. Color, appearance, consistency, and taste were evaluated organoleptically and results for separate and total scores were tabulated as well as extent of deformation. Further tabulation presents extent of skin sloughing determined by the method of Van Buren et al. It is concluded from all these tests that cv. Stip and selection 1099 were similar to cv. Amboy in suitability for quick freezing. (Summary by Food Science and Technology Abstracts) C03

0231

17864 DRYER, S.B.; PHILLIPS, S.G.; POWELL, T.S.; UEBERSAX, M.A.; ZABIK, M.E. 1982. Dry roasted navy bean flour incorporation in a quick bread. Cereal Chemistry 59(4):319-320. Engl., 12 Refs.

Phaseolus vulgaris. Bean flour. Uses.

The quality characteristics of bread prepared using navy bean flour (25.5% protein) to substitute wheat flour at levels of 0, 20, 35, and 50% were compared. Ingredients used were: all-purpose flour (100.65 g), baking powder (2.00 g), salt (3.00 g), baking soda (2.00 g), cinnamon (0.50 g), ground cloves (0.25 g), brown sugar (133.35 g), shortening (31.35 g), whole eggs (50.00 g), canned pumpkin (123.00 g), whole fluid milk (60.50 g), and vanilla (1.25 g). The batter was baked at 177 $\pm$ 2°C for 45 min. Specific gravity, viscosity, and pH for all levels of navy bean incorporation were similar. Color of the bread was darker, less red, and less yellow with increasing levels of substitution. MC of the baked products did not differ significantly. Odor, color, and tenderness of the bread were not affected by navy bean flour substitution. Flavor scores decreased with increasing levels of substitution; the only statistical difference was between the control (0%) and 50%. Protein contents of the breads were 5.[illegible] 5.6, 6.2, and 6.7% for substitution levels of 0, 20, 35, and 50%, resp. Dry roasting the beans reduced the antinutritional factors present in legumes. A high quality bread was produced with 35% navy bean flour. (Summary by EDITEC. Trans. by L.M.F.) C03

0232

18559 FELSTED, R.L.; LI, J.; POKRYWKA, G.; EGORIN, M.J.; SPIEGEL, J.; DALE, R.M.K. 1981. Comparison of Phaseolus vulgaris cultivars on the

basis of isolectin differences. International Journal of Biochemistry 13(5):549-557. Engl., Sum. Engl., 21 Refs., Illus.

Phaseolus vulgaris. Dwarf beans. Cultivars. Proteins. Analysis. Composition.

The properties of lectins from 62 bush bean cv. were examined. All bean extracts agglutinated rabbit and human red cells but showed no differential preference for A-, B-, or O-type human red cells. Although most bean extracts were mitogenic, 13 bean var. were apparently non-mitogenic when incubated with normal human lymphocytes. Polyacrylamide gel electrophoresis of the bean extracts in acid and SDS buffers revealed 2 major different isolectin patterns. Most cv. had 5 isolectins, were strongly mitogenic, and were classified as group I beans. A 2nd group exhibited a distinct isolectin pattern, were weakly or non-mitogenic, and were classified as group II. Finally, 2 beans with lectin electrophoretic patterns distinct from both of the above groups were classified as group III beans. Representative extracts from all 3 bean groups were tested with a red kidney bean isolectin L-subunit specific radioimmunoassay. The group I beans had significantly higher levels of L-subunit cross-reactive protein than the group II beans while one of the group III beans had intermediate levels. (Author's summary) C03

0233

18067 GONZALEZ DE MEJIA, E. 1982. Efecto de diferentes condiciones de almacenamiento sobre el desarrollo de la dureza del fríjol. (Effect of different storage conditions on bean hardening). Archivos Latinoamericanos de Nutrición 32(2):258-274. Span., 18 Refs., Illus.

Phaseolus vulgaris. Storage. Seed. Water content. Temperature. Cooking. Seed characters. Tannin content.

The effect of different storage conditions (bean MC, 9, 13, and 17%; 40, 60, and 80 RH, resp.; temp., 4, 20, and 36°C; available O_2 regulation by injecting CO_2 into the storage containers) on the hardness, cooking time, and water absorption of seeds of black bean var. Suchitán and red bean var. Rojo de Seda was studied. Tannin content and polyphenol oxidase activity were also determined. A significant relationship exists between storage time and grain hardness and cooking time. Cooking time was longer with grain with 13% MC than with those containing 9%. Grains with 17% MC were infected by fungi, especially at higher temp. The correlation between bean hardness and MC was not significant. The correlation between hardness and cooking time was only statistically significant for black bean Suchitán. Storage temp. was another factor that affected cooking time, the latter increasing with increasing temp. Beans stored under normal air conditions required a longer cooking time and were harder compared with those stored in a CO_2-rich atmosphere. There is a significant negative relationship between bean hardness and the coefficient of water absorption. Tannin content decreases with storage time, especially at high temp. In black beans, this reduction is accompanied with an increase in the enzymatic activity of polyphenol oxidase. The red bean var. tended to undergo more changes during storage. (Summary by EDITEC. Trans. by L.M.F.) C03

0234

18703 GRANGE, A. 1980. Vieillissement des graines de Phaseolus vulgaris (L.) var. Contender. 1. Effets sur la germination, la vigueur, la teneur

en eau et la variation des formes d'azote. (Aging of seeds of Phaseolus vulgaris cv. Contender. 1. Effects on germination, vigor, water content, and variation of forms of nitrogen). Physiologie Végétale 18(4):579-586. Fr., Sum. Fr., Engl., 29 Refs., Illus.

Phaseolus vulgaris. Seed. Storage. Germination. Seed vigor. Water content. Seed characters. N. Analysis.

Kidney bean seeds were stored for 3 yr in F-cold (2°C, 30% RH), S-dry (22°C, 0-5% RH), and H-wet (22°C, 60% RH) conditions. MC reached a steady state value according to external RH. In F conditions, the studied parameters remained constant during the 3 yr of storage. In S and mainly in H conditions, an important decrease in vigor and germination was observed. Other effects such as root system modifications (S and H), abnormal seedlings (H), and hard seeds (S) were also studied. In S conditions, a decrease in globulin N and at the same time an increase in albumin N were observed. Variations in macromolecular associations may be responsible for these modifications. It is probable that albumins and globulins, defined only by solubility properties, are heterogeneous and allow possible transformations between protein reserve molecules. (Author's summary) C03

0235

18706 ICHIMARU, D.L.; SALES, A.M. 1980. Comparacao entre quatro métodos para a determinacao de triptófano em alimentos. (Comparison of four methods for determining tryptophan in food). Boletim do Instituto de Tecnologia de Alimentos 17(3):297-307. Port., Sum. Port., Engl., 19 Refs., Illus.

Phaseolus vulgaris. Tryptophane. Analysis. Cultivars.

Four methods for determining tryptophan were compared using 15 food samples, including var. of bean, cereal, soybean, and palmetto. The procedure involving basic hydrolysis and chromatographic analysis proved to be more appropriate for these samples with respect to accuracy and reproducibility of results, than the colorimetric methods. This method requires, however, special equipment for ion-exchange chromatography, and additional time for the hydrolysis stage. (Author's summary) C03

0236

18702 OLSON, A. C.; GRAY, G. M.; GUMBMANN, M. R.; WAGNER, J. R. 1982. Nutrient composition of and digestive response to whole and extracted dry beans. Journal of Agricultural and Food Chemistry 30(1):26-32. Engl., Sum. Engl., 23 Refs.

Phaseolus vulgaris. Cooking. Analysis. Mineral content. Vitamin content. Amino acids. Sugars. Sucrose.

The distribution of nutrients between hot water diffusible and nondiffusible constituents of whole California Small White (CSW), Light Red Kidney, and Phaseolus lunatus cv. Baby Lima was examined. For CSW, 15% of the solids were hot water diffusible and contained more than 90% of the sugars sucrose, raffinose, and stachyose, 12% of the N, 10% of the fat, 60% of the ash, none of the crude fibre, 60% of the thiamin, 80% of the niacin, and 0% of any detectable starch or precipitable protein of the whole beans. PERs for cooked extracted beans were the same or better than those for nonextracted beans. A 50% reduction in flatulence potential measured by H_2

production was observed when rats were fed extracted beans. A significant reduction in subjective gastrointestinal distress was reported by human subjects interviewed 24 h after eating cooked extracted beans compared with cooked nonextracted beans. (Author's summary) C03

0237

18595 ROZO, C. 1982. Effect of extended storage on the degree of thermal softening during cooking, cell wall components, and polyphenolic compounds of red kidney beans (Phaseolus vulgaris). Ph.D. Thesis. Ithaca, N.Y., Cornell University. 143p. Engl., 22 Refs., Illus.

Phaseolus vulgaris. Seed. Storage. Seed characters. Cooking. Analysis. Cell walls. Phenolic content.

The effect of storage under simulated tropical conditions of high temp. and RH on hardness, cell wall constituents, and polyphenolic compounds of red kidney beans was assessed. Three storage conditions were used: (1) 0°C, cold room storage (control); (2) 30°C, 80% RH; (3) 40°C, 80% RH. Samples of beans for chemical and textural analysis were taken at 0, 2, 4, 6, and 8 mo. Cotyledons and seed coats were separated before chemical analysis. The hardness of cooked beans increased significantly due to storage as shown by individual puncture measurements. Equilibrium MC were not reached for beans of treatments 2 and 3. Significant increases in cell wall contents measured as neutral detergent residue (NDR) occurred in cotyledons during storage at 40°C but not at 30°C. Hemicelluloses and cell wall N contents increased significantly at 40°C, showing high correlation with hardness of beans. Acid detergent residue (ADR), lignin and cellulose values did not change in any of the treatments. Traces of condensed tannins and phenols were found in cotyledons. These results suggest that Maillard polymeric material synthesis occurs in cotyledons during storage. The increase in hemicelluloses and the presence of the Maillard polymer probably contributes to the increase in hardness. NDR contents of seed coats increased in the 3 treatments during storage. The ADR content in seed coats of beans stored at 40°C increased and was highly correlated with hardness of beans. This effect was not found in beans stored at 30°C. ADR nitrogen contents increased significantly, showing high correlation with hardness. Cellulose content and extractability of condensed tannins and phenols decreased significantly during storage, showing highly significant negative correlation with hardness. Increased toughness of seed coats may be caused by formation of protein-tannin complexes and/or polymerization of polyphenolic compounds with subsequent bonding to cell wall components. (Summary by Dissertation Abstracts International) C03

0238

17735 SILVA, H.C.; BRAGA, G.L. 1982. Effect of soaking and cooking on the oligosaccharide content of dry beans (Phaseolus vulgaris, L.). Journal of Food Science 47(3):924-925. Engl., Sum. Engl., 11 Refs., Illus.

Phaseolus vulgaris. Cooking. Sugars. Sucrose. Seed. Composition.

The effect of cooking conditions commonly used in Brazilian homes was determined by measuring the oligosaccharide content (sucrose, raffinose, and stachyose) of beans by TLC. Dry seeds were submitted to different periods of (1) water soaking at room temp. (as done at home) and (2) pressure cooking in autoclave. Soaking in water caused a small decrease in the oligosaccharide content of the beans and the relative amount removed

was not proportional to the solubility of the sugars in water. Cooking of the whole seeds led to a larger decrease in oligosaccharide content, especially when large amounts of water were used. (Author's summary) C03

See also 0209 0210 0250 0312 0321 0349

D00 AGRONOMY

0239

17494 EDJE, O. T. 1981. Recommendations for bean production. Zomba, University of Malawi. 37p. Engl.

Phaseolus vulgaris. Cultivation. Irrigation. Water requirements. Technological package. Malawi.

Research has been conducted by the Senate Research and Publications Committee of the U. of Malawi, the International Foundation for Science, the United States Agency for International Development, and the Ministry of Agriculture of Malawi on 3 bean cropping systems in Malawi: rain-fed, as a rotational crop under residual moisture between 2 rice crops, and under irrigated conditions. Technical recommendations are included for each system on land preparation and type of seedbed; var. (dwarf or climbing); seed rate; planting time; fertilizers; plant population and spacing; support for climbing beans; disease, pest, and weed control; harvesting; shelling; storage; mixed cropping bean with maize. Aspects on water management (amount, frequency, and time of irrigation) are given for irrigated crops. (Summary by F.G. Trans. by L.M.F.) D00

D01 Soil, Water, Climate and Fertilization

0240

18071 BIENFAIT, H.F.; VAN DER BLIEK, A.M.; BINO, R.J. 1982. Different regulations on ferric reduction and acidification of the medium by roots of Fe-stressed plants in a Rhizostat. Journal of Plant Nutrition 5(4/7):447-450. Engl., Sum. Engl., 3 Refs., Illus.

Phaseolus vulgaris. Nutrient solution. Mineral deficiencies. Fe. pH.

Fe-stressed and control bean plants were kept for several days in an apparatus (Rhizostat) in which the Fe reducing capacity of the roots and the pH of the medium could be followed in a single plant without significant changes in its Fe status. With increasing Fe stress the Fe reducing capacity increased in a gradual way, whereas pH changes in the medium occurred in pulses. This suggests that Fe reducing capacity and acidification of the medium, both stimulated by Fe stress, are regulated in different ways. (Author's summary) D01

0241

17459 BROMFIELD, A.R.; HANCOCK, I.R.; DEBENHAM, D.F. 1980. Soil and crop sulphur relationships in Kenya. 1. The effect of gypsum and elemental-S

given to beans (Phaseolus vulgaris) grown after natural vegetation and pastures in western Kenya, on yield, percentage S and the recovery of S from the fertilisers. In Kenya. Ministry of Agriculture. Soil and crop sulphur research project (R.3375); published papers, December 1974-March 1980. Kenya, Agriculture Research Deparment. pp.1-15. Engl., Sum. Engl., 5 Refs., Illus.

Phaseolus vulgaris. Fertilizers. S. Mineral deficiencies. Yields. Seed. Mineral content. Nutrient absorption. Kenya.

A definite study was made of S needs and the S relationships in the soil within the Kitale area (Kenya). The results of 10 field trials carried out at 11 sites, using beans as test crop to test for S deficiency and to measure the apparent recovery of fertilizer-S from 2 S sources (gypsum and elemental S) at freshly broken sites of known history are reported. DM responses occurred at 3 sites in the 1st harvest but none in the 2nd. Seed yield ranged from 1327 to 3028 (av. 2225) kg/ha in the 1st and from 503 to 2261 (av. 1345) kg/ha in the 2nd harvest. Concn. of S in seed increased at the most deficient sites. Pod and haulm S concn. increased more frequently at the 2nd harvest than the 1st. Apparent fertilizer-S recovery ranged from 0.7 to 2.1 kg S/ha for individual sites and harvests; there were no differences between the 2 S sources. Sites carrying natural vegetation and old pastures which had not previously received fertilizer-S were the most S deficient. (Author's summary) DOI

0242

17460 BROMFIELD, A.R.; HANCOCK, I.R.; DEBENHAM, D.F. 1980. Soil and crop sulphur relationships in Kenya. 2. The effect of element S and gypsum on yield, uptake and apparent and true recovery of sulphur by beans (Phaseolus vulgaris) and maize (Zea mays) grown in western Kenya. In Kenya. Ministry of Agriculture. Soil and crop sulphur research project (R.3375); published papers, December 1974-March 1980. Kenya, Agriculture Research Department. pp.1-17. Engl., Sum. Engl., 3 Refs.

Phaseolus vulgaris. Fertilizers. S. Dry matter. Yields. Nutrient absorption. Kenya.

Maize and beans grown at 7 sites in western Kenya and an eighth at Muguga, near Nairobi, were given 20 kg radioactive elemental-S and gypsum/ha as S sources. Bean trials contained 8 blocks each consisting of 3 treatments. Seed of bean var. Mexico 142 was used. Bean DM yields were not affected by the sources except at one site where gypsum depressed yield. The amount of plant-S derived from the fertilizer was significantly greater from gypsum than from elemental-S at all sites and in both harvests. Results show that for beans additional fertilizer-S did not result in a greater uptake of native-S. True recovery of S ranged from 0.2 to 2.8 for maize and 0.08 to 2.1 kg S/ha for beans. Apparent recoveries ranged from 2.2 to 8.1 for maize and 0.08 to 2.2 kg S/ha for beans. (Author's summary) DOI

0243

18507 BUZETTI, S.; SA, M.E. 1981. Estudo de diferentes doses de F.T.E. BR-9 na cultura do feijoeiro (Phaseolus vulgaris L.). (Study using different rates of fritted trace elements BR-9 in bean crops). In Campus de Ilha Solteira-SP, Brasil. Universidade Estadual Paulista. Relatório Técnico-Científico no. 1. pp.30-31. Port.

Phaseolus vulgaris. Fertilizers. Micronutrients. Yields. Brazil.

The effect of applying micronutrients in the form of fritted trace elements (F.T.E.) BR-9 on yields of bean cv. Carioca was studied on cerrado soils. Plots received standard NPK fertilization. Micronutrient treatments were applied simultaneously with the basic fertilization 15 days after plant emergence. Treatments included a check (NPK) and 9 standard NPK treatments + increasing rates of F.T.E. BR-9 of 20 kg/ha ranging from 20-180 kg/ha. Micronutrient application resulted in higher bean yields compared with the check (978 kg/ha). The optimum rate for cv. Carioca under these conditions was 80 kg F.T.E. BR-9/ha. (Summary by EDITEC. Trans. by L.M.F.) DO1

0244

17801 DIAZ D., A.; CASTILLO L., J. 1982. El riego del fríjol (Phaseolus vulgaris) en CIAT. (Irrigation in beans at CIAT). Cali, Colombia, Centro Internacional de Agricultura Tropical. Seminarios Internos. Serie SE-10-82. 13p. Span., Sum. Span., Illus.

Phaseolus vulgaris. Irrigation. Water requirements. Soil moisture. Developmental stage. Yields. Colombia.

Three expt. were conducted to determine irrigation frequency and optimum use of irrigation water by bean under CIAT conditions in Palmira, Colombia: In the 1st, tension of soil water was measured as a frequency indicator. Irrigation treatments (70 mm each) were applied at 25, 35, 45, and 55 centibars with a nonirrigated check. Bean yields of 1975 and 1891 kg/ha for the 1st 2 treatments were not statistically different; but these yields compared with yields of 1660, 1605, and 1597 kg/ha for the other 2 treatments and the check, resp., were statistically different. A water tension of 35 centibars was therefore sufficient to be able to determine optimum irrigation time (4 irrigations supplying 342 mm) and to obtain highest yields. Since the check treatment yielded the same as treatments 3 and 4 due to the fact that it received 158 mm precipitation 20-55 days after planting, soil water and water availability during reproduction are considered very important. In expt. 2 both water tension and the developmental stage of bean were taken into account to determine irrigation frequency. Five irrigations supplying a total of 270 mm usable water layer (350 mm applied water) gave the highest bean yields (1872-1874 kg/ha). Regarding water availability, the most critical period is that between the beginning of flowering and fructification. During this stage water tension for irrigation should not be higher than 35 centibars. Irrigation for germination covering the soil moisture capacity for the 1st 30 cm is aufficient for adequate bean growth during the 1st 20 days following planting. On the basis of the 2 former expt., expt. 3 was conducted to determine the min. water level required by bean during its development (flowering through pod fill) for max. production. Line 24 was planted at a density of 240,000 plants/ha and 3 irrigation treatments were used with one check treatment, only irrigated for germination. Treatment 1 included 5 irrigations: 0 (planting), 15, 26 (flowering), 39, and 50 (fructification) days after planting. Treatment 2 included 4 irrigations at 0, 26, 39, and 50 days. Treatment 3 included 4 irrigations at 0, 15, 26, and 50 days. Treatment 2 gave the highest yields (1748 kg/ha) and received 310 mm of used water and 49 mm rainfall. The positive effect of treatment 2, that included a 3rd irrigation during the developmental stage (26, 39, and 50 days), was observed when it was compared with the results of treatment 3 that only received 2 irrigations during the developmental stage (26 and 50 days). Treatment 3 yielded 1639 kg/ha with a total used water layer of 305 mm and 49 mm rainfall. (Summary by EDITEC. Trans. by L.M.F.) DO1

0245

18744 EDJE, O.T. 1981. Effects of nitrogen and leaf removal on Phaseolus bean yield. Luso:Journal of Science and Technology (Malawi) 2(2):39-51. Engl., Sum. Engl., 12 Refs.

Phaseolus vulgaris Fertilizers. N. Defoliation. Yields. Yield components. Leaf area. Malawi.

The effects of 3 levels of N (0, 40, and 80 kg/ha) and leaf removal treatments (0, 1, 2, or 3 defoliations) on seed yield of bean cv. 600/1 were investigated at Bunda College of Agriculture, Malawi, during 2 seasons. Additional N increased seed yield (kg/ha) significantly ($P < 0.05$) in 1973-74 and ($P < 0.$``) in 1974-75. Removal of bean leaves at the preflowering stage had less drastic effect on seed yield than when they were removed later in the season. The no. of seeded pods/m^2 and 100 seed wt. were the yield components most affected by leaf removal. Although leaf removal caused reduction in seed yield, the combined monetary value of seeds and plucked fresh leaves was generally higher than the monetary value of seeds from those of unplucked plants. (Author's summary) D01

0246

16982 FORSYTHE, W.M.; VICTOR, A.; GOMEZ, M. 1979. Flooding tolerance and surface drainage requirements of Phaseolus vulgaris L. In Lal, R.; Greenland, D.J., eds. Soil physical properties and crop production in the tropics. New York, Wiley & Sons. pp.205-214. Engl., 6 Refs., Illus.

Phaseolus vulgaris. Resistance. Soil moisture. Drainage. Yields. Zea mays. Intercropping. Planting. Costa Rica.

Results on a series of greenhouse and field trials on the response of beans to different levels of drainage are discussed. In the greenhouse trials var. 27-R was planted in pots with sterilized soil and 9 flooding treatments (control with no flooding, surface flooding with a 2 cm head of water above the surface for 0.5, 1, 2, and 4 days, and subsurface flooding with a water-table 1 cm below the surface for 0.5, 1, 2, and 4 days) were applied when plants were 18, 26, 33, 40, and 47 days old. All of the 8 flooding treatments reduced yields by 90%. Flooding treatments less than 12 h were studied under similar greenhouse conditions and it was found that both the frequency and duration (1.5 or 9 h) of submergence significantly reduced grain yields (10-100%). In field trials at the exptl. station of the Centro Agronómico Tropical de Investigación y Enseñanza (CATIE) in Turrialba, Costa Rica, with mixed cropping of bean var. Turrialba 4 (50 cm between rows and 100,000 plants/ha) and maize var. Tuxpeño 1 (1 m between rows and 0.5 m within rows, giving 40,000 plants/ha), the effect of cambered beds 1, 2, 3, 4, 5, and 6 m wide on bean yields was assessed. The control was planted on flat ground. The cambered bed increased bean yields up to 40% control, without significant differences among the treatments of 2, 3, 4, 5, and 6 m wide beds. Internal drainage, aeration, and O_2 diffusion rates were adequate during growth cycle in cambered beds. Economic analysis showed that 2 and 3 m wide beds produced max. additional returns. (Summary by EDITEC. Trans. by L.M.F.) D01

0247

18526 GIRALT, E. 1981. Ensayo de régimen de riego en fríjol negro Ica Pijao L-32. (Irrigation regime trial with black bean variety Ica Pijao L-32). Ciencia y Técnica en la Agricultura: Riego y Drenaje 4(2):43-50. Span., Sum. Span., Engl., 3 Refs.

Phaseolus vulgaris. Irrigation. Cultivars. Yields. Cuba.

A trial was carried out from Nov. 7, 1979 to March 5, 1980 at the Estación Central de Investigaciones de Riego in Alquízar, province of La Habana (Cuba) to test the results of the irrigation regime experimentally determined with black bean Cueto 25-9 on black bean Ica-Pijao L-32. Planting took place on a Red Ferralitic soil on deep limestone at a distance of 90 x 5 cm. The total water applied was 3040 m^3/ha, of which 76.4% was due to irrigation and the rest to rainfall. Ten irrigations were applied with an av. partial rate of 232 m^3/ha. Yields were 1.73 t/ha. To assure an adequate germination, the 1st 2 irrigations should be applied at 4-5 day intervals; the remaining irrigations may be applied between 7-9 days, with an av. rate of 200-250 m^3/ha. (Author's summary) D01

0248

18554 GUNTON, J.L.; EVENSON, J.P. 1980. Moisture stress in navy beans. 1. Effect of withholding irrigation at different phenological stages on growth and yield. Irrigation Science 2(1):49-58. Engl., Sum. Engl., 22 Refs., Illus.

Phaseolus vulgaris. Water stress. Flowering. Podding. Yields. Growth. Irrigation. Australia.

The effect of plant water stress imposed at all combinations of the 3 main phenological stages (preflower, flowering, and pod development) on the yield and growth of navy bean Selection 46 was studied in field expt. at the Inglewood irrigation area of Queensland (Australia) during the summers of 1971 and 1972. In 1971, a short mild growing season with early frosts, seed yields varied with treatment from 0.55-1.52 t/ha; in 1972, a hotter growing season especially during the preflower stage but one of normal duration, yields varied from 1.12-2.27 t/ha. Moisture stress imposed in the preflower and flowering stages in 1971 reduced yields by 28 and 24%, resp.; in 1972, moisture stress during the preflower stage reduced yield by 37% only if irrigation was also withheld during the flowering stage. Moisture stress imposed during the flowering stage in 1972 reduced yields by 40%. Evaluation of the effects of moisture stress during the pod development stage was not possible due to early frosts in 1971 and rainfall in 1972. Yields were almost equally highly correlated with LAI ($r = 0.82$) and LAD ($r = 0.84$). CGR was similarly correlated with LAI ($r = 0.85$). (Author's summary) D01

0249

18555 GUNTON, J.L.; EVENSON, J.P. 1980. Moisture stress in navy beans. 2. Relationship between leaf water potential and growth and yield. Irrigation Science 2(1):59-65. Engl., Sum. Engl., 12 Refs., Illus.

Phaseolus vulgaris. Growth. Irrigation. Water stress. Yields. Australia.

Leaf water potentials (LWP) of navy bean plants receiving different irrigation treatments during the 3 main developmental stages were measured at dawn throughout 2 growing seasons in a field expt. at the Inglewood irrigation area of Queensland (Australia) during the summers of 1971 and 1972. Integrated seasonal values of LWP were derived from the measurements for each treatment, weighted in different ways, and the values so obtained correlated with those of seed yield over the 2 seasons. The weather during the 2 growing seasons differed markedly and there were also marked differences in the method of integrating the LWP measurements which gave

the highest correlation with yield in the 2 seasons. In 1971, a season with less negative potentials and lower yields, the highest correlation ($r = -0.85$) was obtained with a linear relationship in which the LWP duration (stress area) during the preflower, flowering, and pod development stages was weighted with the following factors, 1.0, 2.0, and 0.75. In 1972, when more negative values of stress and higher yield levels were recorded, the highest correlation with yield ($r = -0.92$) was obtained with a quadratic equation in which the stress area values during the same 3 development stages were weighted by factors of 0.5, 3.0, and 2.0, resp. Stress area models were also used to obtain seasonal values for correlation with CGR, LAI, and LAD. The highest correlation coefficients obtained for the 1972 growing season were -0.80, -0.72, and -0.7?, resp. (Author's summary) D01

0250

18530 HEMPHILL JUNIOR, D.D.; JACKSON, T.L. 1982. Effect of soil acidity and nitrogen on yield and elemental concentration of bush bean, carrot, and lettuce. Journal of the American Society for Horticultural Science 107(5):740-744. Engl., Sum. Engl., 18 Refs.

Phaseolus vulgaris. Soil amendments. Agricultural lime. S. Fertilizers. N. Cultivars. Y. K. pH. Yields. Mineral content. Ca. Zn. Mn.

Bush bean, carrot, and lettuce were grown for 3 yr on soils amended with S or lime and N fertilizer. Yields of all crops increased with lime application but response to N varied among crops and years. A soil pH of 5.6-6.4 was optimal for carrot and bean. Plant tissue K and Mg concn. were not affected by soil pH or N rate. P and Ca concn. of plant tissue generally increased with lime application. Plant tissue Zn and Mn concn. usually decreased with increasing soil pH between 5.1-6.4. The reduction in bean and lettuce leaf Mn concn. between pH 5.1-5.7 ranged from 30-71%. Low bean yields at pH 5.1 were possibly caused by a combination of Mn toxicity and P deficiency. (Author's summary) D01

0251

17784 LIBARDI, P.L.; VICTORIA, R.L.; REICHARDT, K.; CERVELLINI, A. 1982. Nitrogen cycling in a ^{15}N-fertilized bean (Phaseolus vulgaris L.) crop. Plant and Soil 67(1/3):193-208. Engl., Sum. Engl., Span., 7 Refs., Illus.

Phaseolus vulgaris. Fertilizers. Urea. N. P. Brazil.

To understand the fate of applied N in Phaseolus vulgaris crops grown under tropical conditions, ^{15}N-labelled urea was applied to bean crops and followed for 3 consecutive cropping periods. Each crop received 100 kg urea-N and 41 kg KCl-K/ha. At the end of each period each crop's recovery of the added N, the residual effects of N from the previous cropping period, the distribution of N in the soil profile, and leaching losses of N were estimated. In addition, to evaluate potential effects of added P on N cycling in this crop, beans were treated at planting with either 35 kg rock phosphate-P, 35 kg superphosphate-P, or 0 kg P/ha. A total of 31.2% of the N in the 1st crop was derived from the applied urea, which represents a N utilization efficiency of 38.5%. Only 6.2% of the N in the 2nd crop was derived from fertilizer applied to the 1st crop, and 1.4% of the N in the 3rd crop. N utilization efficiencies for these 2 crops, with respect to the N applied to the 1st crop, were 4.6 and 1.2%, resp. In total, the 3 crops recovered 44.3% of the N applied to the 1st crop. The remainder of the N

was either still in the soil profile or had been lost by leaching, volatilization, or denitrification. ^{15}N enrichment of mineral-N (NO_3 + NH_4) suggests that at the end of the 2nd crop, the distribution of fertilizer applied to the 1st crop had probably passed the 120 cm depth. ^{15}N enrichment of organic-N suggests that root activity of beans and weeds transported N to 90-120 cm (or deeper). A total of 109 kg fertilizer-N/ha could be accounted for in harvested biomass, crop residue, and soil at the end of the 1st cropping period. This indicates an exptl. error of about 10% if no N was lost by volatilization, denitrification, or leaching below 120 cm. At the end of the 2nd and 3rd crops, 76 and 80 kg N/ha, resp., could be accounted for, suggesting that 20-25% of the applied-N was lost from the system over a 2-crop period. The 2 types of added P did not significantly differ in their effects on bean yields. (Author's summary) D01

0252

17956 MACARTNEY, J. C. 1964. Report on fertilizer experiments on seed beans in the Arusha Region. Tanzania, Ministry of Agriculture, Forests and Wildlife. Tengeru Report no. 33. 4p. Engl., Sum. Engl.

Phaseolus vulgaris. Fertilizers. P. Inoculation. Yields. S. Nitrogen-fixing bacteria. Tanzania.

The effects of Tororo superphosphate, gypsum, and in some cases bacterial inoculum on bean yield were studied in 4 trials conducted at Usa River, Oljoro, Mringa Estates, and Karangai Substation (Tanzania). At Usa River and Mringa Estates treatments included inoculated and uninoculated subplots. Fertilizers were incorporated into the soil at planting. No statistically significant responses were obtained with superphosphate or gypsum at any of the sites. Lack of response to gypsum indicates that S is not a limiting factor to yield. Trials applying Mg and Mn are necessary to assess the relative importance of these trace elements. (Summary by L.M.F.) D01

0253

18597 MAUK, C.S. 1982. Influence of irrigation and plant population on yield parameters, flower and pod abscission, and photosynthate distribution in snap beans, Phaseolus vulgaris L. Ph.D. Thesis. Corvallis, Oregon State University. 149p. Engl., Sum. Engl., 249 Refs., Illus.

Phaseolus vulgaris. Irrigation. Spacing. Yields. Abscission. Flowers. Pods. Snap beans. Photosynthesis.

During 2 seasons effects of high and low irrigation (water applied at -0.6 and -2.5 bars soil water potential, resp.) and density were evaluated on yield parameters and flower/pod development at mainstem nodes 2 and 6 (terminal) of Oregon 1604, a determinate snap bean. High and low plant densities were 45 vs. 18 and 54 vs. 33 plants/m^2 in 1978 and 1979, resp. Yield/unit area was increased under high irrigation and/or high density. Yield/plant was increased 121% by high irrigation, and was 67% greater under low than high density in the more stressful year of 1978, (no density effect in 1979). High irrigation increased no. of pods formed (1978, 1979), and % set and total pod fresh wt. (1978) at node 6, as well as, % set (1978, 1979) and pods formed (1978) at node 2. Density had no effect at node 6, however, low density increased no. of flowers and all other yield parameters at node 2. Nodes 2 and 6 combined were responsible for

over 80% of the total yield/plant. The flowering period was prolonged for organs at more distal raceme nodes (RN) within an inflorescence. There was an acropetal decline in yield parameters, which was reduced by high irrigation at both the terminal (6-T) and main lateral (2-A) inflorescences at nodes 6 and 2, resp., whereas, low density only limited the decrease at 2-A (1978). The most proximal raceme node (RN-1) accounted for 65-80% of the total yield/inflorescence. High irrigation reduced flower/pod abscission at both nodes, but low density only decreased abscission at node 2. A large fraction of abscised organs were shed the day after anthesis, and this proportion increased under low irrigation (6-T, 2-A), and high density (2-A). Abscission increased acropetally within both 6-T and 2-A. Organs at RN-1 and RN-2 of 6-T received a larger % of translocated ^{14}C-assimilate (12-19%) from 7-8 days after their anthesis than those at RN-3 (2-3%). Flowers/pods at 2-A showed a similar acropetal decline in ^{14}C-activity, but less pronounced. Low density increased % ^{14}C-activity recovered in RN-1 and RN-2 pods of 2-A at 7-8 days after their anthesis, however, irrigation (6-T, 2-A) and density (6-T) effects were slight. (Summary by Dissertation Abstracts International) DOI

0254

18501 MESQUITA FILHO, M.V. DE; MIRANDA, L.N. DE; KLUTHCOUSKI, J. 1982. Avaliacao de cultivares de feijao para sua tolerancia a toxicidade de alumínio com relacao a disponibilidade de fósforo em solo de cerrado. (Evaluation of bean cultivars regarding tolerance to aluminum toxicity in relation to available phosphorus in cerrado soil). Revista Brasileira de Ciencia do Solo 6:43-46. Port., Sum. Port., Engl., 16 Refs.

Phaseolus vulgaris. Cultivars. Resistance. Toxicity. Al. P. Yields. Brazil.

A field expt. was carried out on a cerrado dark red Latosol at the Centro de Pesquisa Agropecuária dos Cerrados of the Empresa Brasileira de Pesquisa Agropecuária (Brazil) with 15 bean cv., grown at different levels of Al saturation and P availability. Yields increased with available P and decreased with increasing Al saturation in the soil. Using 80% of the max. production as a criterion for satisfactory performance, the bean cv. were divided into 4 groups: very sensitive (tolerating less than 10% Al saturation), sensitive (15% Al saturation), tolerant (25% Al saturation), and very tolerant (40% Al saturation). (Author's summary) DOI

0255

17417 MILLER, D.E.; BURKE, D.W. 1980. Irrigation and soil management; controlling disease and aiding production of dry beans. Michigan Dry Bean 4(3):20-22, 33. Engl., Illus.

Phaseolus vulgaris. Soil conservation practices. Soil moisture. Fusarium oxysporum. Irrigation. Cultivars. Resistance.

The interrelationships of soil conditions as they relate to the severity of Fusarium root rot in beans are described; soil water, soil compaction, and soil aeration relationships are emphasized. Irrigation management in bean crops to maintain optimum levels of soil water during different growth stages is essential in order to reach max. yields even though root rot occurs. Regarding irrigation in relation to soil compaction, it was found that in subsoiled plots bean plants were able to regenerate cortical tissues affected by Fusarium while plants in irrigated non-subsoiled plots did not recover. Soil compaction was also reduced by the incorporation of

crop residues 4-6 wk. before the planting of beans, similar effects to those mentioned above being attained. Studies with var. NY 2114-12 (highly resistant to Fusarium), Gloria Pink (moderately resistant), and Red Mexican UI-36 (susceptible) indicate that excessive wetting and poor soil aeration reduces resistance to Fusarium. It is therefore essential to avoid excess moisture and reduced soil aeration in order to minimize the severe injury caused by Fusarium. (Summary by EDITEC. Trans. by L.M.F.) DOl

0256

11697 MINERVIN, M. H. 1976. El clima y los suelos en la producción de maíz (Zea mays L.) y fríjol (Phaseolus vulgaris L.). (Climate and soil in maize and bean production). In Miranda M., H., comp. Cursos de Producción de Maíz y Fríjol, Santa Tecla, El Salvador, 1976. Notas. Santa Tecla, Centro Nacional de Tecnología Agropecuaria. pp.65-85. Span., 10 Refs., Illus.

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

The effect of climatic, soil, cultivation, and management factors on bean and maize yield in El Salvador was analyzed. If cultivation and management factors are satisfactory, the climate and soil alone are responsible for high or low yield. The following aspects are discussed in detail: soil characteristics and qualities [origin and morphology (color, texture, structure, pH, OM, CEC, base exchange capacity)]; soil classification; major soil groups in El Salvador; land classification according to land use capacity; and adaptation of the classification system to conditions in El Salvador. (Summary by F.G. Trans. by L.M.F.) DOl

0257

18551 MORENO N., A. 1982. Efecto de la fertilización orgánica y mineral sobre el rendimiento en grano y sus componentes del fríjol (Phaseolus vulgaris L.) var. Michoacán 12-A-3. (Effect of organic and mineral fertilization on yield and yield components of bean var. Michoacán 12-A-3). Tesis Ing. Agr. Iguala, México, Instituto Superior Agropecuario del Estado de Guerrero. 82p. Span., Sum. Span., 51 Refs., Illus.

Phaseolus vulgaris. Fertilizers. Dung. N. P. K. Yields. Yield components. Dry matter. Leaf area. Mexico.

A trial was carried out in the exptl. fields of the Instituto Superior Agropecuario del Estado de Guerrero, Mexico, from Dec. 1980-March 1981 to study the effect of organic and mineral fertilization on yield and yield components as well as other physiological parameters of bean var. Michoacán 12-A-3. Treatments used were soil application at planting of chicken and bovine manure, chemical fertilization (40-40-00), their combination, and a check (unfertilized). A Latin square 6 x 6 exptl. design was used. The results obtained showed that grain yield increased with the application of organic + mineral fertilizers. This was due to the higher no. of grained pods, inflorescences, and branches of plants under these treatments. The no. of normal grains/pod and grain size (av. dry wt./grain) were not affected by the treatments. In general beans cultivated in organic and mineral fertilized soil had higher yields of DM, leaf area, LAI, and LAD than plants grown in unfertilized soil. (Author's summary. Trans. by L.M.F.) DOl

0258

16994 PERU. MINISTERIO DE AGRICULTURA. ESTACION EXPERIMENTAL AGRARIA EL PORVENIR. 1972?. Fríjol (Phaseolus vulgaris L.). (Bean). In _____. Resultados de investigación 1966-1972. Tarapoto, Centro Regional de Investigación Agraria del Nor-Oriente. v.1, pp.62-66. Span., Illus.

Phaseolus vulgaris. Fertilizers. N. P. K. Yields. Weeding. Herbicides. Peru.

Results of research in beans in Tarapoto, Peru, are given. In 1971 the 1st fertilization trial was established with NPK using bean var. Rodriguez de Mendoza, with a highly significant response to N and P and no response to K. Av. yield was 340 kg/ha compared with 165 kg/ha for the check treatment (0-0-0). In this area, bean should be fertilized with 400 kg 15-15-15/ha. Low yields are due to attacks of Meloidogyne incognita and Sclerotinia. In a 2nd expt. in 1972 with the same var., the best fertilization rate was found to be 80-80-0 kg NPK/ha, resp., for a yield of 1880 kg/ha. In weed control trials, prometryn was the most recommendable herbicide, applied at 3 kg commercial product/ha immediately after planting. (Summary by EDITEC. Trans. by L.M.F.) DOI

0259

18570 SMUCKER, A.J.M.; MOKMA, D.L.; LINVILL, D.E. 1978. Environmental requirements and stresses. In Robertson, L.S.; Frazier, R.D., eds. Dry bean production - principles and practices. East Lansing, Michigan State University. Cooperative Extension Service. Agricultural Experiment Station. Extension Bulletin E-1251. pp.45-60. Engl., 6 Refs., Illus.

Phaseolus vulgaris. Climatic requirements. Soil requirements. Temperature. Solar radiation. Rainfall. Soil temperature. USA.

Soil and climatic conditions which affect bean production in Michigan, USA, are discussed and the typical adverse conditions which cause reduced yields are described. Soil resources in the region, soil management groups, productive bean soils, and bean yield potentials of the different soil management groups under good management are discussed. Climatic conditions in the region (temp. regime, RH, precipitation, and solar radiation) are described with respect to bean crops. Studies on soil physical requirements indicate that root development may be restricted by one or more factors (dense soil horizons, oxygen stress, water stress, soil temp. extremes, toxic materials, fertility extremes, and root diseases). (Summary by EDITEC. Trans. by L.M.F.) DOI

0260

18548 THUNG, M.; ORTEGA, J.; RODRIGUEZ, R. 1982. Respuesta al fósforo aplicado a dos profundidades y su efecto en el rendimiento del fríjol (Phaseolus vulgaris L.). (Response to phosphorus applied at two depths and its effect on bean yield). Cali, Colombia, Centro Internacional de Agricultura Tropical. 23p. Span., 6 Refs., Illus.

Phaseolus vulgaris. Cultivars. Fertilizers. P. Yields. Nutrient absorption. Leaf area. Colombia.

The effect of triple superphosphate (TSP), band-applied at depths of 5 and 25 cm, with 0, 66, and 131 kg P/ha, on the yield (14% MC) of bean var. Carioca, G 4000, and ICA-Pijao (efficient in P utilization), and Puebla 152 (inefficient) was studied at CIAT's exptl. station in Quilichao, Colombia.

P uptake, root length, and LAI were also recorded 21 days after germination and at flowering. Harvest took place at 90 days. Av. yield of var. fertilized with P at 25 cm was 1421 kg/ha and at 5 cm, 1263 kg/ha. Optimum level of TSP was 66 kg P/ha. Efficient var. such as Carioca and G 4000 gave higher yields than Puebla 152, especially without P. Higher yields were obtained due to the increase in the no. of pods/plant and the no. of seeds/plant. The no. of seeds/pod and the wt. of 100 seeds did not enhance yields. Application at 25 cm had a positive effect on yields at all rates of P. (Summary by EDITEC. Trans. by L.M.F.) DOI

0261

18564 VAN BUREN, J.P.; PECK, N.H. 1981. Effect of K fertilization and addition of salts on the texture of canned snap bean pods. Journal of Food Science 47(1):311-313. Engl., Sum. Engl., 11 Refs., Illus.

Phaseolus vulgaris. Fertilizers. K. Pods. Snap beans. Canned beans.

Snap bean cv. Wax Bonanza and Early Gallatin were grown in sand culture with 2 levels of K (0.3 and 6 meq/l) and outdoors with 4 levels of K (0, 100, 500, and 1700 kg/ha) to determine the effects of K fertilization on the texture of canned pods and to compare the effects of additions of salts and removal of soluble pod components with the effects of fertilization. Increases in pod K, obtained either by fertilization or direct addition to the can, resulted in less firm canned pods. Removal of soluble solids from pods prior to canning resulted in firmer pods. Pod K and texture were highly correlated, with the greatest changes in texture with changing K occurring below 2% K in pods on a dry wt. basis. The effects of K and Na appeared due to a combination of Ca displacement and an enhancement of pectin degradation. (Author's summary) DOI

0262

18503 WEISS, A.; HIPPS, L.E.; BLAD, B.L.; STEADMAN, J.R. 1980. Comparison of within-canopy microclimate and white mold disease (Sclerotinia sclerotiorum) development in dry edible beans as influenced by canopy structure and irrigation. Agricultural Meteorology 22:11-21. Engl., Sum. Engl., 23 Refs., Illus.

Phaseolus vulgaris. Canopy. Irrigation. Temperature. Soil temperature. Whetzelinia sclerotiorum.

Measurements of air, leaf, and soil temp. were made in 2 dry edible bean cv., Great Northern (GN) Tara and Aurora, differing in canopy structure at the Scottsbluff Agricultural Lab., U. of Nebraska (USA). Normal and heavy irrigation treatments applied to each cv. were 5.5 cm of water every 10 and 5 days, resp. Air, leaf, and soil temp. were consistently lower in the heavy irrigation plots. White mold (Sclerotinia sclerotiorum) disease severity was related to irrigation and canopy structure. The heavy irrigation treatment of GN Tara had the greatest disease severity. Results indicate the influence of both irrigation and canopy structure on the microclimate as well as on the severity of white mold. The study suggests that microclimate modification may be one method to control this disease. However, additional research under controlled conditions (growth chambers) as well as further field studies are necessary before microclimate modification can be a viable tool for controlling this disease. (Author's summary) DOI

See also 0265 0270 0272 0277 0280

D02 Cultivation Practices: Planting, Weed Control and Harvesting

0263

17598 BEANS. 1962. Kenya, Kenya Government Extension Note. 1p. Engl.

Phaseolus vulgaris. Cultivation. Cultivars. Resistance. Drought. Kenya.

The Department of Agriculture of Kenya has been carrying out bean var. trials and 2 promissory var. have been found: Richmond Wonder, aimilar in appearance to var. Canadian Wonder but with higher yields, and Herbert Sproggett, a quick maturing, drought resistant var. The 2 most important problems in bean cultivation in Kenya are the introduction of drought resistant var. in the drier areas and the production of rust (Uromyces appendiculatus) resistant var. Aspects of bean cultivation in the country are briefly described: suitable areas for its production, fertilization, pest control, planting density, harvest, threshing, and storage. (Summary by F.G. Trans. by L.M.F.) D02

0264

18558 BLANCO R., F.; SOTO A., A.; GAMBOA H., C. 1981. Mezcla de herbicidas para control de malezas en cultivares de fríjol (Phaseolus vulgaris L.). (Herbicide combinations for weed control in bean cultivars). Alajuela, Universidad de Costa Rica. Facultad de Agronomía. Estación Experimental Agrícola Fabio Baudrit M. Boletín Técnico 14(2):1-11. Span., Sum. Span., 15 Refs.

Phaseolus vulgaris. Herbicides. Weeding. Cultivars. Costa Rica.

Six pre-emergence herbicide combinations were tested on 4 bean cv., 2 red bean cv. (Mexico 80-R and Rojo de Seda) and 2 black bean cv. (Talamanca and ICA-Pijao), at the Estación Exptl. Fabio Baudrit M. at the U. of Costa Rica. DNBP + pendimethalin (2.0 + 1.0 kg a.i./ha, resp.) showed an adequate control of weeds and tolerance by bean cv. and a yield equal to manual weeding at 25 days. (Author's summary) D02

0265

15247 CULTURA DO feijao. 1966. (Bean cultivation). In Instituto de Pesquisas Agronomicas. Brasil. Relatório anual 1966. Recife-PE, Brasil. pp.81-124. Port., Illus.

Phaseolus vulgaris. Research. Cultivars. Spacing. Fertilizers. Planting. Timing. Inoculation. Rhizobium. Seed treatment. Brazil.

Results of research on bean, conducted during 1966 in the state of Pernambuco, Brazil, are given. Studies covered aspects on: (1) cv. (characterization of the collection at the Caruaru Exptl. Station) and var. yield trials conducted in the municipalities of També, Vitória de Santo Antao, and Araripina and indicating that in general yields were low, not reaching 500 kg/ha; (2) spacing, conducted in Caruaru, optimum plant density for max. yield being 0.4 m between rows and 0.2 m within-row spacing (2 or 4 seeds/hill); (3) mineral fertilization conducted in

Palmares, També, Caruaru, Sao Bento do Una, and Araripina with the var. Costa Rica and indicating that the application of macro- and micronutrients and the correction of soil acidity allows the area planted to beans to be increased; (4) planting times, indicating the difficulties to determine the exact planting time (before or after the 1st rains); (5) inoculation with Rhizobium in Vitória de Santo Antao, where inoculation had no effect on yields; (6) the use of substrates for seed germination trials, the best substrate being sand; (7) the use of fungicides in seed treatments (mancozeb proved to be most efficient). (Summary by EDITEC. Trans. by L.M.F.) D02

0266

16754 DWARF OR kidney bean culture (Phaseolus vulgaris). Rose Coco and Canadian Wonder varieties. 1941. Nairobi, Agricultural Department. 3p. Engl.

Phaseolus vulgaris. Cultivation. Insect control. Dwarf beans. Agromyza phaseoli. Agrotis ipsilon. Gonocephalum simplex. Kenya.

Technical recommendations on dwarf bean cultivation in Kenya are given regarding: soil and land preparation, plant density and method, harvesting, and control of major pests [cutworms, leafminers (Agromyza sp.), and Gonocephalum simplex]. (Summary by F.G. Trans. by L.M.F.) D02

0267

16752 EIJNATTEN, C. L. M. VAN 1975. Report on a literature review and field study of agriculture in Kirinyaga District with special reference to beans (Phaseolus vulgaris). Kenya, University of Nairobi. Department of Crop Science. Technical Communication no. 13. 35p. Engl., 32 Refs., Illus.

Phaseolus vulgaris. Cultivation. Marketing. Kenya.

Essential points found in a literature review and field study of bean cultivation and marketing in the Kirinyaga District (Kenya), carried out by postgraduate students of the U. of Nairobi, are summarized. Students made individual visits to 42 farmers distributed equally over the main agricultural zones. The following aspects of cultivation are analyzed in detail: contribution of Kirinyaga to Kenya's bean production; area planted to beans; some seed characters of bean cv. collected in the District; seedbed preparation; planting time and density; weeding; fertilization; harvest; pest and disease control; yield levels; and marketing. Bean is an important food crop in this District, although its adoption is fairly recent. The crop occupies, together with interplanted maize, approx. 35% of the cultivated area. The economic importance of bean has risen with increasing shortages in supply and hence, the higher prices of the past year. Many of the cv. now available have been grown in Kirinyaga for 30-40 yr. During the survey samples were collected and added to the germplasm collection at the U. of Nairobi. Plant populations used are quite high (250,000-300,000 plants/ha) compared with normal recommendations (110,000-145,000 plants/ha). This practice should be investigated to determine the effect of spacing and the no. of plants/station on bean productivity. On-farm trials are needed to ascertain the levels of P and K application. Yield levels seem to be relatively high (1260-1340 kg/ha) compared with the national av. yield in 1960-61 (423 kg/ha). Approx. 33-43% of the bean cultivated is not utilized by the farmer, and is sold. (Summary by F.G. Trans. by L.M.F.) D02

0268

17350 FLETCHER, R.F.; TETRAULT, R.; MACNAB, A.A. 1976?. Growing snap beans for processing. Pennsylvania, Pennsylvania State University. College of Agriculture Extension Service. Circular no. 564. 11p. Engl.

Phaseolus vulgaris. Snap beans. Cultivation. Diseases and pathogens. Injurious insects.

General recommendations for growing snap beans for processing are given. Aspects include crop rotation, temp. requirements, soils and soil preparation, var., handling of seed, planting, soil pH, fertilizers and method of application, weed control, irrigation, and harvesting. Symptoms of major diseases (Fusarium root rot, Rhizoctonia root rot, Pythium root rot, Pseudomonas phaseolicola, P. syringae, Xanthomonas phaseoli, X. phaseoli var. fuscans, Colletotrichum lindemuthianum, Erysiphe polygoni, BCMV, BYMV, Botrytis cinerea, Sclerotinia sclerotiorum, and Uromyces phaseoli) as well as the damage caused by major pests (Epilachna varivestis, Aphis spp., Empoasca spp., Hylemya cilicrura, and Lygus spp.) are briefly described with references on their control. High-density planting is mentioned. (Summary by EDITEC. Trans. by L.M.F.) D02

0269

11970 FUENTES DE PIEDRAHITA, C.L. 1979. Manejo y control de las malezas en el cultivo del fríjol. (Weed management and control in bean crops). Cali, Colombia, Centro Internacional de Agricultura Tropical. 64p. Span., 47 Refs.

Paper presented at Curso Intensivo de Adiestramiento Posgrado en Investigación para la Producción de Fríjol, 4o., Cali, Colombia, 1979.

Phaseolus vulgaris. Weeding. Weeds. Herbicides. Inter-cropping. Zea mays. Manihot esculenta. Colombia.

Major weeds affecting bean crops and their control are examined. The following aspects are also included: (1) classification of weeds; (2) problems caused regarding production; (3) effect of competition; (4) agro-economic aspects and relationship with other cultural practices; (5) weed control methods; (6) weed control in associated cropping; (7) no-tillage cropping systems. A total of 18 narrowleaf and 50 broadleaf weeds were found; among these the most frequent were: Echinochloa colonum, Sorghum halepense, Avena sativa, Amaranthus hibridus, A. spinosus, Agropyron repens, Argemone mexicana, Bidens pilosa, Cenchrus equinatus, Galinsoga parviflora, Lolium temulentum, Polygonum convolvulus, and Setaria viridis. Weeds are also listed with the names of the pests or diseases of which they can be alternate hosts. Problems caused by competition, the effect of other cultural practices on production, economic advantages according to the type of control used are discussed. Application rates and the evaluation of results for different var. are given as well as the herbicides recommended for maize-bean and cassava-bean intercropping. (Summary by C.P.G. Trans. by L.M.F.) D02

0270

16466 HERINGA, R. J. 1973. Bean research project; general report, short rain trials 1972-1973. Thika, Kenya, Ministry of Agriculture. 6p. Engl.

Phaseolus vulgaris. Planting. Fertilizers. N. P. Cultivars. Selection. Kenya.

Research results are given of trials carried out in Thika and Njoro (Kenya) on bean planting density; N and P fertilization, both applied alone and combined; selection work; and assessment of food bean and Leakey materials. The characteristics of the cv. found to be resistant to rust (Uromyces appendiculatus) are described. (Summary by F.G. Trans. by L.M.F.) D02

0271

18301 HUTTON, M.J.; VAN STADEN, J. 1982. Cytokinins in germinating seeds of Phaseolus vulgaris L. 3. Transport and metabolism of 8[^{14}C] t-zeatin applied to the cotyledons. Annals of Botany 49(5):701-706. Engl., Sum. Engl., 19 Refs.

Phaseolus vulgaris. Germination. Cytokinins. Cotyledons. Metabolism.

The application of 8-^{14}C-t-zeatin to the cotyledons of germinating bean seeds demonstrated that cytokinins were not readily exported from the cotyledons to the embryonic axis during the early stages of this process. In the cotyledons the applied zeatin was metabolized extensively to metabolites which were polar and occurred at R_F 0.2-0.5 on paper chromatograms. These metabolites were stable and were not readily exported from the cotyledons. In contrast the metabolites found at R_F 0-0.2 were more readily exported. When exported to the radicles and plumules a large proportion of the translocated metabolites were converted to compounds which on paper co-chromatographed with zeatin. This seemed to suggest that the embryonic axis had the capacity to synthesize cytokinins and that some of the metabolites formed during its catabolism could also be used for its synthesis. (Author's summary) D02

0272

16702 LAMMERS, T.R. 1973. Short report considering the long rains trials 1972/73. Thika, Kenya, Bean Research Project. 8p. Engl.

Phaseolus vulgaris. Spacing. Fertilizers. N. P. Yields. Kenya.

Brief information is included on var., row distance, exptl. design, fertilization, planting, emergence, weeding, flowering, maturity, and harvest dates of trials carried out at Murinduko in the Kirinyaga District (Kenya) regarding spacing and the application of N and P alone or combined. Major pests and diseases found in these trials were leafminers (Agromyza sp.), which caused considerable damage to the crop; charcoal rot (Macrophomina phaseoli); and common blight (Xanthomonas phaseoli). Bean trials carried out in the Embu-Meru region and in Mwea during the long rains in 1973 are described. (Summary by F.G. Trans. by L.M.F.) D02

0273

17964 MACARTNEY, J.C. 1960. The history of the canning bean industry in Tanganyika. Tengeru, Tanzania, Northern Regional Research Centre. 11p. Engl.

Phaseolus vulgaris. Canned beans. History. Snap beans. Seed characters. Cultivation. Uromyces phaseoli. Symptomatology. Etiology. Disease control. Stored grain pests. Tanzania.

A historial review on the canning bean industry in Tanganyika, Tanzania, is given along with prospects for growing white haricot beans in the Northern Province. The problem of hard seed is discussed in detail and the following recommendations are given to eliminate this problem: (1) seed from hard-seeded parents should not be planted or soft seed should be selected through a breeding program; (2) planting should take place under adequate conditions in order to ensure good early germination; and (3) information as to optimum temp. and RH for storing should be obtained. The symptomatology, etiology, and control methods of rust (Uromyces appendiculatus), the major bean disease in Tanganyika, are described. Damage caused to the seed under field and storage conditions and recommended control measures for major pests in the Northern Province [bruchids (Acanthoscelides obtectus), Callosobruchus chinensis, and C. maculatus] are listed. Standard specifications of the white canning haricot and aspects of its cultivation are given. (Summary by F.G. Trans. by L.M.F.) D02

0274

15839 MONNIER, M. 1979. Formation de substances nutritives au cours de l'évolution des cotylédons de Phaseolus vulgaris. (Formation of nutritive substances during the evolution of Phaseolus vulgaris cotyledons). Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences. Serie D 288(3):315-318. Fr., Sum. Fr., Engl., 1 Ref., Illus.

Phaseolus vulgaris. Grafting. Hypocotyls. Cotyledons. Growth.

The hypocotyl of 3-day-old seedlings of Phaseolus vulgaris was successfully grafted onto the cotyledon of a 7-day-old plant; food reserves in the cotyledons were used up and the hypocotyl growth was stimulated by the graft. Embryos were removed from seeds and grown in culture with or without the presence of a cotyledon, or with ground cotyledon added to the culture medium. The presence of a cotyledon enhanced growth of the embryo; the effect was more pronounced with ground cotyledons when they were incubated in advance for 12 days on agar. (Summary by Crop Physiology Abstracts) D02

0275

16952 MUKASA, S.K. 1965. Bean spacing trials in Uganda. Uganda, Kawanda Research Station. Department of Agriculture. 6p. Engl.

Phaseolus vulgaris. Cultivars. Dwarf beans. Climbing beans. Spacing. Uganda.

The results of 3 spacing trials with rows wider than 0.3 m conducted in Uganda are given. In the 1st trial the spacing was varied without altering the seeding rate and the ideal stand with all spacings was 43,560 plants/ac. The trial was planted during 3 seasons at Kawanda and Bukalasa and the plots were split for 2 var.: Banja (bush type) and Mutike 4 (semi-climbing). The 0.3 x 0.3 m gave the highest yield in all the trials at the 2 sites, but when plant populations were maintained at that same level the widening of rows to 0.6 m did not significantly lower yields. The 2nd trial was planted during the 1st season of 1962 on 2 planting dates in Kawanda and Bukalasa. Plots were split for 2 var.: Kawanda 35 and Tanganyika black (both semi-climbing). At both sites yield differences were not significant, indicating the considerable compensating capacity of the plants of semi-climbing var. In the 3rd trial a 0.6 m row width and a wider range of seeding rates with the row were tested. Var. Banja 2 and Kawanda

35 were planted at Kawanda and Bukalasa for 3 seasons. For both var. the optimum spacing within the row is in the range of 2-4 seeds/0.3 m. A high seeding rate is particularly essential for the bush type var. Banja 2; the semi-climbing var. with its compensatory capacity is less sensitive to the seeding rate. (Summary by F.G. Trans. by L.M.F.) D02

0276

17978 MUKASA, S.K. 1970. Beans - Phaseolus vulgaris L. In Jameson, J.D., ed. Agriculture in Uganda. London, Oxford University Press. pp.240-242. Engl.

Phaseolus vulgaris. Cultivation. Cultivars. Selection. Resistance. Diseases and pathogens. Uganda.

Snap bean cultivation in Uganda (Africa) is briefly described. Aspects on its introduction, soil requirements, planting time, growth cycle, uses (most of the crop is consumed locally), and yield are included. Three groups of bush var. may be distinguished according to growth habit: bush type (generally low yielding and susceptible to diseases but quick maturing and suitable for intercropping), semiclimbing, and climbing (occasionally yields of 2000 lb/ac have been recorded and they generally show high disease resistance). Up to 1960 var. trials had been carried out and var. Banja, Mutike 4, Canadian Wonder, Bukalasa, and Abundance were selected. The current breeding program is selecting disease-resistant var., the limiting factor to production. Growth habit, yield, culinary quality, and susceptibility to anthracnose (Colletotrichum lindemuthianum) are given for var. Banja, No. 1/2, Mutike 4, Canadian Wonder, Bukalasa, No. 35, Tanganyika Black, Abundance, No. 49, and Laaja. Major bean diseases in Uganda are: anthracnose, angular leaf spot (Isariopsis griseola), fuscous blight (Xanthomonas phaseoli var. fuscans), common blight (X. phaseoli), and halo blight (Pseudomonas phaseolicola). Plant damage and control measures are given for each of these diseases. (Summary by F.G. Trans. by L.M.F.) D02

0277

16707 NKUNGA, G.F.M. 1972. Shortrains trials 1972 at Thika. Thika, Kenya, Horticultural Research Station. 6p. Engl.

Phaseolus vulgaris. Spacing. Planting. Fertilizers. N. P. Yields. Kenya.

A brief description is given of the objectives, sites, cv., exptl. design, spacing, planting density, plot size, fertilizers, planting and harvesting date, and the cultural practices (land preparation, soil sampling, seed dressing, weed, pest, and disease control) carried out in expt. conducted in Thika (Kenya) in order to determine optimum plant popuiation in relation to yield and the effect of N and P fertilizer applied alone or combined on the yield of bean var. Mexican 142. (Summary by F.G. Trans. by L.M.F.) D02

0278

18581 PICKETT, L. K. 1978. Harvesting dry beans. In Robertson, L.S.; Frazier, R.D., eds. Dry bean production - principles and practices. East Lansing, Michigan State University. Cooperative Extension Service. Agricultural Experiment Station. Extension Bulletin E-1251. pp.180-195. Engl., 8 Refs., Illus.

Phaseolus vulgaris. Harvesting. Agricultural equipment. Timing. Water content. Seed. Pods. USA.

Equipment available for bean harvesting (pullers, windrowers, and combines) are described and recommendations are given on the equipment sizes required, the handling of beans, and the selection of a combine for conditions in Michigan, USA. Harvesting management factors are discussed: harvest time, pod and seed moisture, bean quality, elimination of dirt and stones, scheduling field operations, and operation of the combine. (Summary by EDITEC. Trans. by L.M.F.) D02

0279

18100 PLATEN, H. VON; RODRIGUEZ P., G. 1982. La producción de fríjol tapado en la región de Acosta-Puriscal, Costa Rica. ("Covered bean" production in the Acosta-Puriscal region, Costa Rica). Turrialba, Centro Agronómico Tropical de Investigación y Enseñanza. 17p. Span., 5 Refs., Illus.

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

Phaseolus vulgaris. Technology evaluation. Planting. Cultivation. Yields. Costa Rica.

In the Acosta-Puriscal region in Costa Rica the traditional "covered bean" planting system was compared with a recommended planting system. The covered bean system consisted in broadcasting 45 kg seed/ha on weedy land and then cutting the weeds to form a mulch. The recommended technique consisted in planting 50 kg of treated seed/ha of improved var. Mexico 80 or Jamapa, fertilizing with 150 kg 10-30-10/ha, and applying chemicals to control Diabrotica sp. and Vaginulus latipes. Both systems were managed by farmers on their properties. Plant density was statistically higher in the recommended system (184,000 plants/ha) compared with the covered bean system (122,000 plants/ha). The germination of improved seed was superior to that of local seed. The recommended system required 16% more labor than the covered bean system. Av. yield of the traditionally planted plots was 561 kg/ha while that of plots planted with the recommended system yielded 678 kg/ha; however, the statistical difference is not reliable due to the great variation observed. Economic analysis indicated a gross margen above 12% for the recommended system over the traditional one. Results of a subsequent survey among farmers regarding the adoption of the new system are given as well as suggested modifications. Although the estimated margen that could influence the adoption of technology was 30%, 12% was enough so that the majority (78%) of the farmers were satisfied with the results of the recommended system. (Summary by EDITEC. Trans. by L.M.F.) D02

0280

17480 ROCHA, J.A.M.; AIDAR, H.; TEIXEIRA, M.G. 1982. Viabilidade do plantio de feijao no inverno com irrigacao na microrregiao de Ponta Pora, MS. (Viability of planting winter beans under irrigated conditions in the Ponta Pora microregion, MS). Goiania-GO, Brasil, Empresa Brasileira de Pesquisa Agropecuária. Centro Nacional de Pesquisa-Arroz, Feijao. Pesquisa em Andamento no. 33. 3p. Port.

Phaseolus vulgaris. Planting. Timing. Irrigation. Cultivars. Yields. Adaptation. Brazil.

An expt., including 4 planting times, was conducted in the microregion of Ponta Pora, MS, Brazil, to evaluate the viability of planting winter bean under sprinkler irrigation conditions. Nine lines and 7 traditional cv. were used in a randomized block design with 3 replications. The 1st planting took place on July 8, 1981 and the other plantings were made at 15-day intervals. Visual observations were made of the phenotypic characteristics of the plant 65 days after emergence; data on emergence, beginning and end of flowering, growth habit, height of insertion of the 1st pod, pest and disease resistance, av. no. of seeds/pod, and grain production were also registered. Joint analysis of the last 2 planting times did not reveal significant effects among planting dates. Highest scores and yields occurred in black-type lines (CNF 160, CNF 155, and CNF 154) and the red-colored cv. (CNF 010 and Tayhú). Traditional regional cv. Rio Tibagi, Carioca, and Roxao gave yields markedly below those obtained by the Centro Nacional de Pesquisa-Arroz, Feijao. (Summary by F.G. Trans. by L.M.F.) DO2

0281

18506 SA, M.E.; PANIZZI, R.C.; ROCHA, A.D. 1981. Controle químico de plantas daninhas em feijao (Phaseolus vulgaris L.) em pré-emergencia. (Preemergence chemical weed control in beans). In Campus de Ilha Solteira-SP, Brasil. Universidade Estadual Paulista. Relatório Técnico-Científico no. 1. pp.28-29. Port.

Phaseolus vulgaris. Weeding. Herbicides. Toxicity. Yields.

The phytotoxicity and weed control of herbicides applied alone or in mixtures preemergence in bean cv. Carioca and final bean yield were assessed in an exptl. trial. Treatments included chloramben (2.99 kg a.i./ha), chloramben + alachlor (2.3 + 1.72 kg a.i./ha), alachlor (2.58 kg a.i./ha), chloramben + metribuzin (2.3 + 0.35 kg a.i./ha), metribuzin (0.49 kg a.i./ha), and metribuzin + alachlor (0.35 + 1.72 kg a.i./ha). Major invading weeds were Amaranthus deflexus, Sida spinosa, Acanthospermum australe, Richardia brasiliensis, and Digitaria sanguinalis. All of the treatments controlled more than 80% of A. deflexus, 90% of D. sanguinalis, and more than 70% of R. brasiliensis, except metribuzin which did not control R. brasiliensis. Chloramben alone did not control S. spinosa satisfactorily, unlike its mixtures. Chloramben and metribuzin alone did not control A. australe but their mixture did (87.5% control). Optimum control and the highest av. yield (985 kg/ha) was obtained with the chloramben + alachlor mixture with 94.3% efficiency. Metribuzin alone or in mixture caused slight phytotoxicity in beans but did not decrease yields. No statistically significant differences in yield were observed. (Summary by EDITEC. Trans. by L.M.F.) DO2

0282

16778 SOUZA, D.I. DE 1967. Standard recommendations of Mexico 142 beans. Nairobi, Kenya, National Agricultural Laboratories. Research Information Section. 2p. Engl.

Phaseolus vulgaris. Cultivation. Technological package. Kenya.

Brief standard technical recommendations on the cultivation of bean var. Mexico 142 are given regarding: alt., soil type, land preparation, planting (time, density, and method), control of weeds, diseases [rust (Uromyces appendiculatus)], and pests (aphids and bollworms), harvesting, yields, and returns. (Summary by F.G. Trans. by L.M.F.) DO2

0283

17455 TEASDALE, J.R.; FRANK, J.R. 1982. Weed control systems for narrow and wide row snap bean production. Journal of the American Society for Horticultural Science 107(6):1164-1167. Engl., Sum. Engl., 12 Refs., Illus.

Phaseolus vulgaris. Weeding. Snap beans. Herbicides. Yields. Planting. USA.

Five field expt. conducted in Maryland (USA) compared weed control systems for snap bean cv. Checkmate production in 25-cm rows including herbicides, but no cultivation, with systems for conventional 91-cm rows including both herbicides and cultivation. Herbicide combinations of EPTC + dinoseb each at 3.4 kg/ha, EPTC at 3.4 kg/ha + bentazon at 0.8 kg/ha, and trifluralin at 0.6 kg/ha + bentazon at 0.8 kg/ha provided excellent control of annual weeds and yellow nutsedge (Cyperus esculentus) in most expt. With the most effective herbicide treatments, weed control was similar in 25-cm and 91-cm rows. However, when herbicide treatments failed to control all weed species, weed control in 91-cm rows was better than that in 25-cm rows, because 91-cm rows were cultivated. Snap beans in 25-cm rows yielded an av. of 25% higher than snap beans in 91-cm rows (plant density was equivalent at both row spacings). As weed control improved, the magnitude of the yield difference between 25-cm and 91-cm row spacings increased. (Author's summary) D02

0284

18553 THUNG, M.; ERAZO, O.; ORTEGA, J. 1983. Factores agronómicos en el manejo de ensayos de rendimiento en fríjol. (Agronomic factors in the management of bean yield trials). Cali, Colombia, Centro Internacional de Agricultura Tropical. 46p. Span., 37 Refs.

Phaseolus vulgaris. Research. Yields. Cultivation.

The agronomic factors that should be taken into account in the management of bean yield trials are described. These include: determination of the exptl. site (plot background and soil and climatic conditions); mechanized soil preparation; materials required for field trials; fertilization (types of fertilizers and systems, application methods and times); materials required for testing and their preparation; planting (time, system, population, and spacing); irrigation (systems and times); crop rotations; cultural practices during the exptl. period; phytosanitary condition; pests; deficiencies and toxicities; harvesting; on-farm storage; and approximation of soil nutrient levels for bean. (Summary by EDITEC. Trans. by L.M.F.) D02

See also 0253 0258 0286 0290 0291 0292 0294 0296 0311 0360 0367

D03 Cultivation Systems: Intercropping, Rotational Crops

0285

17458 AMAYA C., M. 1980. Efecto de diferentes poblaciones de maíz y de fríjol en el sistema de asociación de maíz x fríjol de enredadera. (Effects of different maize and bean plant populations on maize/climbing

bean intercropping). Tesis Mag. Sc. Bogotá, Colombia, Universidad Nacional. Instituto Colombiano Agropecuario. 97p. Span., Sum. Span., Engl., 18 Refs.

Phaseolus vulgaris. Intercropping. Spacing. Zea mays. Yields. Genetics. Cultivars. Colombia.

Research was carried out during the first 1979 harvest at the Centro Nacional de Investigaciones Agropecuarias-Tibaitatá, Mosquera (Colombia) to determine the optimum population density for bean/maize intercropping, evaluate the yield in kg/ha of different plant populations used by farmers, determine genotype interaction at different bean and maize populations, and provide the farmer with recommendations. Six expt. were carried out in plots with 0.9 m between furrows and 1 m between plants. Maize var. V506, V555, and Sogamoseño and bean var. ICA 32980 and Bola Roja were used in a randomized complete block design with 2 replications. Maize and bean were planted simultaneously with varying densities of 2, 3, 4, and 5 maize seeds/site vs. 1, 2, 3, and 4 bean seeds/site in each of the expt. The dates of germination, flowering, and harvest, no. of maize ears/plant, no. of harvested sites, yield/plot, and disease incidence were registered for each treatment. The Duncan test and variance analysis were used to evaluate results. Maize yields did not differ significantly among var. Changes in maize and bean populations affected the yields of both crops. The introduction of higher no. of bean plants in the association decreased maize and bean yields significantly. Maize yields were higher when the no. of plants/site increased and the no. of bean plants in association was smaller. At the same time bean yields were higher in monoculture and with low populations/site. The highest economic yield/ha was obtained with combinations of 5 maize seeds x 1 bean seed; 5 maize seeds in monoculture; and 4 maize seeds x 1 bean seed. (Extracted from author's summary) D03

0286

13464 BURITY, H.A.; ZAFFARONI, E.; SHENK, M.; LOCATELLI, E. 1979. Efecto en el suelo y en los rendimientos de los sistemas yuca (Manihot esculenta Crantz) y yuca asociada con fríjol (Phaseolus vulgaris L.) de cinco manejos previos a la siembra en Turrialba, Costa Rica. (Effect of cassava and cassava/bean systems on the soil and yields in five treatments prior to planting in Turrialba, Costa Rica). Brasil, Empresa Brasileira de Pesquisa Agropecuária. 21p. Span., Sum. Span., 25 Refs.

Paper presented at Reunión Anual del PCCMCA, 25a., Tegucigalpa, Honduras, 1979.

Phaseolus vulgaris. Intercropping. Land preparation. Yields. Soil conservation practices. Costa Rica.

A study was conducted on the effect of 5 tillage systems; 3 with mechanical tillage and 2 nonmechanical on the yields of 2 cropping systems - cassava in monoculture and cassava associated with beans - and some physicochemical properties of the soil surrounding the roots. Different ways of soil preparation were: (1) one plowing and 2 harrowings; (2) one plowing, 2 harrowings and the subsequent application of herbicides; (3) one plowing, 2 harrowings and subsequent hand weeding; (4) cutting the vegetation to ground level + herbicide; and (5) cutting vegetation 50 cm above ground level + herbicide. Yields of cassava in monoculture and in association were superior in the treatments of conventional tillage in comparison with the treatments with no tillage. Cassava yields in monoculture were significantly higher than those obtained with the associated system. Bean production was higher for the treatment with no tillage. Total porosity

was increased in all the planting treatments; however, for those treatments with no tillage there was an increase in the porous capillary spaces. The contrary was found to be true for conventional soil tillage. Chemical properties modified to a greater extent by the planting treatments were: the % of N, OM, and P availability that had a higher increase in plots with no tillage with regard to mechanized tillage. The increase of soil reaction -pH- was higher in plots with traditional tillage, when compared with treatments with no tillage. (Author's summary. Trans. by L.M.F.) D03

0287

17846 CENTRO AGRONOMICO TROPICAL DE INVESTIGACION Y ENSEÑANZA. 1979. Sorgo y frijol asociados en fajas alternas, una alternativa para el mejoramiento del sistema frijol en monocultivo practicado en Samulali, Matagalpa, Nicaragua. (Sorghum and bean in association grown in alternated belts; an alternative for the improvement of the bean system in monoculture practiced in Samulali, Matagalpa, Nicaragua). Turrialba, Costa Rica, Programa de Cultivos Anuales. 73p. Span., 7 Refs., Illus.

Phaseolus vulgaris. Intercropping. Cultivation. Costs. Economics. Nicaragua.

After describing the traditional system of planting bean in monoculture, used by bean producers in Nicaragua, the alternative of planting bean and sorghum in alternated belts is discussed. Aspects on soil preparation, planting system, NPK fertilization, weeding, pest control, harvesting, exptl. yields, and production costs are included. A physicobiological and socioeconomical description of the area of Samulali, Matagalpa, for which the proposed cropping alternative is intended, is also given. Agronomic and economic exptl. results that make the use of this system advantageous in this region are given. (Summary by EDITEC. Trans. by L.M.F.) D03

0288

18571 CHRISTENSON, D. R.; ROBERTSON, L. S.; MOKMA, D.L. 1978. Systems of cropping. In Robertson, L.S.; Frazier, R.D., eds. Dry bean production - principles and practices. East Lansing, Michigan State University. Cooperative Extension Service. Agricultural Experiment Station. Extension Bulletin E-1251. pp.62-77. Engl., Sum. Engl., 12 Refs., Illus.

Phaseolus vulgaris. Cultivation systems. Rotational crops. Cultivation. USA.

The term "cropping system" refers to the detailed organization, methods of operation, and practices used in producing a series of crops. There are 2 broad classes of systems: haphazard and systematic. The haphazard system is used extensively in Michigan (USA) which partially explains recent yield trends because many producers grow beans intensively. In a 1974 survey, approx. 1/3 of the beans were produced for the 2nd time in the field during a 3-yr period. A systematic, well-defined cropping system offers several advantages over the haphazard system. Higher yields are likely to be produced in such a system. The advantages of a well-defined cropping system are discussed: it provides for a regular program of inventorying soil fertility levels with soil test methods; helps to furnish a regular program for weed control, whether it be with cultivation or chemicals; makes possible the efficient use of farm implements and power; permits a better soil conservation program by systematically including sod crops, cover crops, and green manure crops as well as annual windbreaks into the system. (Author's summary) D03

0289

17749 EDJE, O.T. 1981. Response of sorghum and beans in monoculture and in association. Luso: Journal of Science and Technology (Malawi) 2(1):3-13. Engl., Sum. Engl., 18 Refs.

Phaseolus vulgaris. Intercropping. Sorghum bicolor. Yields. Income. Malawi.

Sorghum var. NK 283 and Lindsey 555 and a determinate bush bean cv. 253/1 were grown in monoculture and in association at Bunda College of Agriculture, Lilongwe, Malawi. Both crops were planted simultaneously on ridges 91 cm apart. Plant stand of each crop in monoculture or in association was the same, being 109,900 and 219,800 plants/ha for sorghum and bean, resp. Sorghum yields were not significantly affected when grown in association with bean. Bean yields were, however, reduced by 33.2% on the av. when grown in association with sorghum due to competition for solar radiation and perhaps nutrients and moisture and the consequent advantage of sorghum over the associated bean crop. Despite the yield reduction of bean when grown in association with sorghum, the mixed cropping system provided a more efficient use of land, producing a land equivalent ratio of 1.50, and a better economic return with an income equivalent ratio of 1.51. (Author's summary) D03

0290

16995 GATHEE, J. W. 1980. Farming system economics: fitting research to farmers conditions. In Keswani, C.L.; Ndunguru, B.J., eds. Symposium on Intercropping in Semi-arid Areas, Morogoro, Tanzania, 1980. Proceedings. Ottawa, Canada, International Development Research Centre. pp.136-140. Engl., Sum. Engl., Illus.

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

Various systems of intercropping maize and beans were compared in an intent to bridge the gap between the research recommendations and the needs of the small-scale farmers in Kenya. The recommended method is compared with the farmers' present methods (intercropping and monoculture) taking into account not only the inputs and outputs but also physical, economic, and social factors. Pure stands of maize and beans are also included in the comparison. Maize var. Katumani and bean var. Mwezi moja (both short-maturing) were used. The recommended system consisted of maize (44,000 plants/ha) spaced at 75 x 30 cm and beans (178,000 plants/ha) at 2 rows equidistant, 15 cm intrarow. The recommended method was found to require too much planting labor for the small-scale farmers in the semi-arid area of Machakos, Kenya, where timely planting is crucial in view of the short growing period. The introduction of a simple, cheap planting device could probably remove the limitation to adopting the recommended system. (Author's summary) D03

0291

17469 GROOT, W. DE; KITIVO, D.K.; WAKHONYA, H.M.; TOWETT, J.B.K. 1980. Critical period for weed competition in mixed stands of beans and maize. In Kenya. Ministry of Agriculture. Grain Legume Project. Thika, Kenya, National Horticultural Research Station. Interim Report no. 16. Short Rains 1979/80. pp.1-9. Engl., Sum. Engl., 20 Refs., Illus.

Phaseolus vulgaris. Intercropping. Zea mays. Weeding. Yields. Kenya.

Weed competition in simultaneously planted maize/bean associations was

studied in 3 trials carried out in wet areas of Kenya (Embu, Thika, and Kisii). Bean cv. Mwezi moja was used at Thika, Rose coco K74 at Embu, and Rose coco GLP-2 at Kisii. A randomized block design was used with 10 treatments and 6 replications. Treatments consisted of 1, 2, 3, 4, or 5 weedings 10, 20, 30, 40, and 50 days after emergence of both crops and a check treatment (no weeding). Planting both crops on the same day increased yields markedly. In the traditional system weeding operation is spread over a longer period due to the late planting of the beans. Results show that the critical period for weed competition in a simultaneously planted maize/bean association is from 20 to 30 days after crop emergence. One weeding 3 wk. after planting should suffice in the association as compared with at least 2 weedings for beans in monoculture. (Author's summary) D03

0292

17711 HASSELBACH, O.E. 1981. Multiple hill planting as a possible means to increase the returns of maize/bean mixtures. In Kenya. Ministry of Agriculture. Grain legume project. Thika, Kenya, National Horticultural Research Station. Interim Report no. 18. Short Rains 1980/1981. pp.68-74. Engl., Sum. Engl.

Phaseolus vulgaris. Intercropping. Zea mays. Planting. Spacing. Cultivars. Yields. Income. Kenya.

A mixed maize/bean cropping expt. was designed to evaluate the method used by farmers in Nyanza Province in West Kenya which consists of reducing labor for seeding their mixed stand not only by planting maize at more seeds/hill, but also by planting bean and maize seeds in the same hole. A 2 x 2 x 6 factorial design was used with 2 replications and 10 treatments. Bean cv. GLP-2 (Rose coco) and GLP-X.92 (Pinto) and maize hybrid H 612 were used; bean population was 267,000 plants/ha in all treatments, except 2 with 355,000 and 44,000 plants/ha. In all treatments maize was planted at a density of 44,000 plants/ha. Late planting of beans relative to maize resulted in lower bean yields, whereas maize was not affected. Cv. GLP-X.92 gave higher yields than GLP-2 and if planted at a high density, it appeared to be less sensitive regarding plant arrangement. Therefore, if not labor, maize yields could be decisive in selecting an arrangement. The treatment including multiple hill planting of maize (90 cm intrarow) and interplanting beans in and between the maize rows resulted in the best overall returns/unit area of land. Time studies should be conducted. (Summary by L.M.F.) D03

0293

18591 KASS, D.C.L. 1982. Aumento de la productividad y rentabilidad de los sistemas de producción tradicionales del valle de Chimaltenango. (Increased productivity and profitability of traditional production systems in the Chimaltenango valley). Ciencia y Tecnología Agropecuaria (Guatemala) 1(1):31-45. Span., Sum. Span., 8 Refs., Illus.

Phaseolus vulgaris. Intercropping. Climbing beans. Zea mays. Technology evaluation. Guatemala.

Due to the differences in alt. and soil texture, the Chimaltenango valley has environmental conditions different to those of other parts of the Guatemalan tablelands, differences that affect the farming system practiced in the area. Maize is planted in Feb., 3 mo. before the beginning of the rainy season, and climbing bean in June. Bean yields exceed 1000 kg/ha.

Expt. conducted to increase profitability of this system incorporated the following changes into the traditional system: (1) association of a sequence of potato and broccoli with traditional maize and bean; (2) substitution of the local maize var. with one with a shorter growth cycle, thus allowing broccoli or dwarf beans to be planted in monoculture after maize harvest; (3) modification of the traditional maize arrangement to use higher intercrop populations. When one, or a combination, of these changes was used, net returns/ha increased in comparison with the traditional system. ..esults showed the feasibility of increasing the production of both subsistence crops and income-producing crops without changing the traditional dates of farm operations. The use of FYM can reduce production costs. (Author's summary. Trans. by L.M.F.) D03

0294

17425 SEGOVIA S., R.; ARIAS F., J. 1981. Efecto de poblaciones de maíz y de fríjol en el sistema maíz x fríjol arbustivo para clima medio conservando constantes las distancias de siembra. Proyecto: 2-A-81. (Effect of maize and bean plant populations on maize/dwarf bean intercropping for temperate climate zones, maintaining constant planting distances. Project 2-A-81). Bogotá, Colombia, Instituto Colombiano Agropecuario. Programa de Cultivos Múltiples. 24p. Span.

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

The effect of different plant populations in mixed cropping maize var. Blandito Regional x dwarf bean var. Calima or var. ICA-Pijao for areas of small farmers was studied at the El Arsenal Exptl. Station (1450 m.a.s.l., av. temp. 22°C, 1200 mm/yr, light clay soils with a pH between 5.8-6.2). A randomized block design was used with 10 treatments and 3 replications; the check being maize in monoculture. Plots consisted of 3 rows with plants spaced at 0.9 x 0.9 m. Mixed crops were planted simultaneously with 1, 2, 3, or 4 maize plants/hill and 0, 1, 2, and 3 bean plants/hill for all combinations. Increasing the plant population of one of the species increased its production and reduced the production of the other species; highe- maize yields were always reached in association compared with monoculture. Furthermore, the total gross income is higher in multiple cropping than in maize in monoculture (more than Col $23,550 vs. $20,540, resp.). Multiple cropping favored maize since higher yields were obtained in association with dwarf beans. Cultural practices (weeding and hilling) are the same for both crops as those of maize in monoculture. Intercropping makes a more efficient use of land than sole cropping. The treatment showing highest return rates (633.51%) was 2 maize plants x 1 bean plant/hill. However, the highest yields of bean var. Calima and ICA-Pijao (0.215 and 0.619 t/ha, resp.) were obtained by planting 3 and 2 bean plants/hill with 1 of maize, resp. (Summary by EDITEC. Trans. by L.M.F.) D03

0295

17831 SOUZA FILHO, B. F. DE 1981. Irrigacao de culturas consorciadas. (Irrigation in intercropping systems). Lavoura 84:34-35. Port., 6 Refs., Illus.

Phaseolus vulgaris. Intercropping. Saccharum officinarum. Irrigation. Brazil.

The feasibility of planting bean/sugar cane in association is discussed.

The irrigation systems that could be used in this cropping system in order to satisfy the water requirement of bean of 300 mm/cycle, with critical intervals at flowering and at the beginning of maturity, are briefly described. Furrow irrigation by infiltration and sprinkler irrigation are mentioned. The advantages of intercropping lie in increased sugar cane yields after being intercropped with bean and a more efficient land use. The interference in the cultural practices in the sugar cane crop is considered a disadvantage. (Summary by EDITEC. Trans. by L.M.F.) D03

0296

17448 VIEIRA, C. 1980. Plantio de feijao na cultura do milho. (Planting bean in maize crops). Informe Agropecuário (Brasil) 6(72):45-48. Port., 10 Refs., Illus.

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

The practice of intercropping bean and maize in the state of Minas Gerais, Brazil, is described and the results of intercropping expt. carried out by the Escola Superior de Agricultura de Lavras, the U. Federal de Vicosa, and the Empresa de Pesquisa Agropecuária de Minas Gerais are given. In a 1st expt. conducted in Lavras intercropping bean var. Parana with 2 maize var. (normal and tall growth habits, resp.), bean yields in monoculture (1669 kg/ha) decreased noticeably due to the associated cropping (452-561 kg/ha); maize growth habit did not affect yield. In another expt. in Vicosa with bean var. Ricobaio 1014 planted at 0, 40, 80, 120, and 160 thousand plants/ha in all combinations and simultaneously, intercropping was observed to affect bean yield (1000-1500 kg/ha in monoculture vs. a range of 245-775 kg/ha for all the combinations in association). In Vicosa bean var. Manteigao Fosco 11 (determinate growth habit), Rico 23 (indeterminate), Ricopardo 896 (indeterminate), and Preta 1370 (climbing) were studied intercropped with maize. Increasing maize populations decreased bean yield, especially when in-row planting was used. Rico 23 was not considered suitable for intercropping, but Preta 1379 and Ricopardo 896 were the best in the dry season since they served as support for maize plants. Manteigao Fosco 11 was relatively apt under drought conditions and in the rainy season. Results show that outstanding var. in monoculture are not always the most indicated for intercropping. On the basis of the results obtained, it was concluded that (1) bean/maize intercropping reduces bean productivity, (2) intercropping makes land use more efficient, (3) intercropping is an economically profitable planting system for small farmers, (4) up to 160 thousand bean plants can be planted per ha with maize populations of 20-40 thousand plants/ha during the rainy season; this no. can be increased during the dry season. During the dry season climbing beans may be intercropped with maize, not so in the rainy season. The most suitable var. for intercropping have not yet been determined. Other results indicate that intercropping reduced maize lodging, Spodoptera attacks in maize, and Empoasca attacks in bean. (Summary by EDITEC. Trans. by L.M.F.) D03

See also 0269 0336 0345 0360 0363 0400

D04 Seed Production

0297

17845 COPELAND, L.O.; BELL, D.C.; NELSON, L.V.; MADDEX, R.L. 1976. A dryer for field bean seed. East Lansing, Michigan State University. Cooperative Extension Service. Extension Bulletin no. E-1046. 6p. Engl., Illus.

Phaseolus vulgaris. Seed. Agricultural equipment. Drying.

A dryer for bean seed, which can be constructed on the farm, is described. Moisture levels of seed lots are brought from levels of 21-26% down to safe storage levels of 17-18%, without impairing germination, in 8-12 h. A detailed description on its construction and operation is given; lists of wooden and metal components with their specifications and drawings for constructing the bean seed dryer are included. (Summary by EDITEC. Trans. by L.M.F.) D04

See also 0298

D05 Varietal Trials

0298

17453 HASSELBACH, O.E.; NDEGWA, A.M.M.; OKONGO, A.O. 1980. French bean seed production trials 1978/79. In Kenya. Ministry of Agriculture. Grain legume project. Thika, Kenya, National Horticultural Research Station. Interim Report no. 16. Short Rains 1979/80. pp.61-64. Engl., Sum. Engl.

Phaseolus vulgaris. Snap beans. Cultivars. Seed production. Kenya.

A cv. trial was established with locally available planting seed of French bean cv. in order to determine suitable locations in Kenya to produce high yields of good quality seed. Fourteen entries were planted in randomized block expt. with 4 (short rainy season 1978/79) or 3 (long rainy season 1979) replications. No protective measures were taken against prevalent diseases and irrigation was only applied to ascertain an acceptable yield level. It was concluded that 2 seasons are not long enough to produce reliable data on suitable locations. Trials have to be sufficiently checked by local supervisors; simpler trials that are easier to manage should hopefully receive more cooperation. (Summary by L.M.F.) D05

E00 PLANT PATHOLOGY

0299

18063 COPELAND, L.O.; SAETTLER, A.W. 1982. Physical and phytosanitary quality of dry edible bean seed: planter box survey. Michigan Dry Bean Digest 6(4):13-14. Engl.

Phaseolus vulgaris. Seed. Xanthomonas phaseoli. Colletotrichum lindemuthianum. Bean golden mosaic virus. Germination. Seed characters. USA.

In 8 bean producing counties in Michigan (USA), a total of 131 two-pound samples were taken from drill boxes or bags during the planting operation. Samples collected during the planting season of May 25-June 15, 1981 were analyzed for germination and tested for infection by bacterial blight (Xanthomonas phaseoli), BCMV, and anthracnose (Colletotrichum lindemuthianum). Lab. tests showed no anthracnose, 7.6% BCMV, and 4.6% bacterial blight. More than 85% of the samples germinated more than 80% and only 8% germinated less than 70%. Results of this survey show that Michigan bean growers are conscious of the importance of using high quality, disease-free seed. It is recommended that a similar survey be conducted in the same region in approx. 5 yr. (Summary by EDITEC. Trans. by L.M.F.) E00

0300

4410 ECHANDI, E. 1965. Enfermedades del fríjol (Phaseolus vulgaris L.) observadas en Nicaragua, El Salvador, Guatemala y Honduras, en la segunda siembra del año 1964. (Bean diseases registered in Nicaragua, El Salvador, Guatemala, and Honduras during the second planting cycle of 1964). In Reunión Anual del Programa Cooperativo Centroamericano para el Mejoramiento de Cultivos Alimenticios, 11a., Panamá. 1965. Trabajos presentados. Guatemala, Librería Indígena. pp.104-106. Span., 1 Ref., Illus.

Phaseolus vulgaris. Isariopsis griseola. Uromyces phaseoli. Xanthomonas phaseoli. Colletotrichum lindemuthianum. Chaetoseptoria wellmanii. Erysiphe polygoni. Rhizoctonia microsclerotia. Fusarium solani. Sclerotium rolfsii. Meloidogyne. Nicaragua. El Salvador. Honduras. Guatemala.

Bean diseases were observed during the 2nd planting cycle of 1964, which covers most of the area planted to bean and the highest total production of the year, in the major bean growing regions of 4 countries (Nicaragua, El Salvador, Guatemala, and Honduras). Major diseases were: angular leaf spot (Isariopsis griseola), rust (Uromyces phaseoli var. typica); common bacterial blight (Xanthomonas phaseoli), anthracnose (Colletotrichum lindemuthianum), Chaetoseptoria leaf spot (Chaetoseptoria wellmanii), powdery mildew (Erysiphe polygoni), root rot (Rhizoctonia microsclerotia, Fusarium solani f. phaseoli), Ascochyta leaf and pod spot (Ascochyta boltshauseri), Cercospora leaf spot (Cercospora sp.), and southern blight (Sclerotium rolfsii). Marked nematode attack was also observed. (Summary by F.G. Trans. by L.M.F.) E00

0301

16917 LEAKEY, C.L.A.; MUKASA, S.K. 1963. Report on bean growing and improvement in Uganda. 2. Bean diseases and prospects for their control by breeding. Uganda. Kawanda Research Station. Department of Agriculture. 11p. Engl., 19 Refs.

Phaseolus vulgaris. Symptomatology. Etiology. Resistance. Colletotrichum lindemuthianum. Isariopsis griseola. Uromyces phaseoli. Whetzelinia sclerotiorum. Ascochyta phaseolorum. Erysiphe polygoni. Didymella. Xanthomonas phaseoli. Uganda.

Information recently obtained on bean cultivation in Uganda is included as well as a brief literature review on major diseases. Symptomatology, etiology, and var. resistant or susceptible to the following diseases recorded in Uganda are given: anthracnose (Colletotrichum lindemuthianum); angular leaf spot (Isariopsis griseola); rust (Uromyces appendiculatus);

white mold [Ramularia deusta (Sclerotinia sclerotiorum)]; Ascochyta leaf and pod spot (Ascochyta phaseolorum); powdery mildew (Erysiphe polygoni); Didymella sp.; bacterial blight (Xanthomonas phaseoli). Viral diseases do not cause much damage compared with fungal and bacterial diseases. The breeding program currently carried out in Uganda, mainly directed towarda obtaining materials resistant to the mentioned diseases, is discussed. (Summary by F.G. Trans. by L.M.F.) EOO

0302

17592 MUKASA, S.K. 1962. Notes on french beans (Phaseolus vulgaris).The importance of the crop. Kawanda, Uganda. 2p. Engl.

Phaseolus vulgaris. Symptomatology. Colletotrichum lindemuthianum. Pseudomonas phaseolicola. Isariopsis griseola. Uromyces phaseoli. Viroses. Ascochyta fabae. Plant breeding. Uganda.

The importance and present state of French bean cultivation in Kawanda, Uganda, are briefly described. The quality of the crop for marketing is very low since it is a mixture of var. and very little effort is made to clean the crop which always contains foreign matter, bits of straw, broken and discolored or diseased seeds. Symptomatology of major French bean diseases is included, namely anthracnose (Colletotrichum lindemuthianum), bacterial blight (Pseudomonas medicaginis var. phaseolicola), angular leaf spot (Isariopsis griseola), and other diseases that may be important in localized areas or during particular seasons: rust (Uromyces appendiculatus), Ascochyta leaf spot (Ascochyta fabae), viruses, and white mold (Ramularia deusta). The var. collection is being assessed and crosses are being made; preliminary observations have revealed a no. of disease-resistant var. among semiclimbers and climbers. None of the bush type var. have showed resistance. Promising or disease-resistant var. are being imported from other countries. (Summary by F.G. Trans. by L.M.F.) EOO

0303

17414 PLOPER, L. D. 1981. Enfermedades del poroto. (Diseases in bean). Avance Agroindustrial 2(7):11-14. Span., Illus.

Phaseolus vulgaris. Colletotrichum lindemuthianum. Isariopsis griseola. Rhizoctonia solani. Sclerotium rolfsii. Whetzelinia sclerotiorum. Uromyces phaseoli. Xanthomonas phaseoli. Pseudomonas phaseolicola. Bean common mosaic virus. Bean chlorotic mottle virus. Etiology. Symptomatology. Disease control. Argentina.

A description is given of the geographic distribution, economic importance, favorable conditions, etiology, symptoms, and control of the major bean diseases in NW Argentina: anthracnose (Colletotrichum lindemuthianum), angular leaf spot (Isariopsis griseola), root rots (Rhizoctonia solani, Fusarium spp., Pythium spp., and Sclerotium rolfsii), white mold (Sclerotinia sclerotiorum), rust (Uromyces phaseoli), common bacterial blight (Xanthomonas phaseoli), halo blight (Pseudomonas phaseolicola), BCMV, and bean chlorotic mottle virus. (Summary by EDITEC. Trans. by L.M.F.) EOO

0304

4823 SCHIEBER, E. 1963. Principales enfermedades del fríjol en Guatemala. (Major bean diseases in Guatemala). In Proyecto Cooperativo

Centroamericano para el Mejoramiento del Fríjol, 2a., San Salvador, El Salvador, 1963. Trabajos presentados. Turrialba, Costa Rica, Instituto Interamericano de Ciencias Agrícolas de la OEA. pp.31-36. Span., 8 Refs., Illus.

Phaseolus vulgaris. Symptomatology. Colletotrichum lindemuthianum. Isariopsis griseola. Uromyces phaseoli. Chaetoseptoria wellmanii. Erysiphe polygoni. Ascochyta phaseolorum. Xanthomonas phaseoli. Bean common mosaic virus. Bean yellow mosaic virus. Guatemala.

Major bean diseases in Guatemala are described on the basis of observations made as of 1951: anthracnose (Colletotrichum lindemuthianum), angular leaf spot (Isariopsis griseola), rust (Uromyces phaseoli var. typica), Chaetoseptoria leaf spot (Chaetoseptoria wellmanii), powdery mildew (Erysiphe polygoni), Ascochyta leaf spot (Ascochyta phaseolorum), root rots (Pythium sp., Phytophthora sp., Rhizoctonia sp., and Fusarium sp.), bacterial blight (Xanthomonas phaseoli), BCMV, and BYMV. (Summary by F.G. Trans. by L.M.F.) E00

0305

4528 ZAUMEYER, W.J.; THOMAS, H.R. 1962. Bean diseases, how to control them. U.S. Department of Agriculture. Agricultural Research Service. Agriculture Handbook no. 225. 39p. Engl., Illus.

Phaseolus vulgaris. Symptomatology. Disease control. Xanthomonas phaseoli. Pseudomonas phaseolicola. Corynebacterium flaccumfaciens. Colletotrichum lindemuthianum. Uromyces phaseoli. Sclerotinia sclerotiorum. Erysiphe polygoni. Macrophomina phaseoli. Isariopsis griseola. Meloidogyne. Viroses. Snap beans.

Symptoms, causal agent, and control methods of diseases in snap bean and dry bean crops are given, causal agents being Xanthomonas phaseoli, Pseudomonas phaseolicola, Corynebacterium flaccumfaciens, X. phaseoli var. fuscans, Colletotrichum lindemuthianum, Uromyces phaseoli var. typica, Sclerotinia sclerotiorum, Erysiphe polygoni, root rots (Rhizoctonia solani, Fusarium solani f. phaseoli, Pythium butleri, Sclerotium rolfsii), root knot caused by Meloidogyne spp., Macrophomina phaseoli, Isariopsis griseola, Rhizoctonia microsclerotia. Baldhead and sunscald are also described. Diseases of lima beans are also included. Current control practices and disease-resistant and susceptible var. are given. (Summary by I.B. Trans. by L.M.F.) E00

E02 Bacterioses

0306

15404 LINDOW, S.E.; ARNY, D.C.; UPPER, C.D.; BARCHET, W.R. 1978. The role of bacterial ice nuclei in frost injury to sensitive plants. In Li, P.H.; Sakai, A., eds. Plant cold hardiness and freezing stress. Mechanisms and crop implications. London, UK., Academic Press. pp.249-263. Engl., Sum. Engl., 17 Refs., Illus.

Phaseolus vulgaris. Leaves. Plant injuries. Temperature. Snap beans. Pseudomonas syringae.

No intrinsic ice nuclei active above about -10°C were found associated with

leaves of several plant species including Phaseolus vulgaris and maize. Pseudomonas syringae and Erwinia herbicola were shown to be efficient ice nuclei between -2 and -5°C. Leaves of most plants collected from several geographically different areas and during different seasons of the yr had substantial no. of these ice nucleation active (INA) bacteria. It was concluded that epiphytic INA bacteria incite frost injury in tender plants. (Author's summary) E02

0307

18580 SAETTLER, A. W.; ANDERSEN, A. L. 1978. Bean diseases and their control. In Robertson, L.S.; Frazier, R.D., eds. Dry bean production - principles and practices. East Lansing, Michigan State University. Cooperative Extension Service. Agricultural Experiment Station. Extension Bulletin E-1251. pp.172-179. Engl., Illus.

Phaseolus vulgaris. Pseudomonas phaseolicola. Xanthomonas phaseoli. X. phaseoli var. fuscans. Colletotrichum lindemuthianum. Fusarium solani phaseoli. Whetzelinia sclerotiorum. Uromyces phaseoli. Air pollution. Bean common mosaic virus. Etiology. Epidemiology. Symptomatology. Disease transmission. Seed transmission. Disease control. USA.

The etiology, epidemiology, symptomatology, and control of seed-transmitted and non-seed-transmitted diseases in beans in Michigan, USA, are described. Among seed-transmitted diseases are those caused by Pseudomonas phaseolicola, Xanthomonas phaseoli, X. phaseoli var. fuscans, BCMV, and Colletotrichum lindemuthianum. Among non-seed-transmitted diseases are those caused by Fusarium solani f. sp. phaseoli, Sclerotinia sclerotiorum, Uromyces phaseoli, and bronzing (air pollution damage). (Summary by EDITEC. Trans. by L.M.F.) E02

0308

18545 SMITH, A.G.; RUBERY, P.H. 1982. Investigation of the mechanism of action of a chlorosis-inducing toxin produced by Pseudomonas phaseolicola. Plant Physiology 70:932-938. Engl., Sum. Engl., 30 Refs., Illus.

Phaseolus vulgaris. Pseudomonas phaseolicola. Chlorophyll. Chloroplasts. Chlorosis. Toxins.

A toxin that induced chlorotic haloes (typifying halo blight disease) on primary leaves of Phaseolus vulgaris var. Canadian Wonder was partially purified from culture filtrates of the causative agent Pseudomonas phaseolicola. This material was used to investigate chlorosis induction. Haloes could only be induced in those bean leaves that were expanding and synthesizing chlorophyll (Chl); the toxin, therefore, does not promote Chl breakdown. Chl, carotene, and xanthophyll synthesis were inhibited in sections of greening barley (Hordeum vulgare) leaves, irrespective of the irradiance level. In parallel expt., the toxin decreased the level of 5-aminolevulinic acid by amounts sufficient to account for toxin-inhibition of Chl synthesis. Electron microscopy revealed no difference between the transformation of etioplasts into chloroplasts in toxin-treated and control tissue, despite a 60% reduction in Chl in the former. The incorporation of [^{14}C]acetate into lipid by greening barley leaf sections and by isolated Pisum sativum chloroplasts in the light and the dark was inhibited about 60% by the toxin. The distribution of radioactivity among the spectra of acyl residues was the same in the control and toxin-treated material. It is suggested that the toxin interferes with an early process common to the

synthesis of different lipids, including Chl. (Author's summary) E02

See also 0350

E03 Mycoses

0309

2793 ARBELAEZ, T.G.; ULLOA R., J. 1966. La roya del fríjol causada por Uromyces phaseoli var. typica Arth. (Bean rust caused by Uromyces phaseoli var. typica). Agricultura Tropical (Colombia) 22(5):571-578. Span., 20 Refs., Illus.

Phaseolus vulgaris. Uromyces phaseoli. Symptomatology. Etiology. Disease control. Colombia.

General information on bean rust caused by Uromyces phaseoli var. typica is given. The following aspects are discussed: susceptible var., history and extension, economic importance, symptomatology, etiology, epiphytology, and recommended control measures (use of certified seed, eradication, protection, and immunization). (Summary by F.G. Trans. by L.M.F.) E03

0310

18733 EBRAHIM-NESBAT, F.; HOPPE, H.H.; HEITEFUSS, R. 1982. Ultrastructural studies on the development of Uromyces phaseoli in bean leaves protected by elicitors of phytoalexin accumulation. Phytopathologische Zeitschrift 103:261-271. Engl., Sum. Engl., Germ., 22 Refs., Illus.

Phaseolus vulgaris. Snap beans. Uromyces phaseoli. Inoculation. Disease control. Phytoalexins. Etiology.

Glucans, which elicit phytoalexin accumulation, were infiltrated into primary leaves of susceptible French bean cv. Favorit. When leaves were inoculated with uredospores of Uromyces phaseoli, 5 days after elicitor treatment, rust development was completely inhibited. Elicitor treatment had no effect on spore germination and appressoria formation of leaf surfaces. Two days after inoculation in treated leaves many substomatal vesicles were destroyed or heavily damaged. Some apparently morphological normal vesicles were also detected. They allowed scattered intercellular growth of the rust fungus, however, no haustoria could be found in the treated tissue. The absence of haustoria was apparently related to the deposition of electron-opaque material between the plasmalemma and cell wall of plant cells at the sites of contact between host and fungal cells. These deposits were found in the treated tissue 2 days after inoculation in response to contact with disorganized substomatal vesicles and cells of intercellular hyphae. Host cells containing deposits showed sometimes disorganized membranes and cytoplasm. In elicitor-treated, noninoculated tissue as well as in water-treated, inoculated control tissue no comparable deposition of electron-opaque material was observed. (Author's summary) E03

0311

18552 GALINDO, J.J.; ABAWI, G.S.; THURSTON, H.D. 1982. Tapado, controlling

web blight of beans on small farms in Central America. New York's Food and Life Sciences Quarterly 14(3):21-25. Engl., Illus.

Phaseolus vulgaris. Rhizoctonia solani. Disease control. Planting. Central America.

A common production practice used by small farmers in Costa Rica to plant beans, called frijol tapado (covered beans), is described. It consists of broadcasting bean seeds into weedy areas, then cutting the weeds to form soil mulch thus preventing soil splashing, which was found to disseminate the inoculum of Rhizobium solani, and conserving soil moisture. Exptl. trials indicated that this system and the use of rice husk as mulch gave a more effective control of web blight than PCNB used at 10, 20, or 40 kg/ha. In the absence of web blight, bean yields under the covered bean system are lower than those planted in drilled rows with clean cultivation. If bean yields are to be increased and the benefits of controlling web blight under the covered bean system maintained, some modifications are needed: seeds should be drilled rather than broadcasted and more fertilizer supplement should be used. The information collected suggests that disease control measures should tend to reduce the level of inoculum in the soil and avoid splashing of the inoculum on bean tissues. (Summary by EDITEC. Trans. by L.M.F.) E03

0312

17383 HABISH, H.A. 1972. Aflatoxin in haricot bean and other pulses. Experimental Agriculture 8(2):135-137. Engl., Sum. Engl., 6 Refs.

Phaseolus vulgaris. Aspergillus. Plant toxins. Composition.

The incidence of Aspergillus flavus and aflatoxin was investigated in a no. of pulses, chosen because of their importance as food and cash crops in Sudan, with special emphasis on haricot bean (Phaseolus vulgaris). Fifty samples of 10 different pulses from the 1969-70 cropping season were collected from shops in Khartoum and the Northern Province and 24 of mature semidry pods of haricot bean in Jan. 1970 from fields at the same sites. Aflatoxin was found in 41 of the samples, whereas A. flavus occurred in all samples. There was an apparent correlation between the occurrence of the fungus and the level of the toxin in haricot beans. There was evidence that the toxin was produced in haricot beans after harvest, and drying the pods immediately after harvest is therefore suggested as a method of controlling mold growth and the formation of aflatoxin. (Author's summary) E03

0313

17792 NASH, S.M. 1962?. The existence of Fusarium solani f. phaseoli in nature. Ph.D. Thesis. Berkeley, University of California. 83p. Engl., 33 Refs., Illus.

Phaseolus vulgaris. Fusarium solani phaseoli. Etiology. Isolation.

The biology of Fusarium solani f. phaseoli, its pathogenicity, survival, and distribution in the field were studied in the Salinas Valley, a coastal valley in central California, USA. The pathogenic variation of fungal clones found in the region is discussed: variations in sporodochial clones grown on lab. media; the effect of day length and of culture medium on fungus development; colony characteristics of F. solani f. phaseoli on media used in making isolations from field soil and from bean plant

lesions; types of F. solani f. phaseoli isolated from the soil and from bean plant lesions; and infection of greenhouse plants with sporodochial clones isolated from nature and their lab. mutants, their pathogenicity and reisolation. The survival structures of F. solani f. phaseoli in field soil, the fate of conidia seeded into moist soil, and the addition of conidia to both naturally infested soil and to sterilized soil stored outdoors are discussed and the size of chlamydospores formed in soil from conidia are compared with the size of those formed in bean tissue. Results of the quantitative distribution of F. solani f. phaseoli in the soil and the influence of cultural practices on fungus count are discussed. Survival of the chlamydospores in soil for comparatively long periods was also examined. F. solani f. phaseoli is distributed in California soils as infective propagules (up to 3000/g soil) made up of 1 or several chlamydospores, usually buried in plant tissue or other OM in the upper 6-8 in. of soil. The fungus does not search for a host plant but rather the bean roots must extend themselves to contact the chlamydospores. (Summary by EDITEC. Trans. by L.M.F.) E03

0314

18520 SEENAPPA, M.; KESWANI, C.L.; MATIKO, M. 1981. Aspergillus infection and aflatoxin production in beans (Phaseolus vulgaris) in Tanzania. International Biodeterioration Bulletin 17(3):79-82. Engl., Sum. Engl., Fr., Germ., Span., 12 Refs., Illus.

Phaseolus vulgaris. Snap beans. Cultivars. Inoculation. Aspergillus. Toxins. Tanzania.

Nineteen different samples of French beans from 7 regions of Tanzania were inoculated with Aspergillus parasiticis (NRRL 3145) and the degree of infection and aflatoxin production evaluated. All the bean samples supported growth of the fungus and aflatoxin was produced. The amount of aflatoxin (B + G) ranged between 149-1496 mg/kg of seed. There appeared to be no relationship between the seed color, size, or shape and fungal infection or aflatoxin production. (Author's summary) E03

0315

18544 SMITH, D.A.; HARRER, J.M.; CLEVELAND, T.E. 1982. Relation between production of extracellular kievitone hydratase by isolates of Fusarium and their pathogenicity of Phaseolus vulgaris. Phytopathology 72(10):1319-1323. Engl., Sum. Engl., 19 Refs., Illus.

Phaseolus vulgaris. Fusarium solani phaseoli. Isolation. Enzymes. Pathogenicity.

Twenty-eight wild-type isolates of Fusarium and Nectria were surveyed for ability to produce kievitone hydrate from the phytoalexin kievitone and for their pathogenicity towards Phaseolus vulgaris. In culture, at least 14 of the isolates were able to form kievitone hydrate, but only 3 (FB1-S, W8-BK, and W9-BK) were highly virulent on bean. Similarly, only 3 of the 28 isolates yielded cell-free culture filtrates capable of producing kievitone hydrate; these same 3 isolates were the most aggressive pathogens. Kievitone hydratase appeared to be the enzyme involved in each instance of extracellular production of kievitone hydrate. (Author's summary) E03

0316

18546 THEODOROU, M.K.; SCANLON, J.C.M.; SMITH, I.M. 1982. Infection and phytoalexin accumulation in French bean leaves injected with spores of Colletotrichum lindemuthianum. Phytopathologische Zeitschrift 103(3): 189-197. Engl., Sum. Engl., Germ., 10 Refs., Illus.

Phaseolus vulgaris. Snap beans. Phytoalexins. Leaves. Colletotrichum lindemuthianum.

The differential response of French bean leaves injected with different concn. of conidia of races of Colletotrichum lindemuthianum was examined by light microscopy and in terms of phytoalexin accumulation. In the incompatible combination, high spore concn. elicited hypersensitive cell death and phytoalexin accumulation, while lower spore concn. gave less phytoalexins and no visible hypersensitivity. In the compatible combination, fungal development in injected tissue was similar to that seen in hypocotyls, and the tissue collapsed only after extensive cell colonization. Low amounts of phytoalexins were found in the injected tissue, irrespective of the spore concn. used. The amount of phaseolin extracted from the tissue immediately surrounding collapsed injection sites was up to 14 times greater than the amounts detected within the collapsed sites, and twice as great as the highest amount detected in incompatible sites. (Author's summary) E03

0317

15841 TU, J.C.; VAARTAJA, O. 1981. The effect of the hyperparasite (Gliocladium virens) on Rhizoctonia solani and on Rhizoctonia root rot of white beans. Canadian Journal of Botany 59:22-27. Engl., Sum. Engl., Fr., 20 Refs., Illus.

Phaseolus vulgaris. Rhizoctonia solani. Biological control. Gliocladium virens.

Using light and electron microscopy, Gliocladium virens was proved to be a hyperparasite of Rhizoctonia solani. When hyphae of G. virens came in contact with those of R. solani, the following sequence of events were observed: (1) contact of G. virens with host cells, (2) formation of appressoria, (3) penetration of host cells, (4) formation of intracellular hyphae, and (5) collapse and death of host cells. In vitro, G. virens effectively inhibited sclerotial formation of R. solani. Greenhouse tests showed that the presence of G. virens in soil artificially infested with R. solani reduced at planting the severity of Rhizoctonia root rot in white beans. Root rot severity decreased with increasing concn. of G. virens. A similar result was obtained in soil treated with the 2 fungi 2 mo. prior to planting. G. virens may be a promising biological control agent for Rhizoctonia root rot of white beans. (Author's summary) E03

0318

18516 VYAS, S.C.; ANDOTRA, P.S.; JOSHI, L.K. 1981. Effect of systemic fungicides on control of root rot on vegetables caused by Rhizoctonia bataticola and plant growth. Pesticides 15(11):22-24. Engl., 6 Refs.

Phaseolus vulgaris. Macrophomina phaseoli. Disease control. Chemical control. Growth.

Root rot and pre- and post-emergence damping-off caused by the fungus Rhizoctonia bataticola, is a very serious seedling disease in the nursery

or field of several vegetable crops (tomato, beans, and others). Results of trials with French bean cv. Contender suggest that seed treatment with a systemic fungicide like carbendazim at 2500 ppm can provide good seedling protection. It also increased fresh and dry wt. and root and shoot length, thus very likely affecting the plant yields favorably. (Summary by Abstracts on Tropical Agriculture) E03

See also 0226 0255 0262 0273 0307 0344 0350 0355 0358 0366

E04 Viroses

0319

16924 BIANCHINI, A.; HOHMANN, C.L.; ALBERINI, J.L. 1981. Distribuicao geográfica e orientacoes técnicas para prevencao do mosaico dourado do feijoeiro no Estado do Paraná. (Geographic distribution and technical recommendations to prevent bean golden mosaic virus in the state of Parana). Informe da Pesquisa 5(42):1-3. Port., Illus.

Phaseolus vulgaris. Bean golden mosaic virus. Epidemiology. Disease control. Brazil.

The state of Parana in Brazil was divided into 3 microregions according to the occurrence and severity of BGMV, transmitted by Bemisia tabaci: RI (north, NW, and west) with a level of virus infection of 80-100%, yield losses up to 100% during the dry season and lower losses during the rainy season; RII (central zone that connects the SW with the NW), with marked variations in the levels of infection and lower yield losses in comparison with RI; and RIII (south, central south, and part of the SW), where practically no BGMV or vectors are found. In RI planting should only take place during the rainy season (July-Sept.). In RIII bean planting should be early, before the dry season until Jan. 15 or during the rainy season. High fertility soils should be used and var. Carioca, Catu, Rio Ivai, and Porrillo Sintetico are recommended. The last 2 are the most resistant to BGMV. In RIII there are no restrictions as to planting time. The chemical control of the vector in RI has not been effective and in RIII, it could reduce vector and BGMV incidence if chemicals are applied when the pest is 1st detected. (Summary by EDITEC. Trans. by L.M.F.) E04

0320

18543 PRATT, R.G.; ELLSBURY, M.M.; BARNETT, O.W.; KNIGHT, W.E. 1982. Interactions of bean yellow mosaic virus and an aphid vector with Phytophthora root diseases in arrowleaf clover. Phytopathology 72(9): 1189-1192. Engl., Sum. Engl., 30 Refs.

Phaseolus vulgaris. Bean yellow mosaic virus. Pathogenicity.

Arrowleaf clover (Trifolium vesiculosum) was inoculated with BYMV, Phytophthora erythroseptica, and P. megasperma f.sp. trifolii individually and in dual virus-fungus combinations at 7 and 9 wk. Dual inoculations were accomplished simultaneously and sequentially. Severity of symptoms was evaluated by root disease scores (extent of visible rotting and discoloration of roots), root vol., and dry wt. of foliage. Simultaneous dual inoculations, and prior inoculations with BYMV, greatly increased

severity of symptoms as compared with those caused by the virus and Phytophthora species individually. These increases were often synergistic as determined by root disease scores. Subsequent inoculations of BYMV into plants infected with Phytophthora resulted in smaller increases in severity of symptoms. In alsike clover (Trifolium hybridum), a species tolerant to BYMV and resistant to the Phytophthora spp., dual inoculations with BYMV and P. megasperma f.sp. trifolii did not consistently give more severe symptoms than those caused by the pathogens individually. Plants of healthy and BYMV-infected arrowleaf clover were colonized more heavily by the pea aphid in the greenhouse than were plants infected by P. erythroseptica with or without BYMV. However, in assays repeated during 3 seasons in the field, no differences were observed in frequencies of natural infection by BYMV in healthy and Phytophthora-infected arrowleaf clover. (Author's summary) E04

0321

16048 SUNDARESAN, R.V.S.; KIMMINS, W.C. 1981. Effect of virus infection on the cell wall composition of lesions on lesion host Phaseolus vulgaris L. Annals of Botany 47:287-289. Engl., 9 Refs.

Phaseolus vulgaris. Viroses. Cell walls. Tobacco necrosis virus. Composition.

The changes in yield and composition of cell wall in bean var. Prince infected with tobacco necrosis virus, which produces a local lesion infection, were determined. For the 3 treatments (uninoculated control, abraded leaves, and leaves inoculated with the virus) primary leaves of 10-day-old plants were used, from which cell wall material was extracted 3 days after the treatment. The % yield of cell wall/leaf fresh wt., as well as per leaf dry wt., is much higher in the virus-inoculated (7.0 and 35.7%, resp.) and abraded leaves (4.85 and 18.7%, resp.) than in the control (3.5 and 10.0%, resp.). There is a marked increase in the content of hydroxyproline-rich glycoprotein and lignin in the percentage cell wall composition of the virus-inoculated treatment (109 and 140%, resp.) compared with the control. An increase of 25% in the pectin content also indicates that this component, along with lignin and glycoprotein, is probably associated in the formation of a barrier. The inoculation procedure induces the formation of this barrier of secondary wall. There appears to be further elaboration of this barrier in virus-induced necrosis, which is probably responsible for prevention of the cell to cell spread of the virus. (Summary by EDITEC. Trans. by L.M.F.) E04

0322

18532 VALVERDE, R. A.; FULTON, J. P. 1982. Characterization and variability of strains of southern bean mosaic virus. Phytopathology 72(9):1265-1268. Engl., Sum. Engl., 14 Refs., Illus.

Phaseolus vulgaris. Bean southern mosaic virus. Cultivars. Resistance.

A strain of BSMV is described that infects bean cv. with resistance to the type strain of this virus. This strain gave rise to 3 additional strains. The host ranges, physical properties, sedimentation coefficients, serology, nucleic acid, protein, and beetle transmission characteristics are compared with the BSMV-type strain. In most characteristics all strains are similar. Serology distinguishes BSMV-type from the other 4. All 5 can be distinguished on the basis of host range reaction. (Author's summary) E04

See also 0307 0344 0350

E05 Nematodes

0323

18517 SINGH, D.B.; REDDY, P.P. 1981. Influence of Meloidogyne incognita infestation on Rhizobium nodule formation in French b n. Nematologia Mediterranea 9(1):1-5. Engl., Sum. Engl., Ital., 10 Re

Phaseolus vulgaris. Snap beans. Meloidogyne incognita. Growth. Nodulation. Inoculation. Rhizobium.

The effect of the root knot nematode, Meloidogyne incognita, on plant growth and nodulation was investigated in 10 day-old seedlings of French bean cv. Premier. Treatments (replicated 5 times) were: nematodes alone; rhizobia alone; nematodes and rhizobia inoculated simultaneously; rhizobial inoculation 2 wk. after nematode inoculation; nematode inoculation 2 wk. after rhizobial inoculation; control (without nematodes and rhizobia). Observations on plant growth and nodulation were recorded 40 days after the 1st inoculation. Inoculation expt. showed that the nematode caused reduction in plant height, fresh wt. of shoot and root, root length, and no. of nodules in the root system. A greater nodule reduction was noticed when rhizobia and nematodes were inoculated simultaneously or when nematodes were established before the inoculation of rhizobia than when rhizobia were established before the introduction of nematodes. (Author's summary) E05

E06 Physiological Disorders

0324

15813 ASHTON, F.M.; GLENN, R.K. 1979. Influence of chloro-, methoxy-, and methylthio- substitutions of bis(isopropylamino)-s-triazine on selected metabolic processes. Pesticide Biochemistry and Physiology 11(1/3):201-207. Engl., Sum. Engl., 22 Refs.

Phaseolus vulgaris. Photosynthesis. Plant respiration. RNA. Proteins. Fatty acids. Herbicides. Toxicity. Plant physiological disorders.

Time- and concn.-course studies were conducted to determine the effect of chloro-, methoxy- and methylthio-substitutions of bis(isopropylamino)-1,3,5-triazine on photosynthesis, respiration, RNA synthesis, protein synthesis, and lipid synthesis using isolated leaf cells of Phaseolus vulgaris. Propazine, prometon, and prometryne inhibited photosynthesis, RNA synthesis, and protein synthesis but had little effect on respiration. Lipid synthesis was stimulated at low concn. and inhibited at high concn. The relative inhibition of these 3 compounds at 100 micromolar on the 4 inhibited metabolic processes investigated was: photosynthesis more than RNA synthesis equal to or greater than lipid synthesis more than protein synthesis. At 10 micromolar the relative order of inhibition of these processes was similar except that propazine and prometon stimulated lipid synthesis. At 1 micromolar photosynthesis and RNA synthesis were inhibited and lipid synthesis stimulated by the 3 herbicides. The methylthio-substituted compound (prometryne) was more inhibitory to all 4 inhibited

processes than the chloro- and methoxy-substituted compounds (resp. propazine and prometon). Propazine and prometon were similar in their inhibitory capacity. The higher toxicity of prometryne is inherent or has a common basis such as absorption, adsorption, or a common single metabolic reaction. Since the differences observed with these compounds were quantitative rather than qualitative, their mechanism of action appears to be similar. (Author's summary) E06

0325

15814 BARTON, J.R.; McLAUGHLIN, S.B.; McCONATHY, R.K. 1980. The effects of SO_2 on components of leaf resistance to gas exchange. Environmental Pollution. Series A 21(4):255-265. Engl., Sum. Engl., 28 Refs., Illus.

Phaseolus vulgaris. SO_2. Photosynthesis. Transpiration. Air pollution. Stomata. Plant physiological disorders. Relative humidity.

The effects of SO_2 on the gas exchange of bean cv. Red Kidney were studied under fluctuating SO_2 levels at both high and low RH. Single event SO_2 exposures with a peak concn. of 2.0 ppm and a 1-h av. of 0.5 ppm were used to study responses of photosynthesis and transpiration of whole plants. Calculated av. leaf resistances for individual plants were used to compare relative changes in the stomatal and mesophyll components of total resistance to gas exchange during SO_2 exposure. The most consistent plant response to SO_2 was photosynthetic inhibition. Transpiration was less responsive than photosynthesis to SO_2 exposure and the effects were more variable. The SO_2-induced photosynthetic reduction resulted primarily from increased mesophyll resistance rather than increased stomatal resistance to CO_2. Both photosynthetic suppression and mesophyll resistance to CO_2 were increased more by SO_2 when exposures were carried out at high RH. The data supported the possibility that reduced sensitivity of plants to SO_2 under low RH conditions was due to reduced SO_2 uptake. (Author's summary) E06

0326

17310 CZUBA, M. 1977. Cadmium-ozone interactions in cress, tomato and bean in relation to phytotoxicity, growth, and mineral and water contents. Ph.D. Thesis. Guelph, Ontario, University of Guelph. 196p. Engl., Sum. Engl., 245 Refs., Illus.

Phaseolus vulgaris. Cd. Ozone. Toxicity. Growth. Mineral content. Water content. Plant injuries. Chlorosis. Plant physiological processes. Plant physiological disorders.

The effect (phytotoxicity, plant growth, and mineral and water contents) of interacting Cd-O_3 and their independent interactions were studied in cress, tomato, and bean (var. Improved Tendergreen) under controlled temp. (20°/15°C day/night), photoperiod (16 h at 20.0 klux and 8 h dark), and humidity (70 ± 10%) conditions. Injury from treatments with Cd and O_3, expressed as % chlorosis and/or necrosis was greater in cress than in tomato, which in turn had greater injury than bean. In bean, only the O_3 treatment increased chlorosis, but not necrosis. The added sum of separate Cd and O_3 injury was different than the injury of the Cd-O_3 combination. The sum of separate treatments was 9.3% in bean and injury by Cd-O_3 combined was 12.5%. Morphological parameters in bean were not significantly altered by Cd-O_3 treatment. In the absence of O_3, flower bud development was significantly enhanced by Cd (40, 70, 100, and 500 micrograms/ml). Without Cd, O_3 exposure did not affect flower bud development. Cd concn. was significantly reduced in young stems after O_3 treatment. Cd treatment

significantly increased Cd concn. in young stems and increased further after Cd-O_3 treatment. Treatments did not alter the Cd concn. in old stems, apex, and fruit parts. A high frequency of high Ca:Cd ratios occurred in older bean stems. (Summary by EDITEC. Trans. by L.M.F.) E06

0327

16034 FLORE, J.A.; BUKOVAC, M.J. 1981. Pesticide effects on the plant cuticle: IV. The effect of EPTC on the permeability of cabbage, bean, and sugar beet cuticle. Journal of the American Society for Horticultural Science 106(2):189-193. Engl., Sum. Engl., 27 Refs., Illus.

Phaseolus vulgaris. Insecticides. Leaves. Transpiration.

The effect of different concn. of S-ethyl dipropylthiocarbamate (EPTC) on penetration of ^{14}C-NAA, cuticular transpiration, and epicuticular wax of leaves of cabbage, bean, and sugar beet was studied. EPTC concn. used were 0, 0.28, 0.56, 1.12, and 2.24 kg/ha, soil applied. NAA penetration progressively increased with increasing EPTC in the 3 species and in bean, 200% at a concn. of 2.24 kg/ha. EPTC significantly decreased epicuticular wax deposition on leaves of cabbage (49%), but not on bean (24%) or sugar beet (11%). Results indicate the leaves from EPTC-treated plants are significantly more permeable than corresponding leaves from non-treated plants as indexed by greater uptake of NAA and increased cuticular transpiration. The greater permeability due to EPTC treatment is directly related to the reduction in epicuticular wax and to changes in its composition and fine-structure. Further experimentation is needed to characterize the effect of each of these factors. (Summary by EDITEC. Trans. by L.M.F.) E06

0328

18515 HOFSTRA, G.; ALI, A.; WUKASCH, R.T.; FLETCHER, R.A. 1981. The rapid inhibition of root respiration after exposure of bean (Phaseolus vulgaris L.) plants to ozone. Atmospheric Environment 15(4):483-487. Engl., Sum. Engl., 35 Refs.

Phaseolus vulgaris. Ozone. SO_2. Roots. Plant respiration. Plant injuries. Leaves.

An expt. was conducted using O_3 and SO_2 together to determine whether a reduction in foliar response to a given concn. of O_3 would produce a similar reduction in root response. The metabolic activity of the roots of bean cv. Sanilac was very sensitive to the changes induced in the leaves by O_3. Respiratory activity began to decrease well before visible injury appeared on the leaves, and the % reduction of respiration was much greater than the % leaf injury. The triphenyl tetrazolium chloride (TTC) staining technique revealed changes in root tips very quickly, was generally more sensitive to changes in respiratory activity, and was a convenient technique for handling large no. of samples. Reducing foliar injury from O_3 with low levels of SO_2 reduced the effects on the roots indicating the effect of O_3 is on processes in the leaf. (Author's summary) E06

0329

17754 HUCL, P.; BEVERSDORF, W.D.; McKERSIE, B.D. 1982. Relationship of leaf parameters with genetic ozone insensitivity in selected Phaseolus

vulgaris cultivars. Canadian Journal of Botany 60(11):2187-2191. Engl., Sum. Engl., Fr., 17 Refs.

Phaseolus vulgaris. Plant injuries. Ozone. Leaves. Stomata. Cultivars. Resistance. Plant physiological disorders.

The relationship of O_3-induced foliar injury (O_3 sensitivity) with several leaf characteriatics including stomatal frequency, stomatal closure in the presence of O_3, and trichome densities (abaxial and adaxial) was evaluated for a diverse group of 12 Phaseolus vulgaris cv. Differences were observed among cv. for O_3 sensitivity and leaf parameters including stomatal frequency, trichome density, and stomatal closure in the presence of O_3. Although significant ($P < 0.05$) differences among the cv. for stomatal frequency and trichome densities existed, no consistent pattern between insensitive and sensitive cv. was observed. O_3-sensitive genotypes responded to 40 pphm O_3 with similar or greater stomatal closure than the more insensitive genotypes, indicating that stomatal closure was not a primary mechanism for O_3 insensitivity among the cv. evaluated. (Author's summary) E06

0330

18594 MOHAMED, M.B. 1978. Response of vegetable crops to acid rain under field and simulated conditions. Ph.D. Thesis. Ithaca, N.Y., Cornell University. 157p. Engl., 22 Refs., Illus.

Phaseolus vulgaris. Snap beans. Cultivars. pH. Plant physiological disorders. Acid rain.

In field and greenhouse trials in New York, USA, the effect of acid rain on 30 cv. of 16 vegetable crops was studied. Emergence and early growth of Phaseolus vulgaris were adversely affected at pH equal to or less than 2.0; root growth was more responsive to pH than stem growth. Simulated rainfall of pH 3.0 for 1 h/day caused severe morphological and anatomical injury and reduced growth in all cv. The adverse effects decreased at pH 4.0. No injury was visible at pH 5.6 but growth was less than in plants watered through the soil. Sweet corn was the least susceptible species to acid rainfall. The effect of frequency and pH of simulated rainfall on P. vulgaris cv. Kentucky Wonder was studied. With increase in frequency and decrease in pH of simulated rainfall, plant growth was more adversely affected. There was a cumulative effect of rainfall, especially at the lowest pH, but plants outgrew their stressed condition when the low pH treatment was discontinued. (Summary by Dissertation Abstracts International) E06

0331

17381 TINGEY, D.T.; THUTT, G.L.; GUMPERTZ, M.L.; HOGSETT, W.E. 1982. Plant water status influences ozone sensitivity of bean plants. Agriculture and Environment 7(3/4):243-254. Engl., Sum. Engl., 31 Refs., Illus.

Phaseolus vulgaris. Water stress. Resistance. Ozone. Growth. Plant injuries. Ethylene production. Plant physiological disorders.

Studies were conducted in a controlled environment chamber to determine the association between plant water status and O_3 sensitivity. Bean plants were subjected to various water stress regimes for 4-10 days using a semipermeable membrane system which controlled plant water status and then exposed to O_3. Ozone sensitivity was measured using stress ethylene which

was highly correlated with foliar injury. Plant water stress decreased plant sensitivity to O_3; complete protection was attained within 1-3 days depending on the level of water stress. When water stress was removed, the plants regained O_3 sensitivity equal to nonwater-stressed plants within 6 days. The decreased O_3 sensitivity was associated with only a small change in leaf water potential. The reduced sensitivity following water stress was apparently associated with a decreased leaf conductance reducing O_3 uptake. (Author's summary) E06

F00 PEST CONTROL AND ENTOMOLOGY

F01 Injurious Insects, Mites and their Control

0332

16423 ABATE, T. 1983. The use of trap crops for the control of African bollworm (ABW) on haricot bean. Addis Ababa, Institute of Agricultural Research. Nazret Research Station. 4p. Engl.

Phaseolus vulgaris. Heliothis armigera. Insect control. Ethiopia.

An expt. was conducted to compare the attractiveness of 5 possible trap crops and a check to the African bollworm (Heliothis armigera) at the Nazret Research Station of the Institute of Agricultural Research (Ethiopia) in the 1982/83 station. Treatments used were haricot bean (check), Lablab purpureus (Dolichos lablab), lupin, maize, pigeon pea, and sunflower. Planting arrangement consisted of 2 rows of each trap crop planted on either side of each plot of the main crop (haricot bean). The expt. was replicated 5 times in a randomized complete block design with 25 x 25 m plots. Adjustments were made on planting dates so that the trap crops would flower at about the same time as the main crop. Samples of H. armigera eggs and larvae were taken from randomly selected five 1-m rows for each treatment and then on the haricot bean rows adjacent to and 5 and 10 m away from the trap crop at weekly intervals for 7 wk., starting from early flowering. The % of pod damage in haricot bean was calculated by counting the no. of damaged pods in 20 randomly selected plants from the haricot bean rows adjacent to and 5 and 10 m away from the trap crop. Yields were recorded. All trap crops caught more African bollworms than the check. However, lupin, pigeon pea, and L. purpureus resulted in significantly greater catches of H. armigera than the check and sunflower. There was no significant difference between the no. of catches on the sunflower and the check and there was no statistical difference between any of the treatments on haricot bean rows adjacent to the trap crop. At the shortest distance from the trap crop, maize, sunflower, L. purpureus, and lupin (in that order), resulted in statistically lower % pod damage than pigeon pea, which was slightly worse than the check. The highest yield was obtained with maize as trap crop; however, none of the yield means were significant. (Summary by F.G. Trans. by L.M.F.) F01

0333

18038 BORTOLI, S.A. DE 1980. Danos de Hedylepta indicata (Fabricius, 1775) (Lepidoptera-Pyralidae) no feijoeiro (Phaseolus vulgaris L.) e efeitos de desfolha e dobra de folíolos sobre a produtividade da cultura. [Damage caused by Hedylepta indicata (Lepidoptera-Pyralidae) in beans and effects of defoliation and leaf folding on yields]. Tese Doutor Agron. Piracicaba-SP, Brasil, Escola Superior de Agricultura Luiz

de Queiroz da Universidade de Sao Paulo. 129p. Port., Sum. Port., Engl., 50 Refs., Illus.

Phaseolus vulgaris. Hedylepta indicata. Plant injuries. Defoliation. Leaf area. Yields. Leaves. Brazil.

The damage caused by Hedylepta indicata and the effect of artificial defoliation and folding of the folioles on bean yields were assessed during wet season (Nov. 1978) and dry season (May 1980) plantings. Field expt. were carried out at the U. de Sao Paulo exptl. fields, Brazil. The growth of bean cv. Carioca plants, which had been artificially defoliated or whose folioles were folded, was studied in order to determine the leaf area 25, 35, and 60 days after germination. Levels of defoliation and foliole folding used were 33, 67, and 100%. Foliole folding and consumption by H. indicata worms were also evaluated. Bean plants reached complete growth approx. 60 days after emergence. Leaf areas/m^2 of soil surface at the time artificial defoliation or folding was carried out were 52.7, 228.8, and 432.6 dm^2 for the wet season and 46.2, 183.5, and 336.9 dm^2 for the dry season, 25, 35, and 60 days after germination, resp. Each worm of H. indicata ate 34.70 + 1.52 cm^2 of the leaf. The folding and curling of the folioles were not directly proportional to the no. of worms. Generally all the levels of defoliation and foliole folding affected yield. Yield loss was higher at the higher levels of defoliation and foliole folding. Flowering stage was the most susceptible to leaf damage. Reduction of yield was mainly due to the reduction in the no. of pods/plant and the no. of seeds/pod. Damage was more evident at the dry season planting. The economic threshold for leaf damaging insects, including H. indicata, is located below 33% defoliation. (Author's summary) FOl

0334

18561 CAMPBELL, J. R.; PENNER, D. 1982. Enhanced phytotoxicity of bentazon with organophosphate and carbamate insecticides. Weed Science 30(3):324-326. Engl., Sum. Engl., 12 Refs.

Phaseolus vulgaris. Plant injuries. Insecticides. Toxicity.

The organophosphate insecticides malathion, parathion, and diazinon combined with bentazon severely injured soybean cv. Corsoy and navy bean cv. Seafarer. However, organophosphate and carbamate insecticides tank-mixed with bentazon and organophosphate insecticides soil-applied prior to the application of bentazon did not injure maize cv. Great Lakes Hybrid 4122. Technical grade malathion interacted with bentazon to the same extent as formulated malathion. Combination treatments of malathion with bentazon resulted in the same degree of injury whether they were applied as tank mixtures or split applications 48 h apart. (Author's summary) FOl

0335

18560 CANTWELL, G. E.; CANTELO, W. W. 1982. Potential of Bacillus thuringiensis as a microbial agent against the Mexican bean beetle. Journal of Economic Entomology 75(2):348-350. Engl., Sum. Engl., 10 Refs.

Phaseolus vulgaris. Epilachna varivestis. Biological control. Predators.

A preparation of Bacillus thuringiensis, which contained a heat-stable-exotoxin, was effective in controlling larvae of Epilachna varivestis in both lab. and field trials. At a dilution of 0.01, nearly 100% mortality

was attained in 6 days and over 60% mortality was obtained with a dilution of 0.001. In field tests, a dilution of 0.05 provided adequate protection to bean plants, resulting in significant increases in plant yield. (Author's summary) FOI

0336

17728 GARCIA, J.; CARDONA, C.; RAIGOSA, J. 1979. Evaluación de poblaciones de insectos plagas en la asociación caña de azúcar-fríjol y su relación con los rendimientos. (Evaluation of insect pest populations in sugar cane/bean intercropping and their effect on yields). Revista Colombiana de Entomología 5(1/2):17-24. Span., Sum. Engl., Span., 17 Refs., Illus.

Phaseolus vulgaris. Intercropping. Saccharum officinarum. Empoasca kraemeri. Diabrotica balteata. Yields. Colombia.

An expt. was conducted in Cerrito, Valle del Cauca (Colombia) on sugar cane (CP 57603)/bean (Diacol-Calima) intercropping in order to determine the optimum planting date of bean in relation to sugar cane, the agronomic feasibility of this intercropping system, and to assess its effect on the resp. pest populations and on yields. Nymphal and adult populations of Empoasca kraemeri as well as those of the chrysomelids Cerotoma facialis and Diabrotica balteata were always lower in association than in beans in monoculture. This effect was more significant when beans were planted 45 days after sugar cane planting. Insect pest incidence in sugar cane was very low so no differences were observed among treatments. In early associations competition due to beans did not affect sugar cane yields. Highest yields were obtained in both crops when beans were planted 15 days after sugar cane planting and when planted simultaneously. Since these yields were considered satisfactory from a commercial point of view and were obtained without the use of insecticides, it is suggested that sugar cane/bean intercropping is agronomically and entomologically feasible under these environmental conditions. (Author's summary) FOI

0337

17491 GONZALEZ, R.; CARDONA, C. 1979. Biología de Cerotoma facialis plaga del fríjol común, Phaseolus vulgaris L. (Biology of Cerotoma facialis, a bean pest). Revista Colombiana de Entomología 5(1/2):3-8. Span., Sum. Span., Engl., 6 Refs., Illus.

Phaseolus vulgaris. Cerotoma facialis. Insect biology. Colombia.

The biology of Cerotoma facialis, a chrysomelid commonly occurring in bean crops in Colombia, was studied under lab. conditions (27°C, 80% RH). All developmental stages of the insect were measured and described. The morphological characteristics of its immature stages are similar to those of other Galerucinae species. Morphological differences are described which facilitate sex differentiation of adults, as well as phenological variations in adult specimens. Eggs have a mean duration of 6.4 days. Larval stages varied between 9-12 days (1st instar, 3-4 days, mean 3.5 days; 2nd instar, 2-3 days, mean 2.6 days; and 3rd instar, 4-5 days, mean 4.5 days). The prepupal stage had a mean duration of 2.9 days, and the pupal stage, 6.4 days. Sex ratio was 1:1. The preoviposition period ranged between 5-7 days and the max. no. of eggs laid/female was 532. The adults can live up to 79 days under natural conditions. The complete biological cycle of C. facialis from egg to adult emergence occurs in a period of 22-33 days. (Author's summary) FOI

0338

18509 MORAES, G. J. DE 1981. Acaros e insetos associados a algumas culturas irrigadas do sub-médio Sao Francisco. (Mites and insects associated with some irrigated crops of the Sao Francisco subregion). Petrolina-PE, Brasil, Empresa Brasileira de Pesquisa Agropecuaria. Centro de Pesquisa Agropecuária do Trópico Semi-Arido. Circular Técnica no. 4. 32p. Port., 19 Refs., Illus.

Phaseolus vulgaris. Injurious insects. Injurious mites. Insect biology. Plant injuries. Pest control. Brazil.

The most important insects and mites observed damaging irrigated crops in the valley of the Sao Francisco River, NE Brazil, are reported. Crops considered are garlic, onion, Phaseolus vulgaris, Vigna unguiculata, squash, melon, and tomato. Information is included on the morphology of the insects and mites to facilitate identification, the type of damage they cause, and the measures that can be taken for control should this become necessary. Where natural enemies of the pests afford a measure of control, these are also mentioned. (Summary by Review of Applied Entomology) F01

0339

18518 PUTTASWAMY.; REDDY, D. N. R. 1981. Record of some new pests infesting French bean (Phaseolus vulgaris L.) a popular vegetable. Current Research 10(3):39-41. Engl., 6 Refs., Illus.

Phaseolus vulgaris. Snap beans. Frankliniella dampfi. Scirtothrips. Ascotis imperata. Diacrisia obliqua. Polyphagotarsonemus latus. India.

In a survey in Karnataka, India, in July-Oct. 1980, Ascotis imperata, Spilosoma obliqua (Diacrisia obliqua), Frankliniella schultzei, Megalurothrips distalis, Scirtothrips dorsalis, and Polyphagotarsonemus latus were found infesting French bean for the 1st time. Of these, A. imperata, S. obliqua, and P. latus were considered important. (Summary by Review of Applied Entomology) F01

0340

18058 RUPPEL, R.F. 1982. The seedcorn maggot in dry beans. Michigan Dry Bean Digest 6(4):5. Engl.

Phaseolus vulgaris. Delia platura. Plant injuries. Insect biology. Insect control. USA.

The symptomatology of the damage caused by Hylemya platura in bean (seed and seedling), the biological cycle of the pest, general aspects of its population dynamics, and recommendations on its prevention and control are briefly described. Seed treatment with diazinon, lindane, or chlorpyrifos are recommended. If seed is not treated before planting, granular applications of fonofos or phorate should be used at planting. Since bean seed is subject to injury by Hylemya only during a few days between the time that the seed starts to swell and the time of plant emergence, risk of attack can be reduced by reducing the time that the seed remains in the ground: (1) using good, clean seed of a vigorous var.; (2) planting when the soil is moist and warm; and (3) planting with care to assure fast, full germination. (Summary by EDITEC. Trans. by L.M.F.) F01

0341

18505 SA, M.E.; ROCHA, A.D.; MORELLO, S. 1981. Controle químico de mosca branca (Bemisia tabaci Genn) e cigarrinha (Empoasca sp.) em feijao (Phaseolus vulgaris L.) cv. Carioca, com inseticidas granulados de solo e suas respectivas interferencias nas viroses. [Chemical control of whiteflies (Bemisia tabaci) and leafhoppers (Empoasca sp.) in bean cv. Carioca with soil-applied granular insecticides and their respective interference with viruses]. In Campus de Ilha Solteira-SP, Brasil. Universidade Estadual Paulista. Relatório Técnico-Científico no.1. pp.24-27. Port.

Phaseolus vulgaris. Bemisia tabaci. Chemical control. Viroses. Brazil.

The application of aldicarb (1.0, 2.0, and 3.0 kg a.i./ha), carbofuran (2.0 kg a.i./ha), and VC-21865-75 WP - aldicarb sulfone (3.75 kg a.i./ha) at planting to control Bemisia tabaci and Empoasca spp. in bean cv. Carioca was assessed. Virus incidence in treated and nontreated plants was also determined. A randomized block design with 6 treatments and 4 replications was used. Sampling of whiteflies and leafhoppers took place 42 days after application, counting the no. of nymphs anesthetized with sulfur ether on 60 leaves/plot. The no. of virus-infected plants was also counted 52 days after planting. Final grain yield (kg/ha) was analyzed. A mean efficiency of 92, 91, and 75% was observed with aldicarb at all 3 rates, VC-21865-75 WP, and carbofuran, resp., for controlling whiteflies. Efficiencies were 48, 49, and 75% for aldicarb at rates of 1.0, 2.0, and 3.0 kg a.i./ha, resp., and 52 and 60% for VC-21865-75 WP and carbofuran, resp., for controlling leafhoppers. A high incidence of BGMV and BCMV was observed. The % of plants attacked in the plot was 8.5, 11.1, and 11.4% for the rates of 1.0, 2.0, and 3.0 kg a.i. aldicarb/ha, resp., and 12.8, 6.6, and 23.2% for VC-21865-75 WP, carbofuran, and the check, resp. (Summary by F.G. Trans. by L.M.F.) FOl

See also 0342 0343 0364

G00 GENETICS AND PLANT BREEDING

G01 Breeding, Selection and Germplasm

0342

16418 ABATE, T. 1983. Screening of haricot bean varieties against bean fly (BNF) and African bollworm (ABW)? Nursery I.- Nazret, 1982/83. Addis Ababa, Institute of Agricultural Research. Nazret Research Station. 7p. Engl.

Phaseolus vulgaris. Snap beans. Selection. Cultivars. Resistance. Heliothis armigera. Ophiomyia phaseoli. Ethiopia.

A total of 177 haricot bean lines were assessed at Melkasa, Ethiopia, for their resistance to the bean fly (Ophiomyia phaseoli) and the African bollworm (Heliothis armigera). Eighty-two lines did not show symptoms of bean fly attack. The highest no. of symptoms was observed in Negro 150, Guerrero 9, Veracruz-10, Bountiful No. 181, CCG-B44 (P420), B-7515-1 (81), and Red Lands Autumn Crop. Lines 14, 62, 69, 107, and 118 did not present bean fly attack symptoms nor pupal populations. Line BAT 338-1C was the only line that showed no symptoms of bean fly attack, nor pupae, nor damage caused by the African bollworm. Tables are included on the degree of

resistance of the tested lines to both pests, indicating % of infestation, no. of pupae/20 plants, and % pod damage by H. armigera. (Summary by F.G. Trans. by L.M.F.) G01

0343

16417 ABATE, T. 1983. Screening of haricot bean varieties against bean fly and African bollworm (Nursery II)-Nazret, Jima, Kobo, Mekele. Addis Ababa, Institute of Agricultural Research. Nazret Research Station. 3p. Engl.

Phaseolus vulgaris. Snap beans. Selection. Cultivars. Resistance. Heliothis armigera. Ophiomyia phaseoli. Ethiopia.

Thirty-five haricot bean var. were evaluated for their degree of resistance to bean fly (Ophiomyia phaseoli) and the African bollworm (Heliothis armigera) in the 1982/83 season in the provinces of Nazret, Jima, Kobo, and Mekele (Ethiopia). A randomized complete block exptl. design was used in plots of two 6-m rows with 3 replications. Av. % infestation of plants and no. of pupae/20 plants were used as criteria for the degree of resistance to O. phaseoli, whereas the % damaged pods (based on 20 plants) was used to determine resistance to H. armigera. Results from Kobo and Mekele have not been received. Infestations at Nazret and Jima were low. In Nazret var. Mexican 142, Ethiopia 10-27, Accession No. 309747, B-364 (7441-92) and EPID Sample 8 had the least % infestation, while var. Negro Mecentral, W-85 (21305-9), and Tengeru 16-01 showed higher % infestation of O. phaseoli. The % damage by H. armigera was lowest for Nazret Small 03, B-129 (21153-1), B-253 (20308-1), and ICA Lima 34, while 15-R-57, followed by IBRN-42-2, Ethiopia 10-04, and Mexican 142 showed a higher % damage. In Jima, var. B-364 (7441-1), followed by W-95-01 and W-85 (21305-9), were least attacked by the African bollworm. Tables are included on the degree of resistance in the tested var., indicating % of infestation by O. phaseoli, no. of O. phaseoli pupae/20 plants, and % pod damage by H. armigera. (Summary by F.G. Trans. by L.M.F.) G01

0344

18064 ANDERSEN, A. L. 1982. A legacy of the Michigan dry edible bean disease and breeding program. 6. Down-Anderson era - 1948-1958. Michigan Dry Bean Digest 6(4):21-28. Engl., Illus.

Phaseolus vulgaris. Plant breeding. Resistance. Bean common mosaic virus. Colletotrichum lindemuthianum. Cultivars. Curly top virus. USA.

The advances in the development of improved genetic material of dry edible bean by the disease and breeding program of Michigan State U. (USA) during the 1948-58 period are described. Specific goals and objectives proposed for the program regarding the incorporation of resistance to different diseases and pests in both vine and bush bean types, high yield, and quality factors are given. Advances in the incorporation of resistance to BCMV races 1 and 15, Colletotrichum lindemuthianum, and the curly top virus are discussed. (Summary by EDITEC. Trans. by L.M.F.) G01

0345

16797 ARAUJO, G. A. A. DE; CHAGAS, J.M. 1981. Feijao. (Bean). Informe Agropecuário (Brasil) 7(83):56-62. Port., 6 Refs., Illus.

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

The economic importance of bean and research results in the region of Zona da Mata, MG, Brazil, where small-scale farming predominates, are discussed. This region produces 20% of the bean production in Minas Gerais, and 90% of the farmers plant bean in association with maize. Cv. S. Cuva 168-N (920 kg/ha), S. 182-N (751 kg/ha), S. 984-19 (715 kg/ha), and Col. 123-N (751 kg/ha) were outstanding in monoculture in the 1st trials of applied research on cv. adaptation in 1975/76 in Ponta Nova. The av. no. of pods/plant was 5.9; S. Cuva 168-N and S. 182-N were outstanding with 8.6 and 8.0 pods/plant, resp. The av. wt. of 100 seeds did not differ statistically among cv. Cv. Venezuela 350 (1667 kg/ha), Col. 123-N (1620 kg/ha), Manteigao Preto (1613 kg/ha), Carioca 1030 (1573 kg/ha), L. 44-N (1527 kg/ha), and Vinagrinho (1520 kg/ha) were outstanding at Leopoldina in 1977. Black-seeded cv. were tested in monoculture in 1979/80, except for var. Diacol Calima. There were no differences in yield among cv. at all sites and planting times. During the rainy season of 1980/81 cv. 1732 and 1735 from CIAT were outstanding with av. yields of 2076 and 1887 kg/ha, resp., for all testing sites. The variation in maize population (20, 30, and 40 thousand plants/ha) did not affect bean yields in bean/maize intercropping trials during 1977/78 and 1978/79. Av. yields were 333 and 700 kg/ha during the rainy and dry season, resp., for 1977/78, and 436 and 809 kg/ha, resp., for 1978/79. In farmer demonstration trials, researchers of the Empresa de Pesquisa Agropecuária de Minas Gerais and extension workers of the Empresa de Assistencia Tecnica e Extensao Rural showed that with the use of improved var. (I-162 G and Ricobaio 1014) higher gross margen (13.94 and 26.17%, resp.) was obtained compared with traditional var. Roxinha. (Summary by EDITEC. Trans. by L.M.F.) G01

0346

18541 ASOKAN, M. P. 1981. Genetical and physiological studies on effective and ineffective nodulation of some bean (Phaseolus vulgaris L.) cultivars. Ph.D. Thesis. Manhattan, Kansas State University. 28p. Engl., Sum. Engl., 14 Refs., Illus.

Phaseolus vulgaris. Cultivars. Crossbreeding. Nodulation. Rhizobium. Nitrogen fixation. Rhizobium phaseoli.

Bean cv. were grown in association with the Vigna unguiculata strain of Rhizobium sp. 127E15. Crosses were made between cv. differing in nitrogenase activity to determine the mode of inheritance. The low x low activity cross produced only low F_1 values and an F_2 with nearly all plants having low activity. The cross between low x high activity gave an F_1 family of low activity and F_2 composed of approx. 76% low and 24% high and intermediate. This indicated the presence of a single dominant gene (In) determining low nitrogenase activity due to ineffective nodulation. Comparative specific activities of alanine dehydrogenase (AD), glutamate dehydrogenase (GD), and glutamine amide-2-oxoglutarate aminotransferase NAD^+ oxidoreductase (GOGAT) were also studied in effective and ineffective nodules of Phaseolus vulgaris cv. Kentucky Wonder. Kentucky Wonder in association with strain 127E15 of cowpea Rhizobium sp. gave ineffective nodules, while in association with R. phaseoli strain 127K14 it gave effective nodules. Bacteroid extract of 127K14 showed increases of 115.0% in GD and 167.0% in GOGAT specific activity levels over the 127E15 strain. AD was low for both 127E15 and 127K14 bacteroid fractions. Total protein of the bacteroid fraction of 127K14 was about 105.0% higher than for 127E15. However, total protein levels of the cytosol fraction of the nodules induced by both strains were similar. A possible lack of amino acid

synthesis from glutamate or a blockage of the transport stream from nodule to the plant in the ineffective nodule system is suggested. (Author's summary) G01

0347

18528 BASSETT, M.J.; HUNG, L. 1982. Induction of semisterility mutations in common bean, Phaseolus vulgaris L. Journal of the American Society for Horticultural Science 107(5):871-874. Engl., Sum. Engl., 7 Refs.

Phaseolus vulgaris. Mutation. Pollen. Irradiation. Sterility. Inheritance. Crossbreeding. Genes.

Bean pollen treated with 2, 4, 8, and 16 kR of gamma irradiation was used to produce M_1 seed. The M_1 plants were screened for semisterility of the pollen. The inheritance of the semisterility mutations was studied in crosses to a test stock with recessive marker genes and in M_2 and M_3 progeny tests. The 4, 8, and 16 kR treatments produced nearly 100% lethal mutations while 2 kR produced 70% lethality. The semisterility factors behaved genetically like dominant alleles in F_1 test cross progeny but segregated again for a ratio of 1 semisterile to 1 fertile plant in the F_2, indicating that the mutants are probably chromosome aberrations and not genic mutations. They may in fact be chromosome translocation heterozygotes. The semisterility factors produced 40-60% pollen abortion and a significant reduction in seed set/pod. Semisterility factors were found in about 5% of the M_1 plants tested. (Author's summary) G01

0348

18529 BASSETT, M. J.; SHUH, D. M. 1982. Cytoplasmic male sterility in common bean. Journal of the American Society for Horticultural Science 107(5):791-793. Engl., Sum. Engl., 4 Refs.

Phaseolus vulgaris. Sterility. Crossbreeding. Backcrossing. Snap beans. Inheritance. Germplasm.

The inheritance of male sterility was studied in germplasm of common bean obtained from CIAT. The source was selected for plants with high pollen abortion rates (mean = 91%) and for failure to set any seed or pods by self-pollination when grown in screened greenhouses. These male-sterile plants were crossed with the snap bean Sprite, and the resulting F_1 progenies were all male-sterile under greenhouse conditions. The F_1 plants were backcrossed to Sprite and the BC_1 progenies did not segregate for male-fertile plants under field conditions. Four more backcrosses to Sprite produced progenies that were uniformly male-sterile. It was concluded that the CIAT source of male sterility is inherited through the maternal parent and is cytoplasmic. Nineteen commercial cv. of snap beans and dry beans were crossed onto BC_3 plants, and none of these genotypes restored the pollen fertility in F_1 progeny. (Author's summary) G01

0349

17878 BROWN, J.W.S.; McFERSON, J.R.; BLISS, F.A.; HALL, T.C. 1982. Genetic divergence among commercial classes of Phaseolus vulgaris in relation to phaseolin pattern. HortScience 17(5):752-754. Engl., Sum. Engl., 9 Refs.

Phaseolus vulgaris. Cultivars. Phaseollin. Genetics. Snap beans.

Composition. Selection.

Screening of 107 bean cv. and plant introductions (PI) by 2-dimensional electrophoresis revealed only 3 different phaseolin patterns: Tendergreen (T), Sanilac (S), and Contender (C). The majority of the lines had either the T (25%) or S (69%) phaseolin patterns, with only 6% having the C pattern. Phaseolin pattern was not strictly associated with commercial class but most cv. with the T pattern were snap beans, while the majority of lines with the S pattern were dry beans. Furthermore, the phaseolin types of 15 cv. were associated with previous cv. groupings that were based on calculations of genetic relationships. A genetic distinction was noted between the groups of cv. containing the T and S phaseolin patterns. (Author's summary) G01

0350

17433 CONWAY, J.; HARDWICK, R.C.; INNES, N.L.; TAYLOR, J.D.; WALKEY, D.G.A. 1982. White-seeded beans (Phaseolus vulgaris) resistant to halo blight (Pseudomonas phaseolicola), to bean common mosaic virus, and to anthracnose (Colletotrichum lindemuthianum). Journal of Agricultural Science 99(3):555-560. Engl., Sum. Engl., 23 Refs.

Phaseolus vulgaris. Cultivars. Crossbreeding. Resistance. Pseudomonas phaseolicola. Bean common mosaic virus. Colletotrichum lindemuthianum. Yields. Canned beans. Plant breeding. Selection.

Halo blight resistance was transferred in a backcrossing program from PI 150414 to a Michigan-type bean. The resistant selections obtained gave yields that were up to 10% higher than that of cv. Seafarer and had seed of good quality that was suitable for baking in tomato sauce. These selections were also resistant to the common strains of BCMV and to the lambda race of anthracnose. In addition, selections with white seed of similar size to Seafarer were obtained from crosses between Seafarer and cold-tolerant lines with large, colored seeds. In trials over 4 yr these selections gave 20% higher yields than Seafarer and were less sensitive to environmental changes. Like Seafarer, they were homozygous for the I gene for resistance to BCMV but were susceptible to halo blight and anthracnose. Although not as suitable for canning in tomato sauce as other material in the U.K. National Vegetable Research Station program, they offer useful parental material for further cycles of breeding. (Author's summary) G01

0351

18502 LEBEDEFF, G.A. 1947. Studies on the inheritance of hard seeds in beans. Journal of Agricultural Research 74(7/8):205-215. Engl., Sum. Engl., 4 Refs., Illus.

Phaseolus vulgaris. Crossbreeding. Inheritance. Seed characters. Seed vigor.

Five bean selections that exhibited marked differences under certain environmental conditions regarding the rate of softening of hard seeds, were intercrossed in various ways. Plants of the original selections, as well as F_1 and F_2 plants from crosses between these selections, were grown together in a single environment. After harvesting, seeds from these plants were 1st stored in the lab. and then were kept for 5 days in an electric drier, in which the MC of the seed was reduced to approx. 6.61%. Upon removal from the drier, the seed was placed in a germinator and records were kept of hard and swollen seeds throughout the test. Under

these conditions the 2 soft-shelled selections were unchanged while in 3 hard-shelled selections seed softening was even more prolonged. Seed softening in various F_1 crosses either approached closely that of the fast-softening parent or was intermediate between that of the 2 parental selections. In the F_2 seed softening ranged between that found in the 2 contrasting parental selections, often with practically all possible degrees of variation between these 2 extremes represented. Seed of the F_1 crosses involving selection 1130 were extremely slow in softening. The F_2 seed exceeded in both rapidity and slowness the rates of softening in the 2 contrasting parental types; that is, some softened faster than the fast-softening parent, and others softened more slowly than the slow-softening parent, the majority softening at variously intermediate rates. In the progenies other than those of the 1130 crosses, the parental extremes were not exceeded but were usually recovered. Since F_2 populations were small only a few genes appear to be involved. (Author's summary) G01

0352

18738 LEYNA, H.K.; KORBAN, S.S.; COYNE, D.P. 1982. Changes in patterns of inheritance of flowering time of dry beans in different environments. Journal of Heredity 73(4):306-308. Engl., Sum. Engl., 11 Refs.

Phaseolus vulgaris. Crossbreeding. Inheritance. Flowering. Cultivars. Photoperiod. Temperature.

The no. of days to 1st flower was recorded for parents and F_2 of dry bean crosses Bulgarian White x each of GN UI 59, GN D-88, GN 1140, and GN Emerson x GN D-88. The populations were grown in the field under the same long photoperiod and approx. the same day temp., but different night temp. at Lincoln and Scottsbluff, Nebraska (USA). Bulgarian White was much later in flowering than the other parents at Scottsbluff than at Lincoln. All parents showed only limited response to photoperiod in growth chambers. It is hypothesized that days-to-flowering was controlled by alleles at a single locus at Scottsbluff. Transgressive segregation for late flowering plants occurred in all F_2 generations at Lincoln, indicating that more than 1 gene was involved and a 13:3 ratio indicated action of 2 genes in 1 cross. It is suggested that only 1 gene was active under lower night temp. at Scottsbluff while more than 1 gene was activated under high night temp. at Lincoln. (Author's summary) G01

0353

16988 LORZ, A.P. 1952. An interspecific cross involving the lima bean Phaseolus lunatus L. Science 115:702-703. Engl., 1 Ref., Illus.

Phaseolus lunatus. Crossbreeding. Phaseolus polystachyus. Germination.

Fifty attempts to cross Phaseolus lunatus (father parent) and P. polystachyus (mother parent) failed to produce progeny, but 100 attempts to effect the reciprocal cross resulted in the production of 7 F_1 plants. All the hybrids expressed completely or nearly completely the hypogaeal germination habit of P. polystachyus, except in 2 hybrids which tended to present the epigaeal germination habit of P. lunatus. The principal objective of this cross is to incorporate the hypogaeal germination habit into P. lunatus. It is also possible that P. polystachyus possesses yet unrecognized characteristics of value (pest and disease resistance and other physiological characteristics). (Summary by EDITEC. Trans. by L.M.F.) G01

0354

18002 MACARTNEY, J.C. 1961?. Haricot beans. Tengeru, Tanzania, Northern Regional Research Centre. 2p. Engl.

Phaseolus vulgaris. Snap beans. Seed. Canned beans. Cultivars. Selection. Tanzania.

A brief historical review of the seed industry of snap bean in Tanzania, Africa, is given. In 1959 a work program was initiated to produce a bean var. suitable for the export canning market with the following requirements: resistant to rust, seed should be soaked 100% when left in water for 16 h, suitable size, shape, and flavor for canning, and agronomic characters (maturity not longer than 120 days, an erect bush type, non-shattering during drying, ability to resist splitting during threshing, and yield). In 1964 2 rust-resistant var. (Tengeru No. 8 and No. 16) were released for commercial growing. (Summary by F.G. Trans. by L.M.F.) G01

0355

17899 MACARTNEY, J.C. 1962?. The haricot bean; brief summary of work carried out by the Northern Regional Research Centre, Tengeru, 1959-61. Tengeru, Tanzania, Northern Regional Research Centre. 4p. Engl.

Phaseolus vulgaris. Snap beans. Germplasm. Cultivars. Uromyces phaseoli. Resistance. Seed characters. Tanzania.

Research at the Northern Regional Research Centre, Tengeru, Tanzania, began with the collection of var. (seed samples from different departments all over the world were received), differing in size, shape, and quality, and planting time (rainfed and under irrigated conditions). Var. were planted in a series of rust nurseries for field testing. In the Arusha-Tengeru area 29 var. were completely resistant to rust (Uromyces phaseoli); in the Olmolog-Moshi area 12 var. were rust resistant and it was established that a 2nd rust race was virulent. All var. were subjected to soaking tests at harvest and after storage for varying periods under differing conditions of temp. and humidity. Seed hardness was found to be a genetic character; when var. are heterozygous for the gene for soakability, physiological conditions of temp. and humidity existing during crop growth and storage can adversely affect the % soakability. Yields of 7 var. ranging from 1219 to 2904 lb/ac are given. (Summary by F.G. Trans. by L.M.F.) G01

0356

18542 MANSHARDT, R. M. 1980. Inheritance of stigma type in materials derived from hybridization of Phaseolus vulgaris L. and Phaseolus coccineus L. Ph.D. Thesis. Gainesville, University of Florida. 121p. Engl., Sum. Engl., 78 Refs., Illus.

Phaseolus vulgaris. P. coccineus. Hybridizing. Stigma. Inheritance. Genes. Crossbreeding. Backcrossing.

The possibility of introducing the outcrossing flower structure of the scarlet runner bean, Phaseolus coccineus, into germplasm of the self-pollinating common bean, P. vulgaris, was investigated as a means of producing outcrossing common beans suitable for use in population improvement schemes. The chief determinant of outcrossing ability in P. coccineus is the extrorse stigma position of the stigma. The goal of this study was to transfer the extrorse stigma type from P. coccineus into P. vulgaris germplasm through interspecific hybridization. Lengths of

internal surfaces (Int) and external surfaces (Ext) of stigmas were measured microscopically. The Ext/Int ratio was used as an index of stigma shape. Major P. vulgaris cv. employed were Swiss, Harvester, Sprite, and Light Red Kidney, while P. coccineus materials used were Hammond's Dwarf White, PI 273666, PI 311819, PI 312009, and PI 321088. Five interspecific F_2 populations were produced, and segregants with Ext/Int stigma ratios greater than 0.70 from these and advanced inbred lines were backcrossed to P. vulgaris. Stigma measurement distribution in F_1, F_2, backcrosses of F_1's to both parental species, and F_3 generations indicated that stigma shape is a quantitative character with a polygenic mode of inheritance. The only exception was an F_2 population that showed evidence of major gene segregation for introrse terminal and extrorse stigma classes, suggesting a 2-gene system with dominant epistasis. However, the latter may have been attributable to a qualitative, rather than a quantitative, classification of stigma types and to a small sample size. Correlation between mean stigma measurements of F_3 progenies and stigma measurements of F_2 parents was high. Narrow-sense heritability estimates for stigma measurements, calculated from correlation coefficients, averaged 60%. Inbreeding produced nearly homozygous F_3, F_4, and F_5 progenies, the means of which had Ext/Int ratios that formed a continuous distribution. The failure of homozygous genotypes to cluster indicates that a large no. of genes govern stigma shape. Fertility of the inbreds declined with each generation of inbreeding. In general, it was not possible to progress beyond the F_4 generation due to self-sterility. Segregants with Ext/Int ratios greater than 0.70 in F_2, F_3, and F_4 generations were backcrossed to P. vulgaris. In the resultant BC_1-F_2 and BC_2-F_2 generations, only about 1% of the segregating population recovered the parental phenotypes with Ext/Int greater than 0.70. The low frequency of terminal stigma types in BC-F_2 populations argues for polygenic control of stigma shape. Results of a reciprocal test cross showed that failure to recover a greater proportion of terminal and extrorse stigma types in BC-F_2 populations was not due to selective elimination of stigma alleles of P. coccineus. Furthermore, the no. of parental segregates recovered in the test cross progenies indicated that a min. of 5-7 genes was segregating for stigma shape in these progenies. Backcrossing to P. vulgaris did not improve the general level of fertility above that of the interspecific F_2 generation. There was no improvement in fertility between BC_1-F_2 and BC_2-F_2 generations. Plants with Ext/Int ratios greater than 0.70 seemed more sterile than those with Ext/Int ratios less than 0.70. Sterility factors may be linked to a block of P. coccineus stigma alleles in an inverted chromosome segment, or alternatively, sterility may be a pleiotropic effect of P. coccineus alleles in interspecific hybrids. The sterility accompanying stigma alleles of P. coccineus and the large no. of genes controlling stigma inheritance make it doubtful that stigma alleles of P. coccineus will be employed in P. vulgaris germplasm to provide an outcrossing mechanism suitable for population improvement breeding schemes. (Author's summary) G01

0357

18539 MATTJIK, A.A. 1980. Construction of selection indices on dry beans (Phaseolus vulgaris L.). Ph.D. Thesis. Fort Collins, Colorado State University. 107p. Engl., Sum. Engl., 67 Refs., Illus.

Phaseolus vulgaris. Selection. Plant breeding. Yield. Seed. Protein content. Methionine. Inheritance.

Two selection indices (termed estimated and base indices) were constructed for the F_8, F_9 and F_{11} generations of a bulk breeding population grown in 1979. A total of 126 estimated indices were constructed for each

generation using 18 combinations of 6 traits (4 yield component traits and 2 quality traits) and 7 combinations of economic wt. of zero or one, for seed yield, protein %, and available met./unit of protein (AMP). Seven base indices using the 7 sets of economic wt. were also constructed. Genetic differences among the 3 generations were observed. A comparison of the total expected genetic gain for 7 estimated indices based on 6 traits with the 7 base indices showed similarity in all 3 generations. An advantage of the estimated index is the possibility of calculating expected gain for subset combinations having zero economic values. Broad-sense heritabilities ranged from 0.88 for seed wt. to 0.16 for AMP and narrow-sense heritabilities from 0.61 for seed yield to 0.00 for AMP. (Summary by Plant Breeding Abstracts) G01

0358

17227 MELIS, R. J. M.; LEA, J. D. 1982. Dry bean cultivar studies in KwaZulu, 1981-82. Pietermaritzburg, South Africa, University of Natal. 14p. Engl., Illus.

Phaseolus vulgaris. Cultivars. Yields. Resistance. Uromyces phaseoli. Cercospora cruenta. Ascochyta phaseolorum. Alternaria tenuissima. South Africa.

An initial comparison of yield potential and disease resistance of 35 cassava cv., 4 of which were local strains and the others belonging to the International Bean Yield and Adaptation Nursery (IBYAN) collection, was conducted in a trial at the KwaGubeshe Farmer Training Centre in the Vulindlela district of KwaZulu (South Africa). The 35 cv. and one check (Bonus) were planted in a triple lattice design. Disease incidence was observed weekly. Cv. Carioca was outstanding, yielding 2690 kg/ha which was statistically superior (5%) to any other cv. and the check (500 kg/ha). Cv. NEP 2, another high yielder (2191 kg/ha), matures late (117 days), is slightly less prone to lodging, and has a high degree of resistance to rust (Uromyces appendiculatus). Of the early maturing cv. (97 days), Bat 85 gave the highest yield (2144 kg/ha). Dominant diseases were rust, Ascochyta leaf spot (Ascochyta phaseolorum), Cercospora leaf spot (Cercospora cruenta), and Alternaria leaf and pod spot (Alternaria tenuissima). The check was susceptible to rust. Annexes are included on short descriptions of observed disease symptomatology; the method of determining disease rating; and a key to growth stages of bean. (Summary by F.G. Trans. by L.M.F.) G01

0359

2639 MIRANDA C., S. 1974. Cruzamiento natural en fríjol. (Natural crossbreeding in bean). Campo 49(986):34-40. Span., 9 Refs., Illus.

Phaseolus vulgaris. Cultivars. Crossbreeding. Flowers. Spacing. Genes. Mexico.

Bean var. Michoacán-128, Puebla-305, and Puebla-194 were tested in Chapingo (Mexico) in order to determine the % of natural crossing, and use this information in seed improvement programs and in handling improved seed. The purple color of the flower (dominant gene) was used as indicator gene in order to be able to isolate F_1 hybrids. Var. Puebla-194 (purple-flowered) was intercropped with var. Michoacán-128 and Puebla-305 (white-flowered). Plots consisted of three 6-m long rows with 60 seeds/row. Three planting distances were used: (1) 180 cm between plots and 200 cm between rows of the same plot; (2) intercropping var. (1 seed/10 cm) in adjacent 6-m long

rows planted at a distance of 90 cm with 10 replications; (3) intercropping the 3 var. in the same 6-m long row with 20 replications. At harvest, 960 seeds of var. Michoacán-128 and Puebla-305 were planted; when these flowered, F_1 hybrids (purple-flowered) could be distinguished. The no. of seeds/plant and the % of natural crossing were determined on the basis of the no. of F_1 plants and seeds. The % of natural crossing varied according to the planting distance and the character that determined this %. This % was higher when it was calculated as a function of the no. of F_1 seed due to the manifestation of hybrid vigor in relation to the no. of seed that each plant produced (7.45% at a planting distance of 10 cm). Tables are included on the characteristics and % of natural crossing. (Summary by F.G. Trans. by L.M.F.) G01

0360

18565 MONTEIRO, A.A.T.; VIEIRA, C.; SILVA, C.C. DA 1981. Comportamento de cultivares de feijao (Phaseolus vulgaris L.) na Zona da Mata de Minas Gerais - II. (Performance of bean cultivars in the Zona da Mata region of Minas Gerais - II). Revista Ceres 28(160):588-606. Port., Sum. Port., Engl., 19 Refs., Illus.

Phaseolus vulgaris. Cultivars. Adaptation. Yields. Resistance. Diseases and pathogens. Intercropping. Brazil.

Twenty common bean cv. (19 with small black seeds) were included in 19 yield trials in 8 municipalities of the Zona da Mata region, MG, Brazil, for 2 yr. Yield, disease resistance, adaptability, and stability of performance were assessed. Black bean cv. 51051, Pecho Amarillo, ICA Pijao, Línea 29, Porrillo Sintético, S-182-N, Rio Tibagi, S-166-A-N, and Costa Rica had the best performance. ICA Pijao and S-182-N were the best adapted to high yielding environments. Costa Rica was most resistant to diseases and Línea 29, the most stable. Cv. 51051 outyielded all others under monoculture. Most var. gave lower yields when cultivated in association with maize in the dry season, the most productive being Rico 23 and Diacol Calima. (Author's summary) G01

0361

17629 MUKASA, S.K. 1961. The improvement of Phaseolus beans in Uganda. Uganda, Kawanda Research Station. 1p. Engl.

Paper presented at Meeting of the Specialist Committee on Agricultural Botany, 9th., Kawanda Research Station, Uganda.

Phaseolus vulgaris. Plant breeding. Cultivars. Uganda.

French bean is extensively grown in all districts in Uganda, except the relatively dry regions of the North. Var. mature at 90 days and several crops are planted every year. Most of the crop is consumed fresh. In the past intermittent var. testing led to the establishment of the following standard var.: Mutike 4, Canadian Wonder, and Bukalasa (semiclimbing), and Banja (bush type). The aim of the breeding program is to provide the farmer with high yielding, disease-resistant var. of desirable type. (Summary by F.G. Trans. by L.M.F.) G01

0362

18522 NATARAJAN, S.; ARUMUGAM, R. 1981. Selection indices in French beans (Phaseolus vulgaris L.). South Indian Horticulture 29(2):122-123. Engl., 3 Refs.

Phaseolus vulgaris. Snap beans. Cultivars. Agronomic characters. Yields. Selection. India.

Twenty diverse French bean were examined at the Horticultural Research Station, Kodaikanal, Tamil Nadu (India) to determine the degree of association of characters with yield. No. of pods/plant, no. of branches/plant, pod length, no. and wt. of seeds/pod, plant height, and pod diameter together accounted for 87% of total variation in green pod yield. The 1st 5 characters made the biggest contributions with no. of pods/plant exerting the max. influence. (Summary by Plant Breeding Abstracts) G01

0363

18090 PEREZ A., A.V. 1982. Selección simultánea maíz-frijol en generaciones segregantes. (Simultaneous bean-maize selection in segregating generations). Tesis Mag. Sc. Buenavista, México, Universidad Autónoma Agraria Antonio Narro. 121p. Span., Sum. Span., 42 Refs., Illus.

Phaseolus vulgaris. Intercropping. Zea mays. Plant habit. Selection. Genetics. Colombia.

An expt. was conducted in exptl. fields at CIAT on clay loam soils in order to determine the degree of interaction between maize and bean genotypes in simultaneous planting and to identify several characteristics that would help attain a good maize/bean intercropping system. During crop development all the usual cultural practices were applied. Genetic material consisted of 50 bean types of growth habit I (determinate bush) distributed in 10 groups of 5 genotypes, 50 F_3 lines of growth habits II/III (indeterminate erect and postrate growth) corresponding to 10 families with 5 lines, 50 F_3 lines of growth habit IV (indeterminate climbing bean) belonging to 10^3 families with 5 lines, and 3 populations of open-pollinated maize with different morphophysiological characteristics (La Posta, a vigorous, tall plant with a long growth cycle and numerous big leaves; Población-30, a short growing plant of limited vigor with a short growth cycle and few small leaves; Suwan-1 with intermediate characteristics). Maize and bean genotypes were distributed in the field in an exptl. split-split plot design with 2 hierarchic factors and 2 replicates. Planting was the same for monoculture and in association and corresponded to 40,000 and 120,000 maize and bean plants/ha, resp., planted simultaneously. Bean plant height was registered at 24, 45, and 65 days as well as canopy height at 45 and 65 days, days to flowering and physiological maturity, no. of nodes on the stem and branches, no. of branches, leaf area and wt. of 100 cm^2 of leaf surface, no. of pods/m^2, seeds in 10 pods, wt. of 100 seeds, and yield. Variance analysis was conducted for all bean and maize characteristics, independently. Correlation and regression analyses in F_2/F_3 for bean yield and wt. of 100 seeds were also conducted. Equivalent yields and land use equivalents were compared. Bean yield results indicate that the differences due to the associated system vs. monoculture are more important than those due to maize. A substantial part of this difference is due to the interaction of growth habit with association vs. monoculture. The differences in association of growth habit/maize plants were significant; there were differences among and within families regarding the 3 habits. The interaction intercropping vs. monoculture at a family level regarding the 3 habits was important. From combined analysis it was concluded that a simultaneous breeding method should be used in order to select both genotypes; however, if this is not possible, maize and bean characteristics such as plant vigor, growth rate, growth cycle, and plant height can

contribute to attaining an adequate association. Associated systems had higher land use equivalent and equivalent yield indexes (maize:bean price ratios, 1:3) than in monoculture. (Extracted from author's summary. Trans. by L.M.F.) C01

0364

18556 SCHOONHOVEN, A. VAN; CARDONA, C. 1982. Low levels of resistance to the Mexican bean weevil in dry beans. Journal of Economic Entomology 75(4):567-569. Engl., Sum. Engl., 7 Refs.

Phaseolus vulgaris. Cultivars. Resistance. Zabrotes subfasciatus. Selection. Stored grain pests. Colombia.

Low levels of resistance were detected among more than 4000 accessions of dry beans, exposed to Zabrotes subfasciatus. Although significant differences were found among the accessions for all of the parameters of resistance measured, most consistent separation among cv. was obtained by using developmental time and wt. of adult progeny. Expression of resistance was maintained when the no. of bean seeds/adult was varied; however, the standard method used (7 pairs of adults infesting 50 seeds) was the best infestation level to detect var. differences in resistance. Successive rearing for 5 generations on resistant or susceptible classified entries did not change resistance expression or reduce reproduction of Z. subfasciatus on resistant lines. Resistance levels were too low to be of economic value. (Author's summary) C01

0365

17783 SELLSCHOP, J.P.F. 1968. Dry beans; characteristics of the classes, their cultivars growth habits, areas of production and utilization. Potchefstroom, South Africa, Agricultural Research Institute of the Highveld Region. 21p. Engl., 23 Refs.

Phaseolus vulgaris. Seed. Seed characters. Cultivars. Plant habit. Uses. South Africa.

Mature seed of 3 species or types of the genus Phaseolus (P. coccineus, P. vulgaris, and P. acutifolius) vary in size, color, and markings, which determine their class and utilization. This differentiation is important because it forms a basis for price quotations and furthermore, indicates their purity and quality. Bean (P. vulgaris) has the following classes: B - medium-sized white bean; C - small white bean; E - speckled bean; and F - self- or parti-colored bean. Characteristics and properties of each one of these classes are described. Growth habits, production areas, and utilization of the var. making up each class are included. (Summary by F.G. Trans. by L.M.F.) C01

0366

18527 SILVA, G.H.; HARTMANN, R.W. 1982. Inheritance of resistance to Rhizoctonia solani Kuhn in snap beans (Phaseolus vulgaris L.). Journal of the American Society for Horticultural Science 107(4):653-657. Engl., Sum. Engl., 7 Refs., Illus.

Phaseolus vulgaris. Inheritance. Resistance. Rhizoctonia solani. Snap beans. Genes.

F_3 progeny tests were used to confirm individual F_2 plant Rhizoctonia resistance classifications determined from greenhouse inoculations of bean seedlings. F_2 segregations within individual disease classes mostly agreed with the hypothesis that genetic control of resistance to Rhizoctonia is controlled by 3 pairs of genes acting equally and additively. Partially resistant families postulated to be homozygous for 2 pairs of genes for resistance were recovered in the segregating generations in the frequencies expected. (Author's summary) G01

0367

16464 SUMMARY INFORMATION from national haricot bean variety trials. 1972. Ethiopia. 6p.

Phaseolus vulgaris. Cultivars. Snap beans. Planting. Timing. Weeding. Herbicides. Yields. Ethiopia.

Trial sites for evaluating haricot bean var. in Ethiopia in 1972 are described. For each site information is included regarding: planting date, days to maturity, location, alt., soil type, preceding crop, amount of fertilizer (kg/ha), row spacing (cm), planting method, rainfall during growth cycle. Data on yield (q/ha) of var. tested at the different sites, disease incidence of rust (Uromyces appendiculatus) and leaf spot for each var., yields obtained in planting date trials and in 2 chemical weed control trials are given. (Summary by F.G. Trans. by L.M.F.) G01

See also 0202 0254 0263 0270 0276 0285

G02 Cytogenetics

0368

18079 HALL, T.C.; SUN, S.M.; BUCHBINDER, B.U.; PYNE, J.W.; BLISS, F.A.; KEMP, J.D. 1979. Bean seed globulin mRNA: translation, characterization, and its use as a probe towards genetic engineering of crop plants. In Leaver, C.J., ed. Genome organization and expression in plants. New York, Plenum Press. pp.259-272. Engl., 30 Refs., Illus.

Phaseolus vulgaris. Seed. RNA. Proteins. DNA. Analysis. Cytogenetics.

The convenience of using bean seed in genetic engineering studies to investigate the molecular mechanisms of genome expression is examined and discussed. The structure of the major bean storage protein, the preparation of mRNA from bean cotyledons, cloning of cDNA, and cloning of genomic sequences coding for storage proteins are discussed. (Summary by EDITEC. Trans. by L.M.F.) G02

H00 NUTRITION

0369

18060 BERRI, T.; DONAZZI, G. 1982. Status report: Italian canned beans. Michigan Dry Bean Digest 6(4):10. Engl.

Phaseolus vulgaris. Canned beans. Consumption. Uses. Marketing. Cultivars. Italy.

Aspects related to the canned bean industry in Italy are briefly described. Consumption, main bean var. used and their relative importance, participation of the different marketing channels in sales, main trademarks, trend of av. retail prices, and quality problems are included. Participation of the var. in canned bean production in 1981 (57,458 t) was: Borlotti (43.1%), Cannellini (37.5%), Bianchi di Spagna (14.2%), and others (5.2%). Broken beans after sterilization and the decline in the purity of the var. due to incorrect selection or mixing of var. at storage are the 2 major problems of the canned bean industry in Italy. (Summary by EDITEC. Trans. by L.M.F.) H00

0370

14209 JONES, A.T.; PFLUG, I.J.; BLANCHETT, R. 1980. Effect of fill weight on the F-value delivered to two styles of green beans processed in a Sterilmatic retort. Journal of Food Science 45:217-220. Engl., Sum. Engl., 3 Refs., Illus.

Phaseolus vulgaris. Snap beans. Canned beans. Cooking. Processing.

The effect of fill weight on the F-value delivered to 2 different styles of green beans heated in a FMC Sterilmatic processing continuous cooker/cooler was evaluated biologically. Four different fill wt. of each product, French-style and 1-in. cut green beans, were evaluated. All tests were carried out at least 2 times. F-values were measured using biological indicator units filled with a suspension of Bacillus stearothermophilus spores and calibrated at 121.0°C. The F(250°F)-value decreased 2-3 min. when the fill wt. in 300 x 406 cans was increased from 11.5 to 13.0 oz. (Author's summary) H00

0371

17816 KORTE, R. 1972. Heat resistance of phytohemagglutinins in weaning food mixtures containing beans (Phaseolus vulgaris). Ecology of Food and Nutrition 1:303-307. Engl., Sum. Engl., 15 Refs.

Phaseolus vulgaris. Phytohaemagglutinins. Bean flour. Human nutrition. Cooking. Composition. Tanzania.

The presence of hemagglutinins in foods prepared from bean indicates that they are inadequately cooked. Hemagglutinins were found in 22% of samples of a mixture of maize and bean flour cooked by African mothers in their homes. There is considerably less risk of incomplete hemagglutinin destruction when whole beans are prepared in the traditional way. The possible hazards of incomplete destruction of bean toxin and the possibilities of breeding toxin-free strains of Phaseolus beans are discussed. Data suggest that bean flours which have not been adequately heat-treated should not be used, especially as a weaning food for infants. (Author's summary) H00

0372

18511 KUMAGAYA, T. 1979. Automatic high-pressure flash cooker. United States Patent 4,175,482. 4p. Engl., Sum. Engl., Illus.

Phaseolus vulgaris. Cooking. Human nutrition.

An automatic high-pressure flash cooker, particularly for beans, comprises a cylindrically shaped steaming chamber, set in a slanted position with its lower end open, and a drain collector which has at its upper end a perforated plate permitting passage of water and is connected to the open end of the steaming chamber. The cooked beans are discharged by releasing the drain collector from engagement with the steam chamber. (Extracted from author's summary) H00

0373

18589 SUDDENDORF, R. F.; WRIGHT, S. K.; BOYER, K. W. 1981. Sampling procedure and determination of lead in canned foods. Journal of the Association of Official Analytical Chemists 64(3):657-660. Engl., Sum. Engl., 6 Refs., Illus.

Phaseolus vulgaris. Canned beans. Analysis. Pb. Snap beans.

A method is presented for improving within-can homogeneity and simplifying the determination of Pb in canned foods. The entire content of a canned food product is blended with 2N HNO_3 and allowed to stand 16 h; then the sample is again blended and a subsample is taken. The subsample is digested by wet ashing using nitric acid-perchloric acid or nitric acid-sulfuric acid-hydrogen peroxide. The pH of the sample is adjusted with ammonium hydroxide, and the Pb is extracted into butyl acetate as the pyrrolidinecarbodithioate complex. Pb concn. is determined by flame atomic absorption spectrometry. Recoveries of Pb ranged from 92-104% for added 100-mesh Pb particulate. Within-sample variability for green beans was reduced from 37% obtained with blending alone to 3.7% using the proposed procedure at the 3.1 micrograms/g added Pb level. Variability was 7.6% at the 0.68 microgram/g level and 16.4% at the 0.20 microgram/g level of added Pb. The use of nitric acid-sulfuric acid-hydrogen peroxide for digestion has the advantage of not forming a precipitate during the neutralization step, as occurs when nitric acid-perchloric acid is used for dissolution. (Author's summary) H00

See also 0261

H01 Foods and Nutritive Value

0374

18062 BOLLES, A.D.; UEBERSAX, M.A.; HOSFIELD, G.L. 1982. Contamination of packaging material in processed beans. Michigan Dry Bean Digest 6(4): 15. Engl., Illus.

Phaseolus vulgaris. Canned beans. Pollution. Processing. Analysis.

Processed bean quality and the condition of fragment pieces when cans were contaminated with inked laminated paper, printed burlap, and polypropylene packaging materials were assessed. Michigan navy beans containing 12% moisture were processed. After processing, cans were stored for 24 h and opened to evaluate bean and contaminant appearance. During the soaking process there were no changes in bean color quality with burlap. A considerable dye leaching from the paper and a small amount of polypropylene were observed; however, there was no change in bean color since the soaking medium was discarded afterwards. The physical integrity

of the contaminants was not significantly affected by soaking. Neither burlap nor polypropylene produced changes in bean color after storage, but inked paper did. Adverse coloration was primarily due to an increase in contaminant size which resulted in more dye leaching. The processing or heat treatment applied did not cause contaminant breakdown, deterioration, or adherence to the beans. Recommendations to avoid incidental contamination from packaging materials in canned beans include the use of good quality bag materials from a reliable source, avoiding physical damage to bags during all phases of shipping and handling to minimize fragments, the use of proper openings and dumping techniques to minimize incorporation of packaging materials, and instructing final inspection line personnel to remove all foreign materials prior to filling. (Summary by EDITEC. Trans. by L.M.F.) H01

0375

17388 CARPENTER, K.J. 1981. The nutritional contribution of dry beans (Phaseolus vulgaris) in perspective. Food Technology 35(3):77-78. Engl., 16 Refs.

Phaseolus vulgaris. Human nutrition. Nutritive value. Digestibility. Proteins.

The capacity of bean (30 and 15 g) to meet recommended dietary allowances for adults and children regarding vitamins and minerals, proteins and energy, is analyzed. Findings of an extensive literature review on the amino acid composition of beans and protein quality studies with rats are summarized. The only limiting amino acid is met. and protein digestibility is low (77%). Results of studies on the value of bean as the sole source of protein for children are analyzed. The following priorities for plant breeding are recommended: (1) increase bean yield potential; (2) increase protein content and improve digestibility; (3) reduce carbohydrate content (or that of other factors) responsible for flatulence and fecal bulk; (4) improve cooking qualities. (Summary by EDITEC. Trans. by L.M.F.) H01

0376

18535 DILAWARI, J.B.; KAMATH, P.S.; BATTA, R.P.; MUKEWAR, S.; RAGHAVAN, S. 1981. Reduction of postprandial plasma glucose by bengal gram dal (Cicer arietinum) and rajmah (Phaseolus vulgaris). American Journal of Clinical Nutrition 34(11):2450-2453. Engl., Sum. Engl., 15 Refs., Illus.

Phaseolus vulgaris. Glucose. Human nutrition. Diets. Uses.

Postprandial plasma glucose levels were measured in 6 healthy (human) subjects at 0, 15, 30, 45, 60, 90, and 120 min after taking 50 g of carbohydrate in the form of wheat, rice, Cicer arietinum, and red kidney beans. The results were compared with the plasma glucose values obtained after taking 50 g dextrose. C. arietinum and red kidney beans, when compared with dextrose, were more effective in reducing postprandial plasma glucose levels than wheat and rice. The mean peak rise in plasma glucose was decreased by 82.1% with C. arietinum and 67% with red kidney beans, while wheat and rice showed reduction only by 25 and 16%, resp., when compared with dextrose. This study suggests a reappraisal of the diet for diabetics. (Author's summary) H01

0377

16080 GRAHAM, G.G.; MORALES, E.; PLACKO, R.P.; MACLEAN, W.C. 1979. Nutritive value of brown and black beans for infants and small children. American Journal of Clinical Nutrition 32(11):2362-2366. Engl., Sum. Engl., 9 Refs.

Phaseolus vulgaris. Nutritive value. Human nutrition. Diets. Methionine. Digestibility. Proteins.

A precooked, instant mixture of brown and black beans, without DL-met. or with 0.3% added was the only source of protein in the diets of 10 recovered malnourished infants and children 10-42 mo. old. At 6.4-6.7% dietary protein energy stool wet wt. were twice as high, apparent N absorption significantly lower, 65.6 against 87.5% of intake, and apparent N retention much lower, 9.8 against 34.5% of intake, than during, before, and after isonitrogenous casein-based diets of equal energy and N value. The addition of met. improved N retention slightly and increased free met. in plasma. Prolonged feeding on the met.-enriched beans at 8.0-10.0% protein energy supported satisfactory growth and serum albumin in 2 of 3 children but not in the smallest one, in whom repeated balance studies showed no decrease with time in stool wet wt. and only marginal improvement in N absorption and retention. The poor digestibility of the protein in these beans is the 1st-limiting factor in its utilization by infants and small children. (Author's summary) HOl

0378

18549 CRULLON R., V.; JIMENEZ, J.S. 1982. Estudio de la propiedad de cocción de algunas variedades de fríjol común (Phaseolus vulgaris L.) y su relación con el contenido de ácido fítico, minerales y humedad. (Study on the cooking properties of some common bean varieties and their relationship with phytic acid, mineral, and moisture contents). Tesis Ing. Agr. Santiago de los Caballeros, República Dominicana, Universidad Católica Madre y Maestra. Instituto Superior de Agricultura. 70p. Span., Sum. Span., 22 Refs., Illus.

Phaseolus vulgaris. Cooking. Storage. Analysis. Composition.

Factors that alter organoleptic and cooking qualities of bean were studied by increasing cooking time. When beans were stored under environmental conditions for more than 9 mo., time required for cooking was tripled. A similar hardening of bean occurred when stored for more than 12 mo. under refrigerated conditions with a MC greater than 17%. Cooking time increased 1.5 times compared with recently harvested beans of the same var. Cooking time of the tested var. was significantly affected by the var. characteristics. Beans of var. José Beta (red-seeded) took longer to soften than those of var. Pompadour Checa (red-seeded), BAT-258 (black-seeded), and BAT-482 (white-seeded). Beans of var. Pompadour Checa and BAT-258, however, did not show significant differences regarding cooking time. Initial MC of fresh beans did not significantly affect their cooking time. MC of beans of each var. was adjusted to 14% and then was decreased in amounts of 2% until it reached 8%. Phytic acid and Ca contents of beans were determined. A slight variation was found among the tested var., but no relationship was found between cooking time and phytic acid:Ca ratios. (Author's summary. Trans. by L.M.F.) HOl

0379

17734 HALABY, G.A.; LEWIS, R.W.; REY, C.R. 1981. Variations in nutrient content of commercially canned legumes. Journal of Food Science 47(1): 263-266. Engl., Sum. Engl., 6 Refs.

Phaseolus vulgaris. Canned beans. Carbohydrate content. Fat content. Protein content. Mineral content. Amino acids.

Nutrition information for label declaration on 8 canned bean products was generated through analyses. Variability between products and variability due to year of pack, production plant, and can size were evaluated. Variability in caloric content, carbohydrates, and fats/serving was attributed to formulation and processing variations. All the bean products tested supplied protein and Fe in amounts equal to or greater than 20% of the U.S. Recommended Daily Allowances/serving. Seasonal variations in raw commodities, changes in blanching and/or processing methods, fluctuations in bean-to-bean sauce ratio, as well as analytical variability are probable causes of variations detected in the nutrient content of the canned products. Values are also tabulated for bean production in different states in the USA and for nutrients in raw beans, cooked beans, and canned bean products. (Author's summary) H01

0380

18705 KOZUP, J.; SISTRUNK, W.A. 1982. Quality attributes of fermented and acidified green beans. Journal of Food Science 47(3):1001-1005. Engl., Sum. Engl., 21 Refs.

Phaseolus vulgaris. Snap beans. Canned beans. Nutritive value. Palatability.

A study was conducted with 2 styles and 4 blanch methods on green beans acidified with 1 of 4 organic acids or fermented. The beans were compared with conventional canned beans for selected quality attributes. Analyses showed that acidified and fermented beans were acceptable in color, firmness, and flavor regardless of style, blanch, or storage. The acidified and fermented beans were much firmer with less sloughing than conventional canned beans. Minor differences were noted in nutritive value of the beans. Panel ratings for flavor of acidified beans were not significantly different from those for conventional canned beans except in fermented beans. Flavor differences in fermented beans were probably caused by flavor volatiles produced by the bacteria. Acidified and fermented beans should be suitable for many types of dishes. (Author's summary) H01

0381

18073 LUSE, R.A. 1982. Estudios realizados por el Centro Internacional de Agricultura Tropical (CIAT) sobre el problema del endurecimiento del fríjol. [Studies conducted by the Centro Internacional de Agricultura Tropical (CIAT) on aspects regarding bean hardness]. Archivos Latinoamericanos de Nutrición 32(2):401-414. Span., Illus.

Phaseolus vulgaris. Seed coat. Storage. Cooking. Human nutrition. Seed treatment. Colombia.

Research work conducted by CIAT's Food Quality and Nutrition Lab. on the development of hard seed coat in stored beans, its interrelationship with water absorption, its relationship with seed treatment with edible oils, and its physicochemical characters (still in progress) is described and analyzed in detail. These studies are based on well-defined standardized tests as well as on the use of genetically pure bean lines developed by CIAT's bean improvement program. The following factors are used to describe nutritional value and consumer acceptability: protein content,

water absorption, cooking time, broth thickness, flavor and texture, and the tendency to develop a hard seed coat during storage. The problem of hard seed coat can be minimiz .. some bean var. by storing freshly harvested seed under low temp. conditions. Housewives can reduce the effect of hard seed coats by soaking beans for a prolonged period under cool conditions. (Summary by F.G. Trans. by L.M.F.) H01

I00 MICROBIOLOGY

I01 Rhizobium spp., Nitrogen Fixation and Nodulation

0382

18531 BAL, A.K.; SHANTHARAM, S.; WONG, P.P. 1982. Nodulation of pole bean (Phaseolus vulgaris L.) by Rhizobium species of two cross-inoculation groups. Applied and Environmental Microbiology 44(4): 965-971. Engl., Sum. Engl., 24 Refs., Illus.

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

Physiology and morphology of pole bean cv. Kentucky Wonder root nodules induced by 2 Rhizobium species of different cross-inoculation groups were compared. Root nodules induced by Rhizobium sp. 127E15, which is a strain of the cowpea group Rhizobium, were pinkish, had irregular shapes, and were only partially effective. Their peak acetylene reduction activity was 4.36 micromol of C_2H_4 formed/g of fresh nodules/h at 30 days after inoculation. The effective nodules induced by R. phaseoli 127K14, which is a strain of the bean group Rhizobium, were dark red, spherical, and showed peak acetylene reduction activity of 15.95 micromol of C_2H_4 formed/g of fresh nodules/h at 15 days after inoculation. The partial effectiveness of 127E15-induced nodules was associated with fewer infected cells, a delay in the increase of bacteroid population within the host cells, abundance of cytoplasmic vesicles in the host cells, more bacteroids within a membrane envelope (peribacteroid membrane), and the inability of bacteroids to completely fill up the host cytoplasmic space. The 127K14-induced nodules were fully mature, with host cells filled with bacteroids by 12 days after inoculation. In contrast, the 127E15-induced nodules did not reach a similar developmental stage even 30 days after inoculation. (Author's summary) I01

0383

18513 CORREA, M. U. 1980. Compatibilidade de estirpes de Rhizobium phaseoli com fungicidas, antibiótico, nitrogenio e seus efeitos na fixacao simbiótica e producao do feijoeiro-comum (Phaseolus vulgaris L.). (Compatibility of strains of Rhizobium phaseoli with fungicides, antibiotics and nitrogen, and their effects on symbiotic fixation and yield in beans). Tese Mag. Sc. Lavras-MG, Brasil, Escola Superior de Agricultura de Lavras. 85p. Port., Sum. Port., Engl., 87 Refs.

Phaseolus vulgaris. Rhizobium phaseoli. Nodulation. Nitrogen fixation. Herbicides. Yields. Symbiosis.

In order to verify the effects of fungicides and antibiotics on nodulation and N fixation in beans using different strains of Rhizobium phaseoli and their effect on bean yield, a greenhouse trial was carried out using the

fungicides: carboxin (150 g a.i./100 kg seed), thiram (175 g a.i./10 kg seed), PCNB (262 g a.i./100 kg seed), and the antibiotic streptomycin (1 g a.i./l 1 H_2O/100 g seed). The strains of Rhizobium phaseoli (C-37, C-29, and C-88) came from the Centro de Energia Nuclear na Agricultura. Seeds, treated with chemical products, were sown in sterilized soil and inoculated with 2 ml inoculant/seed. The var. tested was Venezuela-350. Fifty days after planting the wt. of the canopy, no. and dry wt. of nodules, % of N and total N in the plant canopy were recorded. At the end of the cycle the no. of pods/plant, no. of seeds/pod, and dry wt. of seeds were assessed. A randomized block exptl. design with 3 replications, arranged in a 2 x 4 x 5 factorial was used. N at a rate of 1 g/3 kg soil was applied, half at planting and half 20 days later. Results show that strains C-29 and C-88 were more efficient in symbiosis with Venezuela-350. The application of mineral N to the soil was beneficial to plant development, % of N and total N of the canopy, no. of pods/plant, and dry wt. of seed. It may interfere with the symbiotic process of N fixation, causing a decrease in its intensity. The effects of the fungicides and the antibiotic varied with the strains of R. phaseoli and according to the parameter used, but in the general, thiram was most favorable to bean x R. phaseoli symbiosis with positive increases in bean yield. (Author's summary) I01

0384

17384 HABISH, H.A.; ISHAG, H.M. 1974. Nodulation of legumes in the Sudan. 3. Response of haricot bean to inoculation. Experimental Agriculture 10(1):45-50. Engl., Sum. Engl., 7 Refs.

Phaseolus vulgaris. Inoculation. Rhizobium. Strains. Nodulation. Mineral content. N. Yields. Nitrogen fixation. Sudan.

Field expt. conducted in 2 localities, Shambat and Hudeiba (Sudan), in 2 growing seasons on the effect of inoculating a local haricot bean var. (RO_2/I) showed that a local strain of Rhizobium significantly improved nodulation and usually increased the N content of plants. In 3 out of 4 expt., increases in seed yield were obtained ranging from 20-145% (significant in 2 cases). Inoculation was better than the application of 43 kg of combined N/ha but not better than the application of 86 kg N. Soil inoculation gave better early nodulation than seed inoculation, but the difference diminished in the later stages of plant growth. (Author's summary) I01

0385

18586 HOHENBERG, J.S.; MUNNS, D.N.; TUCKER, C.L. 1982. Rhizobium - host specificities in Phaseolus coccineus L. and Phaseolus vulgaris L. Crop Science 22(3):455-459. Engl., Sum. Engl., 21 Refs., Illus.

Phaseolus vulgaris. Hybridizing. Phaseolus coccineus. Rhizobium phaseoli. Nodulation.

The introduction of desirable agronomic characteristics into Phaseolus vulgaris is being attempted by interspecific hybridization with P. coccineus, but the effects on root nodulation are unknown. Accordingly, cross-inoculation relationships between P. vulgaris cv. Red Kidney and P. coccineus cv. Scarlet Runner were tested in the greenhouse with a group of 16 Rhizobium strains effective on Red Kidney and a group of 12 strains effective on Scarlet Runner. Both groups had diverse origins, including commercial sources and isolations from bean fields and other sites in California, USA. Only 6 strains, all isolates from Scarlet Runner, were

effective on both hosts. Fifty percent of Scarlet Runner isolatea were as effective on Red Kidney as the more effective of Red Kidney's homologous strains. Thirty percent of the California isolates tested on Red Kidney were more effective than 2 commercial inocula. Strain rejection in Red Kidney was expressed in 75% of all cases as failure to form nodules. In contrast, strain rejection by Scarlet Runner was expressed in 64-68% of all cases as ineffective nodulation (nodule malfunction). If Scarlet Runner is representative of P. coccineus in this respect, interspecific hybridization is likely to increase rather than reduce the tendency of P. vulgaris to nodulate with ineffective rhizobia. (Author's summary) I01

0386

18596 ROBERT, F.M. 1981. Persistence of Rhizobium phaseoli in soil and rhizosphere as studied by immunofluorescence. Ph.D. Thesis. Minneapolis, University of Minnesota. 141p. Engl., Sum. Engl., 175 Refs., Illus.

Phaseolus vulgaris. Rhizobium phaseoli. Strains. Inoculation. Nodulation.

The success of inoculant strains of Rhizobium phaseoli was investigated with respect to the persistence of the introduced strains in the soil and their competitiveness for nodule occupancy in presence of a resident population of R. phaseoli. Fluorescent antibodies (FA), specifically staining the strains of interest, were used to identify and enumerate, in the field, inoculant strains QA 1062 and Viking 1 and that fraction of the native population reacting with the FA prepared against R. phaseoli CIAT 134. The soil (Hubbard loamy sand) was inoculated homogeneously with 5×10^5 cells/g of soil and confined in plastic cylinders (20 cm high, 15 cm in a diameter) closed at the bottom with a nylon net. Inoculated and uninoculated cylinders were either left fallow or were planted to 2 seeds of legumes. Strain QA 1062 was stimulated in the rhizosphere of its host navy bean cv. Seafarer throughout the growing season. However, the competitive ability of strain QA 1062 was mediocre, this strain occupying only 17% of the nodules. R. phaseoli Viking 1 was a better competitor, occupying 100% of the nodules on both navy bean and snap bean. The establishment and persistence of inoculant Viking 1 through the winter, as influenced by plant cultivation, was examined in the root zone of 2 host legumes, navy bean cv. Seafarer and snap bean cv. Picker as well as in 1 nonhost legume, soybean cv. Wilkin. R. phaseoli Viking 1 was highly stimulated in all 3 rhizospheres throughout the growing season while FA counts in fallow soil decreased rapidly. A plant-dependent build-up of R. phaseoli was found at the end of the growing season. High counts of both inoculant Viking 1 and the native population were maintained in host rhizospheres through the winter. In contrast, counts in bulk soil were influenced to a lesser extent by plant cultivation in the year following cultivation. Although Viking 1 was undetectable by FA after the winter, it was still present as evidenced by the abundant nodulation produced on cv. Seafarer by bulk soil kept under fallow. Thus plant cultivation was not essential to the establishment and survival of inoculant Viking 1 in the soil. (Summary by Dissertation Abstracts International) I01

0387

18701 VENCATASAMY, D.R.; PEERALLY, M.A. 1981. Seasonal changes in the nitrogen fixing activity of Phaseolus vulgaris cv. Long Tom. Revue Agricole et Sucriere de L'Ile Maurice 60(1):5-9. Engl., Sum. Engl., Fr., 24 Refs., Illus.

Phaseolus vulgaris. Nodulation. Dry matter. Rhizobium phaseoli. Strains. Inoculation. Nitrogen fixation. Developmental stages.

A study was undertaken to determine the pattern of nodule development, leghemoglobin build-up, DM production, and N accumulation in common bean cv. Long Tom, artificially inoculated with an effective strain of Rhizobium phaseoli. Pink nodules appeared around day 12 after germination, indicating that this cv. is a later nodulator. A steep rise in leghemoglobin content of nodules occurred from day 12 to 39 and was followed by a period of about 10 days when leghemoglobin content was constant, after which it declined. N-fixing activity increased until day 29 (at flowering) and continued until day 39 (at pod filling) and then decreased. The peak in N-fixing activity occurred between days 29-39. Results indicate that cv. Long Tom has a comparatively short N-fixing cycle, lasting for about a month. Such a short cycle does not permit fixation and hence the accumulation of aufficient N in the plant for medium pod production. Supplementation with mineral N is therefore necessary after germination and prior to pod filling. (Author'a summary) I01

See also 0323 0346

J00 ECONOMICS AND DEVELOPMENT

0388

18583 BLACK, J.R.; LOVE, R. 1978. Economics of navy bean marketing. In Robertson, L.S.; Frazier, R.D., eds. Dry bean production - principles and practices. East Lansing, Michigan State University. Cooperative Extension Service. Agricultural Experiment Station. Extension Bulletin E-1251. pp.210-220. Engl., Sum. Engl., 3 Refs., Illus.

Phaseolus vulgaris. Marketing. Production. Trade. Prices. Storage. USA.

Navy beans are an important agricultural commodity in Michigan, USA. Price and income variability at the grower level is substantial, reflecting the structure of the industry, supply/demand conditions, and the biological process. Growers feel they need 20% more net income/ac relative to competing crops to make earnings comparable. Over the long run, storage of a portion of the crop appears profitable; however, storage earnings exhibit very large variability. Growers should forecast and price within a rolling assessment context: roll information ahead as time passes, construct new forecaats, and price in the context of the forecast relative to offer price but conditioned by the risk preferences and risk-bearing ability. (Author's summary) J00

0389

18514 BRITO, A.J.B. 1980. Estimativa da oferta de feijao, na micro-regiao Homogenea - 135 da Chapada Diamantina Setentrional, do Estado da Bahia. (Bean supply in the homogeneous microregion 135, Chapada Diamantina Setentrional, in the state of Bahia). Tese Mag. Sc. Lavras-MG, Brasil, Escola Superior de Agricultura de Lavras. 76p. Port., Sum. Port., Engl., 32 Refs., Illus.

Phaseolus vulgar.s. Production. Prices. Statistical analysis. Economics. Brazil.

Bean supply in the homogeneous microregion 135 in the state of Bahia, Brazil, was estimated. Price elasticities and cross elasticities for both cultivated area and yield were also estimated and the response of the amount produced, cultivated area, and yield to several production factors was analyzed. Short- and long-term price elasticities of bean supply were determined. Time series data from 1965-77, issued by the Fundacao Getúlio Vargas, the Fundacao Instituto Brasileiro de Geografia e Estadística, and the Secretaria do Planejamento, Ciencia e Tecnologia were used. The least squares method was used, the statistical model being made up of 3 equations. Cultivated area was determined simultaneously with yield. In order to evaluate this model, equations of both cultivated area and yield were combined to make an equation able to explain the amount produced. Bean price elasticities for cultivated area were -0.22 and -0.023 for the short- and long-term, resp. Cross elasticity with the maize price was 0.04. Bean price elasticity for yield was 0.58 and price elasticity for the amount produced was 0.37. The model explains the changes in the amount produced, cultivated area and yield, despite the differences between observed and estimated values. According to results beans and maize are complementary crops in Chapada Diamantina Setentrional. On the other hand, to increase the area planted to beans, farmers react more to changes in maize prices than to changes in bean prices. Considering that the price elasticity for beans regarding yield was positive and had a higher absolute value than cultivated area, bean growers were found to react more toward measures to increase crop yield, when stimulated by bean prices. Policies that guarantee min. price are not sufficient to increase production. Other studies on bean supply in the region, risks, and uncertainties should be conducted in order to estimate the effect of climatic factors on yield. (Author's summary) J00

0390

18068 CASTILLO DE A., Y. 1982. Problemas en el almacenamiento y el mercado del fríjol en Centroamérica y el Caribe. (Bean storage and marketing problems in Central America and the Caribbean). Archivos Latinoamericanos de Nutrición 32(2):275-307. Span., Illus.

Phaseolus vulgaris. Production. Trade. Storage. Marketing. Central America. Dominican Republic. Haiti.

The production, demand, foreign trade, and commercialization systems (prices and margin of commercialization, storage losses and problems) of bean in Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, Panama, Dominican Republic, and Haiti are analyzed in relation to the information available from 1969 through the 1970's. Bean commercialization systems in the region are characterized by: (1) increasing no. of small farmers; (2) defects during wholesale trade; and (3) disorganized retail trade. Bean hardening is the main problem of prolonged storage, thus reducing the operative capacity of the governmental institutions. In order to make the processes of bean commercialization and supply more efficient and the government's regulatory actions more effective, it is recommended that the countries examine the causes and real magnitude of postharvest losses and likewise continue looking for economical systems of bean conservation for prolonged periods. (Summary by EDITEC. Trans. by L.M.F.) J00

0391

18065 GALVEZ E., G. E. 1982. Producción de fríjol en Centroamérica, Panamá y el Caribe durante la década de 1970-1980. (Bean production in Central America, Panama, and the Caribbean during the 1970-80 decade).

Archivos Latinoamericanos de Nutrición 32(2):217-232. Span., 8 Refs.

Phaseolus vulgaris. Production. Yields. Costs. Prices. Central America. Dominican Republic. Haiti. Cuba.

Bean production between 1970-80 in Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica, Panama, Dominican Republic, Haiti, and Cuba is reviewed. Data on area harvested, production, and yield and analyses on cultivated var., production costs, prices, and factors limiting production are included for each one. (Summary by F.G. Trans. by L.M.F.) J00

0392

17791 JOHNSON, D. 1981. Agricultural zonstion using production data: the example of beans in Guatemala. Revista Geográfica (México) 94:117-121. Engl., Sum. Engl., 5 Refs., Illus.

Phaseolus vulgaris. Plant geography. Guatemala.

The results of an attempt to zonate for agricultural development using available production data as criterion and bean growing in Guatemala as example are given. The methodology used is described and it is concluded that, due to the success of the results, the utilization of production data as sole criterion to crop zonation provides a fast and inexpensive method of zonation, when compared with agroclimatological or crop ecological approaches. A drawback to this approach is that it does not include potential crop areas. With some minor adjustments, production data can be used effectively to delimit individual crop regions which can then serve as geographical framework for the collection and storage of general crop information. (Summary by EDITEC. Trans. by L.M.F.) J00

0393

17849 LEAKEY, C.L.A. 1972. Factors affecting increased production and marketing of food crops in Uganda. Eastern African Journal of Rural Development 4:1-20. Engl., Sum. Engl., 55 Refs.

Phaseolus vulgaris. Production. Marketing. Prices. Development. Uganda.

Factors affecting the increased production of food crops, including Phaseolus vulgaris, as a policy objective are discussed. Assuming that Uganda produces enough food in aggregate and also enough calories and proteins to feed its entire population with a margin to spare, the following aspects are analyzed: tradition and resistance to innovation, types of research, development strategies, traditional agricultural systems in East Africa, the convergence of modern agricultural science with peasant practices, and technical factors in increased production (fertility, improved seed and planting material, implements, pest and disease control, marketing and prices, and agricultural credit). A market information service combined with a liberal marketing structure with efforts to shorten the paths between producers and consumers is recommended. To be economic, any significant extra production must be used for the urban or export markets or for conversion through industry. The market for processing includes that for the production of animal feeds to support a growing livestock industry and for conversion of raw food materials to higher value and less perishable exportable forms. (Summary by L.M.F.) J00

0394

15888 NAIK, W.M.; CHUNGU, R.K.; CHIBASA, O.M. 1981. Bean production in Zambia. In Regional Workshop on Potential for Field Beans in Eastern Africa, Lilongwe, Malawi. 1980. Proceedings. Cali, Colombia, Centro Internacional de Agricultura Tropical. Series 03EB-1. pp.187-199. Engl., Sum. Engl., 6 Refs., Illus.

Phaseolus vulgaris. Cultivation. Cultivation systems. Production. Trade. Uses. Seed production.

Bean production in Zambia is described regarding: types of beans cultivated, their introduction and distribution; production areas; cropping systems (cultural practices, farming systems, and irrigation); production, trade, storage, and utilization. Factors limiting production include biological factors such as bean var., diseases (Colletotrichum lindemuthianum, Phaeoisariopsis griseola, Uromyces appendiculatus, Elsinoe phaseoli, Pseudomonas phaseolicola, Xanthomonas phaseoli, Meloidogyne spp., Alternaria sp., Ascochyta phaseolorum, Oidium sp., Macrophomina phaseoli, and Sclerotium rolfsii), pests (Ophiomyia sp. and Mylabris sp.) and inoculation with Rhizobium, and socioeconomic and institutional factors especially availability of seed. The activities of the country's Bean Program are briefly described. Seed production and distribution in Zambia are also described along with the achievements reached in research. Future research plans include breeding for multiple resistance to diseases and pests, selection of suitable var. for low rainfall areas, inoculation with suitable local strains of Rhizobium, mixed cropping, suitable small-scale equipment for planting and harvesting, and extension services to promote bean production. (Summary by EDITEC. Trans. by L.M.F.) J00

0395

14001 SANDERS, J.H. 1981. Evaluation of new technology on Colombian farms producing beans: methodology and results. Cali, Colombia, Centro Internacional de Agricultura Tropical. Seminarios Internos. Serie SE-1-81. 22p. Engl., Sum. Engl., 30 Refs., Illus.

Phaseolus vulgaris. Technology evaluation. Research. Colombia.

The methodology of on-farm testing of technology as a component of the research process is discussed as compared to traditional agronomical research. Evaluation criteria for on-farm trial analysis are proposed. The research process proceeds from the exptl. station to regional trials, and finally to farm level evaluation. Feedback from the farm enables modifications to be incorporated into future technology design. Once technology has passed the economic and systems criteria, the research evaluation process is completed and suggestions can be made for extension. Results of farm trials obtained by CIAT's Cassava and Bean Programs from 1977-80 are analyzed with these criteria. (Summary by EDITEC. Trans. by L.M.F.) J00

0396

15361 SANDERS, J.H.; LYNAM, J.K. 1981. Evaluation of new technology on farms: methodology and some results from two crop programmes at CIAT. Cali, Colombia, Centro Internacional de Agricultura Tropical. 23p. Engl., Sum. Engl., 32 Refs.

Phaseolus vulgaris. Technology evaluation. Developmental research. Colombia.

In 2 food crops in L.A., beans and cassava, one principal hypothesis of the authors for the continuation of the yield gap between expt. station and farm yields in the production of food crops in developing countries over time is that many successful technologies on the expt. station do not pass a set of reasonable farm level criteria. Farm testing is the logical extenaion of the research evaluation process once a technology has been identified on the expt. station and regionally tested for adaptation. Farm testing is an especially important component of the research process in developing countries, where communication links between farmers and researchers are weak and farmers often do not have the information or management experience to combine and modify various technology components adapting expt. station or regional trial observations to their own environments and production systems. The research problems at the farm are different from those at the expt. station or in regional trials so there are important distinctions in design and analysis in the farm trials. The evaluation process developed here identified the technologies later adopted by farmers. For the unsuccessful technologies, information was provided from the farm trials to the breeders and other scientists on further design requirements. The results of the farm trials substantially modified the recommendations for farmers, which would have been arrived at utilizing the results from the expt. station and/or regional trials. (Author's summary) J00

0397

17503 SOUTH AFRICA. DEPARTMENT OF AGRICULTURAL ECONOMICS AND MARKETING. 1974. Regulations relating to the grading of dry beans. 13p. Engl.

Phaseolus vulgaris. Seed. Analysis. Legal aspects. Marketing. South Africa.

The regulations of the Ministry of Agriculture of South Africa regarding the grading of bean are given. Definitions of the terms or expresaions used, classes and grades in which bean is divided according to cv., form type, size, and color, and deviations (according to the nature of the defects) are included. The following methods are followed to determine the grade of dry bean: (1) sampling; (2) determination of the % deviation (% foreign matter, % defective bean, % not-true-to-type bean and bean with testa defects, no. of dry beans/30 g); (3) determination of MC. (Summary by F.G. Trans. by L.M.F.) J00

0398

17591 SOUTH AFRICA. DEPARTMENT OF AGRICULTURAL ECONOMICS AND MARKETING. 1974. Regulations for regulating the requirements in connection with the export of dry beans from the Republic of South Africa. 24p. Engl.

Phaseolus vulgaris. Legal aspects. Trade. Marketing. South Africa.

The regulations in force in the Republic of South Africa regarding bean exports are described. Definitions of the terms used, notice of intended exportation, presentation of material for inspection, removal of rejected beans, appeal, and quality requirements (classes, grades, and deviations) are included. Characteristics of the containers, packing, and marking of beans for exportation are listed. The methods used for evaluating material for exportation is discussed in detail. (Summary by F.G. Trans. by L.M.F.) J00

0399

17955 WATSON, D.R.W. 1966. Import and export of bean seed (Phaseolus vulgaris). Tanzania, Ministry of Agriculture, Forests and Wildlife. Tengeru Report no. 94. 2p. Engl.

Phaseolus vulgaris. Legal aspects. Trade. Tanzania.

The legal requirements that seed should fulfill before importation into Tanzania are listed: (1) seed should be packed using clean, new materials; (2) it should be accompanied by a phytosanitary certificate issued by the official services of the exporting country; (3) this certificate should include an additional declaration that bacterial wilt (Corynebacterium flaccumfaciens) does not occur in the country of origin. Although there is no legal requirement that bean seed exported from Tanzania be certified in any way, the Plant Pathology Lab. at Tengeru is able to issue the following certificates: (1) international model phytosanitary certificate which is issued after a careful examination in the lab.; (2) freedom from anthracnose (Colletotrichum lindemuthianum); (3) freedom from common and fuscous blights (Xanthomonas phaseoli) and halo blight (Pseudomonas phaseolicola); (4) freedom from bacterial wilt. (Summary by F.G. Trans. by L.M.F.) JOO

0400

18592 WIJESINHA, A.; FEDERER, W.T.; CARVALHO, J.R.P.; PORTES, T. DE A. 1982. Some statistical analyses for a maize and beans intercropping experiment. Crop Science 22:660-666. Engl., Sum. Engl., 8 Refs., Illus.

Phaseolus vulgaris. Intercropping. Zea mays. Statistical anslysis.

Several univariate and multivariate analyses were applied to observations from a single expt. involving sole crop and intercropped combinations of 2 maize and 4 bean cv. Some of the strengths and weaknesses of the analyses are indicated. For joint analyses on maize and bean yields, analyses for crop value or income, land equivalent ratios, and a multivariate analysis with maize yields as 1 variable and bean yields as a 2nd variable, were performed on the data. The last analysis necessarily ignores sole crop yields. These different types of analyses provided insight into different aspects of an intercropping expt. It was found that an intercropping system which maximized the yield of any one crop did not necessarily maximize total crop value or income or land equivalent ratio. This indicated that the type of analysis required clearly depended on the goals of the expt., and that all these analyses may usefully be performed on an intercropping expt. The conclusions from the multivariate analyses for this expt. agreed with those from the univariate analyses. All 8 mixtures had a land equivalent ratio greater than one. Combined crop values computed for bean prices 3 times that of maize were larger for 3 of the 8 mixtures than for the highest sole crop value for a tall maize cv. Considering total yield of maize + beans, none of the mixtures yielded as high as the higher yielding maize cv. In considering combined yields in a multivariate analysis, yields of beans were relatively twice as important as maize yields in determining differences in total yield. (Author's summary) JOO

See also 0267 0369

K00 FIELD PLOT TECHNIQUE

0401

18724 RAMIREZ D., L.E. 1981. Consideraciones generales sobre el diseño experimental. (General concepts of experimental design). 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.1-33. Span., Sum. Span., 30 Refs.

Phaseolus vulgaris. Experiment design.

Concepts that should be taken into account in order to obtain an exptl. design offering max. information desired at the min. possible cost are discussed. Basic components (replicates, randomization, and local check) are briefly explained as well as some concepts on exptl. unit, exptl. error, accuracy, precision, and efficiency. Several methods to obtain the optimum no. of replications and the optimum size of the exptl. unit are also indicated. (Author's summary. Trans. by L.M.F.) K00

L00 GRAIN STORAGE

0402

18582 MADDEX, R.L. 1978. Handling and storage. In Robertson, L.S.; Frazier, R.D., eds. Dry bean production - principles and practices. East Lansing, Michigan State University. Cooperative Extension Service. Agricultural Experiment Station. Extension Bulletin E-1251. pp.196-209. Engl., Illus.

Phaseolus vulgaris. Storage. Agricultural equipment. Water content. Seed. USA.

Recommendations on equipment and systems of handling and storing beans on the farm in Michigan, USA, are given. Storage bins, belt conveyors, aeration and drying systems for beans (unheated and heated air) are described. (Summary by EDITEC. Trans. by L.M.F.) L00

L01 Stored Grain Pests

0403

17973 LUKANDO, N.F. 1978. Susceptibility of grain and legume crops to storage pests. In Kenya, University of Nairobi. Department of Crop Science. Technical Communication no. 21. pp.19-27. Engl., 11 Refs.

Phaseolus vulgaris. Acanthoscelides obtectus. Snap beans. Resistance. Stored grain pests. Kenya.

Susceptibility of maize, sorghum, wheat, chickpea, and haricot bean to storage pests is discussed. Regarding haricot bean, research is conducted on factors affecting its susceptibility to Acanthoscelides obtectus. According to preliminary results, it was found that var. differences exist and that for a given var., resistance is due to a no. of factors that act

alone or in combination: (a) thickness of testa; (b) presence of Ca oxalate crystals in the testa, and (c) presence of alkaloids or other chemicals which repel bruchids. It was also found that the roughness of the testa increases susceptibility. (Summary by F.G. Trans. by L.M.F.) L01

0404

18735 RHEENEN, H. A. VAN 1983. Oil treatments for protection against insects. Thika, Kenya, National Horticultural Research Station. Grain Legume Project. 9p. Engl., Sum. Engl., 16 Refs., Illus.

Paper presented at International Workshop in Integrated Pest Control for Grain Legumes, Goiania, Goias, Brazil, 1983.

Phaseolus vulgaris. Stored grain pests. Zabrotes subfasciatus. Acanthoscelides obtectus. Seed treatment.

The effect of oils and their possible applications in controlling storage grain pests are discussed. Crude oils have been found to perform better than purified oils while triglyceride-oleic acid combination was found the most effective. Acanthoscelides obtectus and Zabrotes subfasciatus in beans are controlled by vegetable oils, namely maize and sunflower oils. Amounts required range between 2-15 cc/kg seed, depending partly on the degree of infestation. Side effects and alternatives for oil treatments

(Summary by L.M.F.) L01

See also 0273

LIST OF ABBREVIATIONS

A	Angstrom(s)
ABA	Abscisic acid
ac	Acre(s)
Afr.	Afrikaans
a.i.	Active ingredient
alt.	Altitude
CAMD	Cassava African mosaic disease
CAMV	Cassava African mosaic virus
AMV	Alfalfa mosaic virus
approx.	Approximately
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 oxygen 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)
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
COD	Chemical oxygen demand
concd.	Concentrated
concn.	Concentration
CP	Crude protein
in.	Inches
i.e.	That is
Ital.	Italian
IU	International unit
J	Joule
Jap.	Japanese
kat	Katal(amount of enzymatic activity that converts 1 mole of substrate/s)
kcal	Kilogram-calorie(s)
kg	Kilogram(s)
Kj	Kilojoule
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
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
oz	Ounce(s)
P	Probability
Pa	Pascal(s)
PAN	Pexoxyacetic 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

km	Kilometer(s)
KNap	Potassium naphthenate
kR	Kiloroentgen(s)
l	Liter(s) (only in combination with no.)
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	α-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
pv.	Pathovar.
Ref(s).	Reference(s)
resp.	Respective(ly)
R*f*	Retardation factor-chromatography
RGRs	Relative growth rate
RH	Relative humidity
RNA	Ribonucleic acid
Rom.	Romanian
Russ.	Russian
S	Svedberg unit of sedimentation coeff. (10^{-13} S)
s	Second
$S_{20,w}$	Sedimentation coefficient corrected to water at 20°C
SBM	Soybean meal
SCN	Thiocyanate
SCP	Single cell protein
SDS	Sodium dodecyl sulfate
Sk.	Slovak
sp.	Specie
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	Tobacco 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)
α	*alpha*
β	*beta*
γ	*gamma*
δ	*delta*
ϵ	*epsilon*
λ	*lambda*
π	*pi*
ψ	*psi*
/	Per
μ	Micro
%	Percent(age)
>	More than, greater than
<	Less than
≤	Equal to or less than
≥	Equal to or greater than
±	Plus or minus
ϕ	Diameter
≪	Much less than
≫	Much greater than

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Abstracts on Field Beans

Phaseolus vulgaris L.

Centro Internacional de Agricultura Tropical

113

ABSTRACTS ON FIELD BEANS

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1.14

Abstracts on Field Beans

(*Phaseolus vulgaris* L.)

Vol. VIII | No. 3 | December, 1983

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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 fr 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.

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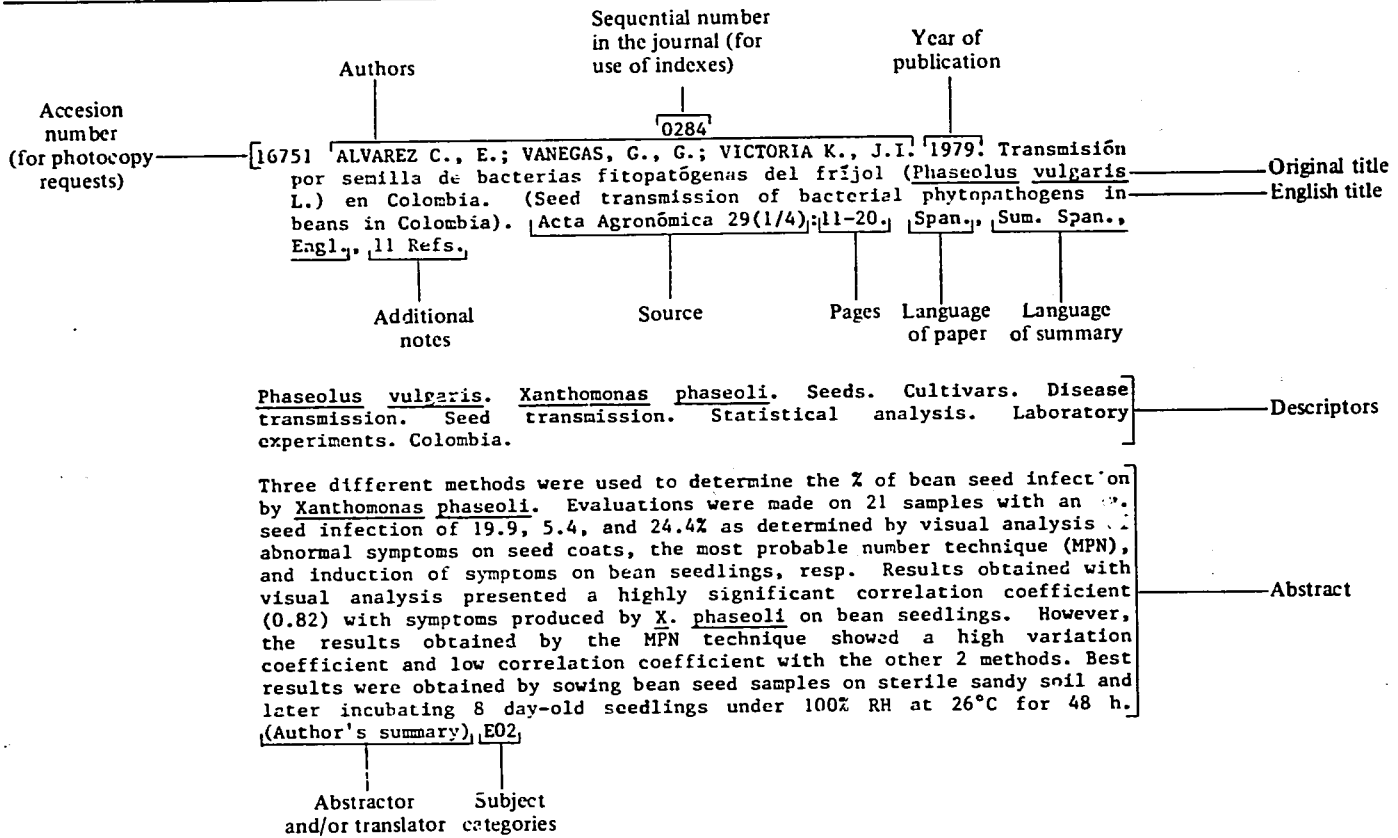
COMPONENTS OF AN ABSTRACT



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HOW TO USE THE INDEXES

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

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

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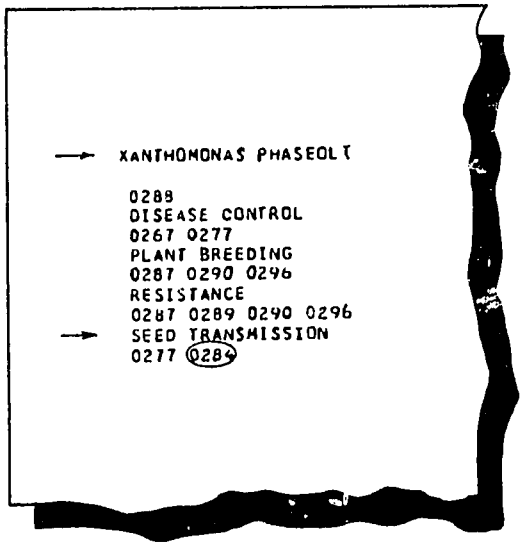

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120

A00 BOTANY, TAXONOMY AND GEOGRAPHICAL DISTRIBUTION

0405

19042 IZQUIERDO, J.A.; HOSFIELD, G.L. 1983. The relationship of seed filling to yield among dry beans with differing architectural forms. Journal of the American Society for Horticultural Science 108(1): 106-111. Engl., Sum. Engl., 25 Refs., Illus.

Phaseolus vulgaris. Cultivars. Plant architecture. Plant habit. Yields. Yield components. Determinate cultivars. Indeterminate cultivars.

Nine dry bean strains were compared, characterized by the following different architectures for seed filling, yield, and yield components: small bush, tall erect bush, classic II, and archetype. Small and tall erect bush are determinate in growth habit; classic II is indeterminate and produces a short vine. Archetype is erect, contains 2-4 branches angled acutely upward, grows to about 75 cm, terminates in a short vine, and does not lodge at maturity. Seed dry wt. vs. days after 50% flowering data were fit to a cubic polynomial to calculate the rate and duration of seed filling. Small bush produced the greatest no. of pods/m^2 of the groups, but pod set was offset by a high % of shriveling and seed abortion. The archetype outyielded the tall erect and small bush groups by 34 and 45%, resp., which was due to a greater no. of seeds/pod, seeds/m^2, and heavier seeds. The heavy seeds of the archetype compared with the bush appeared to be due to a longer filling duration, because linear seed filling rates were similar. The archetype filling duration was 11.3 days compared with 5.7 and 7.0 days for small and tall erect bush, resp. The longer archetype filling duration may be associated with its ability to prolong the duration of photosynthesis. The 17% yield increase of the archetype over classic II was due to improved lodging resistance through a modification of the morphology by reducing branches and narrowing the plant canopy. (Author's summary) A00

B00 PLANT ANATOMY, MORPHOLOGY AND CYTOLOGY

0406

18731 ANAYA, M.V. 1976. Estudios sobre la cinética de crecimiento e inducción de raíces en callos de Phaseolus vulgaris var. Pencil. (Studies on the kinetics of root growth and induction in callus of Phaseolus vulgaris var. Pencil). Tesis Lic. Biol. Mérida, Venezuela, Universidad de los Andes. 30p. Span., 22 Refs., Illus.

Phaseolus vulgaris. Tissue culture. Culture media. Rooting. Plant tissues. Roots.

Various culture media and chemical factors (auxins and cytokinins) inducing callus and root formation were studied in primary root segments of bean var. Pencil. The 7 culture media for callus induction received different concn. of 2,4-D, kinetin, yeast extract, and coconut water. During the exponential growth stage 5 agar media were examined regarding root formation from callus. Different concn. of 2,4-D and kinetin were added to each one. Results of histological tests under the microscope are described and illustrated. Growth of nondifferentiated tissues was greatest in Murashige and Skoog medium supplemented with Romberg vitamins in addition to (A) 2 mg 2,4-D/l + 2 mg kinetin/l and (B) 1 mg 2,4-D/l + 1 mg kinetin/l. Highest root production during a short period of time was observed in medium A, while production was slower and more limited in culture medium B. Root formation and growth from callus in a definite culture medium facilitates the in vitro study of nodulation and N fixation in bean, increasing the

control of factors regulating these processes. (Summary by EDITEC. Trans. by L.M.F.) B00

0407

19465 DEBOUCK, D.G. 1983. Contribution a l'etude des correlations perimeristematiques intervenant dans les processus de ramification et de floraison chez les haricots (Phaseolus). [Study on the perimeristematic correlations involved in branching and flowering of bean (Phaseolus)]. Mag.Sc. Thesis. Gembloux, Belgique, Faculte des Sciences Agronomiques de L'Etat. 235p. Fr., Sum. Fr., Engl., Span., 328 Refs., Illus.

Phaseolus vulgaris. Morphogenesis. Flowering. Plant habit. Plant anatomy. Leaves.

In a morphogenetical study of the growth habit within several bean species, the polymorphism of the main stem (with rank 0) and lateral branches (with rank 1, 2, 3) was analyzed. The multiple acropetal gradients towards floral structures, the variability of lateral branches sequences as well as the localization of sites with further vegetative development are discussed. The last term of the polymorphic sequence—the papilionaceous flower—should occur immediately at shoot bud initiation; otherwise, it will unavoidably operate in a plastochronic way either vegetative or inflorescent. Flowering does not affect the meristems of main stem and 1st rank branches but does affect branches of higher rank; so the term determinate is abusive in their case. The appearance of double terminal racemes on rank 0 and 1 axes is due to both the flowering of higher rank axillary buds so far inflorescent and the transformation of the axis lateral appendages into bracts. The control of these 2 events, which unavoidably appear sooner (determinate var.) or later (indeterminate var.) in the course of the Phaseolus ontogeny, was explored through morphogenetic correlations studies. It was observed that primary leaves of cv. Cordonco after 24 h of seed imbibition (beside other morphogenetic actions towards the next leaves and internodes) play a role in the floral evolution of the 2nd rank upper axillary buds. At the same time, they take some part in the transformation of the main stem lateral appendages into bracts probably through the next-to-appear foliar primordia. At this stage during the course of ontogeny, the cotyledons seem to intervene in the opposite way. The role played by other bean plant organs in the expression of the bud polymorphism is discussed in relation to the above mentioned actions. (Author's summary) B00

C00 PLANT PHYSIOLOGY

0408

18758 ASENCIO, C.I.; CEDENO-MALDONADO, A. 1979. Effects of cadmium on carbonic anhydrase and activities dependent on electron transport of isolated chloroplasts. Journal of Agriculture of the University of Puerto Rico 63(?):195-201. Engl., Sum. Engl., Span., 12 Refs., Illus.

Phaseolus vulgaris. Cd. Chloroplasts. Enzymes. Inhibitors. CO_2. Carbon fixation. Plant physiological processes.

Chloroplasts extracted from 2-wk.-old seedlings of bean cv. Jamapa were subjected to 0 or 50 mM $CdCl_2$/100 mg chlorophyll for 0-30 min. CO_2 fixation was inhibited by Cd treatment and this inhibition was exacerbated by dark preincubation. Carbonic anhydrase (an enzyme associated with CO_2 fixation) was very sensitive to Cd in impure or partially purified form of in intact chloroplasts. Inhibition occurred at Cd concn. lower than those required to inhibit electron transport. (Summary by Field Crop Abstracts) C00

127

0409

19055 GHOBRIAL, G.I. 1983. Effects of root pruning on translocation of photosynthates in Phaseolus vulgaris L. Journal of Experimental Botany 34(138):20-26. Engl., Sum. Engl., 22 Refs., Illus.

Phaseolus vulgaris. Pruning. Roots. Translocation. Nutrient transport. Nutrient solution. Africa.

Root pruning increased the level of ethanol-soluble sugars in red kidney bean plants grown in aerated nutrient solution. However, the concn. gradient of these sugars down the stem and its translocation velocity remained unchanged. Removal of 50% of the roots had no effect on the total photosynthates exported from source leaves but the final distribution pattern of photosynthates was altered; less moving toward the upper plant parts, and accumulation occurring in the lower stems. Translocation velocity of photosynthates toward the upper plant parts was drastically reduced by root pruning. (Author's summary) COO

0410

18770 GIAQUINTA, R.; GEIGER, D.R. 1977. Mechanism of cyanide inhibition of phloem translocation. Plant Physiology 59(2):178-180. Engl., Sum. Engl., 18 Refs., Illus.

Phaseolus vulgaris. Translocation. Nutrient transport. Petioles. Inhibitors.

Petiolar application of KCN inhibited ^{14}C-assimilate translocation without affecting source leaf photosynthesis or phloem loading of sucrose in bean cv. Black Valentine. The inhibition of transport was correlated with disruption of the structural integrity of the sieve tubes (sieve pore blockage) rather than impairment of a metabolic process in the path driving translocation. (Author's summary) COO

0411

18774 HANISCH TEN CATE, C.H.; BRETELER, H. 1982. Effect of plant growth regulators on nitrate utilization by roots of nitrogen-depleted dwarf bean. Journal of Experimental Botany 33(132):37-46. Engl., Sum. Engl., 29 Refs., Illus.

Phaseolus vulgaris. Plant growth substances. Plant assimilation. Indoleacetic acid. Cytokinins. Dwarf beans.

The effect of pretreatments (18 h at 5 micromol/dm^3) with ABA, the ethylene-releasing substance 'Ethephon', GA, IAA, kinetin, and zeatin on nitrate uptake and in vivo nitrate reductase activity (NRA) in roots of N-depleted bean cv. Witte Krombek was examined. Nitrate uptake showed an apparent induction pattern with a steady state after about 6 h, in all treatments. The nitrate uptake rate after 6 h was unaffected or at most 30% lower after treatments with the plant growth regulators. GA, kinetin, and zeatin induced substantial NRA in roots in the absence of nitrate, whereas Ethephon enhanced NRA only during nitrate nutrition. Kinetin-induced NRA (Ki-NRA) was maximal after a pretreatment at 1 micromol/dm^3, and showed a lag phase of 6-8 h. Ki-NRA was additive to nitrate-induced NRA (NO_3^--NRA) for at least 24 h, independent of the induction sequence. After full induction, Ki-NRA approximated 20% of NO_3^--NRA. ABA counteracted the development of Ki-NRA, but not of NO_3^--NRA. Cycloheximide and tungstate were equally effective to suppress the development of NRA after supply of kinetin of NO_3^-. Data are consistent with the operation of 2 independent enzyme fractions (Ki-NRA and NO_3^--NRA) with apparently identical properties

but with separate control mechanisms. The absence of major effects of plant growth regulators on the time-course and rate of nitrate uptake suggests that exogenous regulators, and possibly endogenous phytohormones, are of minor importance for initial nitrate uptake. The differential effect of some regulators on nitrate uptake and root NRA furthermore indicates that the processes of uptake and reduction of NO_3^- are not obligatory or exclusively coupled to each other. (Author's summary) C00

0412

18791 KATEKAR, G.F.; GEISSLER, A.E. 1975. Auxin transport inhibitors. Fluorescein and related compounds. Plant Physiology 56(5):645-646. Engl., Sum. Engl., 23 Refs., Illus.

Phaseolus vulgaris. Inhibitors. Auxins. Indoleacetic acid.

Fluoresceins were shown to be effective inhibitors of IAA transport in Phaseolus vulgaris petioles, eosin having the same order of activity as 2,3,5-triiodobenzoic acid and naptalam, with fluorescein less effective. It was suggested that many of the effects of fluoresceins on plants, especially on those which involve auxin, are at least partially due to inhibition of auxin transport. (Author's summary) C00

0413

18510 KIRKHAM, M.B.; GARDNER, W.R.; GERLOFF, G.C. 1972. Stomatal conductance of differentially salinized plants. Plant Physiology 49(3): 345-347. Engl., Sum. Engl., 5 Refs., Illus.

Phaseolus vulgaris. Stomata. Leaves. Nutrient solution. Salinity. Plant physiological processes.

Stomacal resistance was measured daily with a stomatal diffusion porometer during a 4-wk. period in leaves of bean var. Bush Blue Lake and barley var. Liberty plants having roots equally split between 2 differentially salinized nutrient solutions. In bean plants with roots in media of 0 or -4 bars salinity, or with 50% of the roots in water and 50% in a salinity of -4 bars, and in barley plants under the same conditions but with salinities of -15 bars, the stomatal conductance of plants with roots half in saline solution was intermediate to those of the other treatments. It was concluded that the stomatal diffusion parameter used to measure stomatal resistance in these expt. could be used to diagnose stress conditions in plants prior to the appearance of visible injury. (Summary by Field Crop Abstracts) C00

0414

18309 KRIEDEMANN, P.E.; LOVEYS, B.R.; FULLER, G.L.; LEOPOLD, A.C. 1972. Abscisic acid and stomatal regulation. Plant Physiology 49(5):842-847. Engl., Sum. Engl., 22 Refs., Illus.

Phaseolus vulgaris. Stomata. Leaves. Inhibitors. Plant physiological processes.

Application of ABA to the cut ends of leaf petioles of Phaseolus vulgaris and sugar beet caused stomatal closure in 8-9 min. The time and ABA concn. needed was dependent on the ABA content of the leaves, but contents of 8.9 moles ABA/cm^2 gave stomatal closure in P. vulgaris leaves. Racemic ABA had 50% of the activity of (+)-ABA, and trans-ABA and the methylester were inactive. It is suggested on the basis of the effect of stress on ABA levels and the ability of very small amounts of ABA to bring about stomatal

closure that stomatal control is a normal physiological function of ABA in leaves. (Summary by Field Crop Abstracts) C00

0415

19099 MARQUES, I.A.; OBERHOLZER, M.J.; ERISMANN, K.H. 1983. Effects of different inorganic nitrogen sources on photosynthetic carbon metabolism in primary leaves of non-nodulated Phaseolus vulgaris L. Plant Physiology 71(3):555-561. Engl., Sum. Engl., 30 Refs., Illus.

Phaseolus vulgaris. N. Plant nutrition. Photosynthesis. Leaves. Metabolism. Enzymes.

Young plants of bean var. Saxa were fed with 3 different types of inorganic N_4 after being grown on N-free nutrient solution for 8 days. The pattern of $^{14}CO_2$ fixation was investigated in photosynthesizing primary leaf discs of 11-day-old plants (3 days with N source) and in a pulse-chase expt. in 13-day-old plants (5 days with N source). Ammonium caused, in contrast to nitrate nutrition, a higher level of ^{14}C incorporation into sugar phosphates but a lower incorporation of label into malate, glycolate, glycerate, aspartate, and alanine. The labeling kinetics of glycine and serine were changed little by the N source. Ammonium feeding also produced an increase in the ratio of extractable activities of ribulose-1,5-bisphosphate carboxylase to phosphoenolpyruvate carboxylase and an increase in dark respiration and the CO_2 compensation concn. Net photosynthesis was higher in plants assimilating nitrate. The results point to stimulated turnover of the photosynthetic carbon reduction cycle metabolites, reduced phosphoenolpyruvate carboxylation, and altered turnover rates within the photosynthetic carbon oxidation cycle in ammonium-fed plants. Mechanisms of the regulation of primary carbon metabolism are proposed and discussed. (Author's summary) C00

0416

19045 POWLES, S.B.; CHAPMAN, K.S.R.; WHATLEY, F.R. 1982. Effect of photoinhibitory treatments on the activity of light-activated enzymes of C_3 and C_4 photosynthetic carbon metabolism. Plant Physiology 69(2):371-374. Engl., Sum. Engl., 24 Refs.

Phaseolus vulgaris. Leaves. Enzymes. Light. Plant physiological processes.

Exposure of maize leaves to a 3-h photoinhibitory treatment (photon flux rate of 2000 microeinsteins/m^2/s, CO_2-free air) resulted in lower activities of the light-activated enzymes NADP malate dehydrogenase, pyruvate, Pi dikinase, and ribulose-5-phosphate kinase. The activities could be recovered partially either by incubating enzyme extracts with dithiothreitol or by illuminating the treated leaf in air. Several enzymes which are not light-activated were not affected by the treatment. Ribulose-5-phosphate kinase activity was also reduced when bean plants grown in low light were subjected to a similar photoinhibitory treatment. It is suggested that, although the reactivation of these enzymes may be correlated with the short term increase of CO_2 uptake capacity observed when photoinhibited leaves are returned to illumination in air, inactivation of these enzymes does not contribute significantly to the long term in vivo expression of photoinhibition observed after 2-4 h. The results provide an example of partial inactivation of light-activated enzymes under illumination equivalent to full sunlight. (Author's summary) C00

0417

19006 SIMINI, M.; LEONE, I.A. 1982. Effect of photoperiod, temperature, and relative humidity on chloride uptake of plants exposed to salt

spray. Phytopathology 72(9):1163-1166. Engl., Sum. Engl., 32 Refs., Illus.

Phaseolus vulgaris. Photoperiod. Temperature. Relative humidity. Plant assimilation. Leaves. Cl.

The effect of day length, temp., and RH on chloride uptake by leaves of plant species with widely differing salt-spray tolerance was determined. Phaseolus vulgaris, tomato, and 9 tree and shrub species were exposed to airborne salt sprays with a composition similar to that found within 600 m of the New Jersey coast (USA). Cl uptake by leaves of P. vulgaris was 300-500% of uptake by unsprayed control plants and was enhanced by low temp. (10°C) and high RH after treatment. (Summary by Field Crop Abstracts) COO

0418

18771 SMILLIE, R.M.; NOTT, R. 1982. Salt tolerance in crop plants monitored by chlorophyll fluorescence in vivo. Plant Physiology 70(4):1049-1054. Engl., Sum. Engl., 24 Refs., Illus.

Phaseolus vulgaris. Resistance. Salinity. Leaves. Nutrient solution. Chlorophyll.

Expt. on sugar beet, sunflower, and Phaseolus vulgaris demonstrated that salt stress in leaves could be detected by measurement of the chlorophyll fluorescence of leaf discs, even where photosynthetic activity was reduced in the absence of visible symptoms. Unlike in sugar beet and sunflower, leaves of salt-treated bean progressively lost chlorophyll. The rate of slow quenching of chlorophyll fluorescence decreased indicating development of a partial block after photosystem II and possible initial stimulation of photosystem II activity declined. With further loss of chlorophyll photosystem II activity declined. The method is rapid and nondestructive of plants and the equipment needed is portable. (Summary by Plant Breeding Abstracts) COO

See also 0451 0492 0528

C01 Plant Nutrition

0419

18796 CHAUDHRY, F.M.; WALLACE, A.; MUELLER, R.T. 1977. Barium toxicity in plants. Communications in Soil Science and Plant Analysis 8(9):795-797. Engl., Sum. Engl., 2 Refs.

Phaseolus vulgaris. Dwarf beans. Ba. Toxicity. Ca. Mg. K. Sr. Yields. Plant assimilation.

The level of Ba in plants necessary to cause bean and barley yield depression was studied. Av. DM yields of Phaseolus vulgaris plants after growth in 500 g of loam soil were reduced from 0.75-0.86 g/plant with 0-1000 micrograms Ba/g soil to 0.32-0.35 g/plant with 2000 micrograms Ba/g soil, with or without application of $CaCO_3$. Bean leaves contained approx. 2% Ba following the highest rate of Ba application. (Extracted from summary by Field Crop Abstracts) C01

126

0420

18795 ROMNEY, E.M.; WALLACE, A.; ALEXANDER, G.V.; CHA, J.W. 1982. The effect of stable strontium superimposed upon soil uniformly contaminated with strontium-85 on uptake of strontium-85 by bush bean plants. Soil Science 134(1):76-79. Engl., Sum. Engl., 20 Refs.

Phaseolus vulgaris. Nutrient absorption. Sr. Mineral content. Dwarf beans. Nutrient transport. Ca.

In pot trials, bush bean plants were grown for · ' days in Yolo loam soil to which ^{85}Sr had been added. Stable Sr was additionally applied at 0, 10, 25, and 100 micrograms/g of soil. Uptake of both forms of Sr showed that the soil contained about 8 micrograms available native Sr/g soil. Without added Sr, primary leaves, trifoliate leaves, and stems contained 72, 30, and 64 micrograms stable Sr/g, resp. Stable Sr addition increased plant uptake of stable Sr. It was suggested that native soil Sr would have a much greater effect than soil Ca on radioactive Sr transport. (Author's summary) COl

0421

18753 TEMPLE-SMITH, M.G.; KOEN, T.B. 1982. Comparative response of poppy (Papaver somniferum L.) and eight crop and vegetable species to manganese excess in solution culture. Journal of Plant Nutrition 5(9): 1153-1169. Engl., Sum. Engl., 27 Refs., Illus.

Phaseolus vulgaris. Nutrient solution. Mn. Composition. Mineral content. Toxicity. Plant tissues.

The relative response of poppy (Papaver somniferum) and 8 crop and vegetable species, including Phaseolus vulgaris cv. G.V. 50, to excess Mn was investigated in a glasshouse solution culture expt. Plant yields and Mn concn. were measured after 2 and 6 wk. growth at 5 levels of Mn (10, 100, 200, 400, and 800 micromolar). Poppies were highly sensitive to Mn toxicity in solution culture and reductions in shoot yield occurred at lower Mn levels in solution and at lower shoot Mn concn. compared with the following sensitive species, ranked in order of increasing tolerance: brussels sprout, barley, green beans, lucerne, and green pea. Shoot DM yields of bean decreased significantly as the Mn level in solution increased from 10 to 800 micromolar. The Mn-sensitive species were compared on the basis of relative yields due to the large differences among species in actual dry wt. At the 1st harvest, poppy, brussels sprout, and green bean had the highest tissue Mn levels of the 10 species tested at solution concn. of 200-800 micromolar Mn. Shoot Mn toxicity threshold value for bean was 500 micrograms Mn/g DM. (Extracted from author's summary) COl

0422

19083 VEIGA, C.L.; RUCHEK, A.P. 1981. Absorcao de nitrogenio na forma ionica e molecular de cultivares de feijoeiro (Phaseolus vulgaris L.). (Absorption of nitrogen in ionic and molecular forms by bean cultivars). Revista do Centro de Ciencias Rurais 11(2/3):153-161. Port., Sum. Port., Engl., 18 Refs.

Phaseolus vulgaris. Cultivars. Nutrient absorption. N. Rhizobium phaseoli. Inoculation. Nitrogen fixation. Mineral content. Canopy.

The capacity for N utilization when supplied in different mineral and molecular forms on N-uptake and symbiotic N-fixation was assessed at the Centro de Energia Nuclear na Agricultura, Piracicaba, SP, Brazil, under greenhouse conditions in a modified 1/5 Hoagland nutrient solution. Twelve bean cv. (Porrillo Sintetico, Aroana, Moruna, Carioca Precoce, 51051,

N-159, Carioca, Mexico 309, Negro 325, Ica Pijao, Composte Negro Chimaltengo, and Venezuela 350) were used, with 2 levels of N (42 or 4.2 ppm). Plants were inoculated with a mixture of 3 Rhizobium phaseoli strains. Samples were taken 40 days after germination. The following parameters were studied: dry wt. of canopy, total N, nodule dry wt., nitrate reductase and nitrogenase activities. Plants grew better in complete nutrient solution than when inoculated. The best cv. for N-uptake and utilization of N_2-fixation were Carioca Precoce and Ica Pijao. Aroana, Carioca, and Venezuela 350 tended to be good N-fixing cv. and for N-uptake in ionic form. (Author's summary) C01

0423

18573 VITOSH, M.L.; CHRISTENSON, D.R.; KNEZEK, B.D. 1978. Plant nutrient requirements. In Robertson, L.S.; Frazier, R.D., eds. Dry bean production—principles and practices. East Lansing, Michigan State University. Cooperative Extension Service. Agricultural Experiment Station. Extension Bulletin E-1251. pp.94-111. Engl., Sum. Engl., 11 Refs., Illus.

Phaseolus vulgaris. Fertilizers. N. P. K. Mn. Zn. S. Mineral deficiencies. Agricultural lime. Micronutrients. Plant nutrition. USA.

The potential sources of essential nutrients for beans are discussed: soil, fertilizer, manure, rain, irrigation water, and air (especially N). Nutrient deficiency symptoms in beans regarding N, P, K, Mn, Zn, and S are described and the methods used to diagnose nutrient requirements (soil testing and plant tissue analysis) are discussed for N, P, K, lime, Ca, Mg, S, Zn, and Mn. Results of research in Michigan, USA, and the amounts of fertilizers recommended according to these trials are given. Beans respond to 40 lb applied N/ac. No responses to P were observed at soil test levels above 40 lb/ac (Bray I) or to K at soil test levels above 160-180 lb/ac. On high pH soils (above 6.8), response to Zn and Mn may be expected if soil test levels for these nutrients are low. (Summary by EDITEC. Trans. by L.M.F.) C01

0424

18747 VYAS, B.N.; MISTRY, K.B. 1978. Studies on the uptake of plutonium from major Indian soils and its distribution in plants. Journal of Environmental Quality 7(4):533-536. Engl., Sum. Engl., 19 Refs.

Phaseolus vulgaris. Plant assimilation. Soils. Pu. Mineral content.

Pot trials were conducted to study the plant uptake of Pu from major Indian soil types and its distribution in plants. It was observed that, irrespective of plant species, the highest amount of Pu was absorbed from acidic laterite soil having predominantly kaolinite clay mineral and low CEC, followed by alluvial soil, and the lowest from black alkaline soil with predominantly montmorillonite clay and high CEC. Pu concn. ratios for Phaseolus vulgaris and maize ranged from 1.5×10^{-4} to 9.6×10^{-4} for the aerial tissues and from 13.9×10^{-4} to 15.3×10^{-4} for roots; the values for bean were higher than those for maize over identical durations of plant growth. The distribution pattern of Pu in bean plants grown to maturity in labelled nutrient solution indicated max. concn. of Pu in roots and a marked acropetal gradient in the aerial tissues. Further, split-root studies indicated that Pu absorbed by roots from the soil was not subsequently released into the nutrient solution. Fractionation of Pu in freshly harvested bean pods indicated that the max. amount of Pu (39.11%) was associated with ionic forms extractable by $HClO_4$. The concn. of Pu associated with the ethanol fraction (13.00%), HCl fraction (11.44%),

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acetone insoluble fraction (7.58%), NaOH fraction (11.39%), and lignin and cellulose fraction (12.24%) were next in significance. The nucleic acid fraction was found to contain the lowest concn. (5.18%) of the radionuclide. (Auchor's summary) C01

0425

18763 WALLACE, A. 1977. Effect of concentration on uptake of some trace metals by plants. Communications in Soil Science and Plant Analysis 8(9):689-691. Engl., Sum. Engl., 10 Refs.

Phaseolus vulgaris. Plant assimilation. Cu. Zn. Co.

Data derived from previous research work involving the study of trace metal uptake by plants, including Cu, Zn, and Co uptake by Phaseolus vulgaris and Cd uptake by maize, is discussed. Uptake of trace metals at different concn. was generally found to be closely related to the decay constant, ln2. (Summary by Field Crop Abstracts) C01

See also 0446 0452 0453

C02 Plant Development

0426

19005 KANTHARAJ, G.R.; MAHADEVAN, S.; PADMANABAN, G. 1979. Early biochemical events during adventitious root initiation in the hypocotyl of Phaseolus vulgaris. Phytochemistry 18(3):383-387. Engl., Sum. Engl., 14 Refs., Illus.

Phaseolus vulgaris. Snap beans. Auxins. Rooting. RNA. Proteins.

IBA initiates roots in the hypocotyl of French bean. The response is dependent on the concn. of IBA and the duration of exposure to the hormone. IBA enhances the rate of total protein synthesis in approx. 30 min after exposure of the hypocotyl segments to the hormone. There is no detectable change in total or poly(A)-containing RNA synthesis in this period, although significant increases are seen 2 h after hormone pretreatment. The early IBA-mediated increase in protein synthesis (30 min) is not sensitive to actinomycin D, but the antibiotic blocks the increase manifested 2 h after hormone pretreatment. Inhibition of early protein synthesis by cycloheximide depresses and delays root initiation. Cytosol prepared from IBA-treated hypocotyl tissue stimulates protein synthesis in vitro to a greater extent than that of the control. (Author's summary) C02

0427

19046 NILSEN, K.N.; HODGES, C.F. 1983. Hypobaric control of ethylene-induced leaf senescence in intact plants of Phaseolus vulgaris L. Plant Physiology 71(1):96-101. Engl., Sum. Engl., 26 Refs., Illus.

Phaseolus vulgaris. Leaves. Temperature. Photoperiod. Chlorophyll. Timing. Chlorosis. Growth. Plant physiological processes.

A controlled atmospheric-environment system (CAES) designed to sustain normal or hypobaric ambient growing conditions was developed, described, and evaluated for its effectiveness as a research tool capable of controlling ethylene-induced leaf senescence in intact plants of Phaseolus vulgaris. Senescence was prematurely induced in primary leaves by treatment with 30 ppm ethephon. Ethephon-derived endogenous ethylene reached peak

levels within 6 h at 26°C. Total endogenous ethylene levels then temporarily stabilized at approx. 1.75 microliters/l from 6 to 24 h. Thereafter, a progressive rise in ethylene resulted from leaf tissue metabolism and release. Throughout the study, the endogenous ethylene content of ethephon-treated leaves was greater than that of nontreated leaves. Subjecting ethephon-treated leaves to atmospheres of 200 millibars, with O_2 and CO_2 compositions set to approx. normal atmospheric partial pressures, prevented chlorophyll loss. Alternately, subjecting ethephon-treated plants to 200 millibars of air only partially prevented chlorophyll loss. Hypobaric conditions (200 millibars), with O_2 and CO_2 at normal atmospheric availability, could be delayed until 48 h after ethephon treatment and still prevent most leaf senescence. In conclusion, hypobaric conditions established and maintained within the CAES prevented ethylene-induced senescence (chlorosis) in intact plants, provided O_2 and CO_2 partial pressures were maintained at levels approximating normal ambient availability. An unexpected increase in endogenous ethylene was detected within nontreated control leaves 48 h subsequent to relocation from winter greenhouse conditions (lat. 42°00" N) to the CAES operating at normal ambient pressure. The longer photoperiod and/or higher temp. utilized within the CAES are hypothesized to influence ethylene metabolism directly and growth-promotive processes (response thresholds) indirectly. (Author's summary) CO2

0428

18768 SMITH, J.G. 1973. Embryo development in Phaseolus vulgaris. 2. Analysis of selected inorganic ions, ammonia, organic acids, amino acids, and sugars in the endosperm liquid. Plant Physiology 51(3): 454-458. Engl., Sum. Engl., 24 Refs.

Phaseolus vulgaris. Embryo. Analysis. Ca. K. Mg. P. Amino acids. Sugars. Plant development. Tissue culture.

Analysis of the endosperm liquid bathing the embryo of Phaseolus vulgaris cv. Black Valentine and Topcrop during development showed a decrease in osmolarity and in K, P, Mg, NH_4, and organic acid contents, the presence of amino acids, and an increase in the content of sucrose, but not in reducing-sugar content. These results are discussed in relation to the culture of bean embryos in vitro. Comparisons are made with the compositions of other media which have been used for plant embryo or tissue culture. (Summary by Field Crop Abstracts) CO2

0429

18728 WALTON, D.C.; SONDHEIMER, E. 1972. Activity and metabolism of ^{14}C-(±)-abscisic acid derivatives. Plant Physiology 49(3):290-292. Engl., Sum. Engl., 13 Refs., Illus.

Phaseolus vulgaris. Abscission. Plant growth substances. Metabolism.

Several radioactive analogues of ABA were tested for their growth-inhibitory effects and their metabolism in excised embryonic axes of Phaseolus vulgaris. The compounds tested were the methyl and ethyl esters of 2-^{14}C-ABA and the cis- and trans-1',4'-diols of 2-^{14}C-ABA. All 4 compounds caused less growth inhibition than ABA, and all 4 compounds were converted to ABA in the axes at rates which were sufficient to account for most, if not all, of the observed growth-inhibitory activity. None of the 4 compounds were metabolized to the extent that ABA was metabolized in the axes, suggesting that the structural requirements for growth-inhibitory activity and metabolism may be similar. (Author's summary) CO2

See also 0444 0448 0449 0455 0458 0482 0587

130

0430

17730 AGUILERA, J.M.; LUSAS, E.W.; UEBERSAX, M.A.; ZABIK, M.E. 1982. Roasting of navy beans (Phaseolus vulgaris) by particle-to-particle heat transfer. Journal of Food Science 47(3):996-1000,1005. Engl., Sum. Engl., 25 Refs., Illus.

Phaseolus vulgaris. Seed. Processing. Mechanization. Temperature. Water content. Protein content. Ash content. Amino acids.

A rotating chamber dry roaster using preheated ceramic beads as heat transfer media was used to roast navy beans. Processing conditions were: beads temp., 240 and 270°C; bean-to-bead ratio, 1:10, and 1:15; and contact times, 1 and 2 min. Product temp. achieved ranged from 92-125°C for the 8 runs. Heat transfer coefficient (W) varied from 3.6-23.4 superficial W/(m^2)(°C). Roasted products showed reduced water-soluble N content and gel forming capacity, increased water-holding capacity and cold paste viscosities. There were no changes in available lysine and degree of starch damage. Residual trypsin inhibitor (TIA) and hemagglutinin activity varied from 92 to 22%, and 48 to 1%, resp. A correlation was found between N solubility index and TIA of products. Roasting caused fracture and separation of hulls, and facilitated their removal. (Author's summary) C03

0431

17871 BAKKEN, T.J.; BOE, A.A. 1982. Two bioassay techniques for determining abscisic acid concentrations. Journal of the American Society for Horticultural Science 107(1):109-112. Engl., Sum. Engl., 15 Refs., Illus.

Phaseolus vulgaris. Snap beans. Embryo. Analysis. Composition.

Two bioassay techniques for determining ABA concn. are reported. One used snap bean cv. Improved Tendergreen embryos while the other used lettuce (Lactuca sativa) hypocotyls. The bean embryo assay requires that seeds 1st be soaked overnight, then the embryos excised and placed in known concn. of synthetic (RS)-ABA for 24 h, and finally measured. Seven concn. were tested: 0.01, 0.1, 0.5, 1.0, 10, 50, and 100 micrograms/ml with 3 replications/treatment and 5 embryoa/replication. The lettuce hypocotyl assay utilizes seeds incubated for 48 h, then placed in known concn. of (RS)-ABA for 72 h and finally measured. A dose-response curve of each bioassay may then be used to determine unknown concn. of ABA. The bean embryo test was more rapid, but the lettuce hypocotyl assay was simpler and more sensitive. Elongation of bean embryos and lettuce hypocotyls was inversely correlated to the log concn. of (RS)-ABA within the range of 0.01-100 and 0.01-100 micrograms/ml, resp. (Author's summary) C03

0432

19460 JOHNSON, S.; GRAYSON, G.; ROBINSON, L.; CHAHADE, R.; McPHERSON, A. 1982. Biochemical and crystallographic data for phaseolin, the storage protein from Phaseolus vulgaris. Biochemistry 21(20):4839-4843. Engl., Sum. Engl., 24 Refs., Illus.

Phaseolus vulgaris. Proteins. Phaseollin. Biochemistry. Analysis.

A major seed protein from Phaseolus vulgaris, that appears to be identical with a form of the storage protein of that plant seed known as phaseolin, was isolated and biochemically characterized. It appears very similar in most properties to the storage protein from Canavalia ensiformis solved to

3.0-Å resolution using X-ray diffraction techniques. A preliminary X-ray diffraction analysis was conducted on crystallized phaseolin. Data show the crystals belong to a pseudocubic space group P432, although the symmetry can be, strictly speaking, only P1. The unit cell has one trimeric molecule of 150,000 daltons in a unit cell of dimensions a = b = c = 66.6 and alpha = beta = gamma = 90°. The crystals apparently possess some form of disorder that makes reconciliation of the unit cell contents with the observed crystallographic properties difficult, although they do diffract strongly to better than 2.8-Å resolution. No evidence of twinning has been observed. (Author's summary) C03

0433

18798 NISHIMOTO, R.K. 1981. Comparative effects of Polado™ on several horticultural crops. Honolulu, University of Hawaii. Hawaii Institute of Tropical Agriculture and Human Resources. Research Series no. 004. 11p. Engl., Sum. Engl., 4 Refs., Illus.

Phaseolus vulgaris. Maturation. Toxicity. Symptomatology. USA.

A sugarcane ripener, Polado™ (glyphosate), was sprayed over various horticultural crops in Hawaii (USA) to determine general toxicity levels and the type of symptoms that might result from misapplication. Bean cv. Greencrop was the most sensitive, symptoms occurring at 0.0042 lb/ac. Pawpaw cv. Kapoho Solo was the most tolerant, requiring 0.17 lb/ac to produce symptoms. The order of sensitivity established was bean more than tomato cv. Hawaii Selection 8221, lettuce cv. Anuenue, cucumber cv. Burpee Hybrid more than Chinese cabbage cv. China King, and maize more than pawpaw. Injury symptoms were very similar to those induced by the cane ripener Polaris (glyphosine). (Extracted from author's summary) C03

0434

19079 SAWAZAKI, H.E.; TEIXEIRA, J.P.F.; ALMEIDA, L.D'A. DE 1981. Variacao do teor de prolina em folhas de feijao em funcao da disponibilidade de agua no solo. (Variations in the proline content of bean leaves in response to the availability of soil water). Bragantia 40:47-56. Port., Sum. Port., Engl., 14 Refs., Illus.

Phaseolus vulgaris. Cultivars. Water stress. Amino acids. Leaves. Irrigation.

The accumulation of free proline in bean leaves when subjected to water stress was studied in 18 bean cv. and 2 strains under greenhouse conditions. Samples of primordial leaves were taken after 11 and 15 days of water stress and 4 days after reinitiating irrigation after the 11-day period of water stress to estimate proline content. Plants irrigated daily were used as controls. Results obtained showed differences among cv. and among treatments regarding proline content and the capacity for accumulating this amino acid. Cv. Jalo, Roseli, and Roxao Lustroso had the highest proline contents (more than 7 micromoles/g DM) whereas Moruna and Curitibano-Bairro das Palmeiras had the lowest proline contents (less than 3 micromoles/g DM) after 15 days of water stress. Rehydrated plants after 11 days of water stress showed proline contents similar to that of irrigated plants (control). Tested materials were classified according to their capacity for free proline accumulation in leaves. (Author's summary) C03

0435

19048 SAVE, H. 1983. Long-term effects of low levels of SO_2 on bean plants (Phaseolus vulgaris). 2. Immission-response effects on biomass

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production: quantity and quality. Physiologia Plantarum 57(1):108-113. Engl., Sum. Engl., 31 Refs., Illus.

Phaseolus vulgaris. Nutrient solution. SO_2. Analysis. Chlorophyll. Leaves. Carbohydrate content. Starch content. Mineral content Enzymes. Protein content. Amino acids. Biomass.

Plants of bean cv. Processer were grown in water culture with separate air supply to roots for 4-5 wk. at 5 levels of SO_2 ranging from 10 to 950 micrograms/m^3. At harvest the plant material was divided into 6 fractions: root, stem, fruit, and leaves of 3 age groups. Plants were mainly affected at and above approx. 250 micrograms SO_2/m^3. Fresh wt. was reduced in mature and old leaves, and roots and fruit. Dry wt. was also reduced in mature and old leaves, and roots and stem. A reduction was found in chlorophyll a and chlorophyll b in mature and old leaves, and starch was also reduced in the leaves. S content of leaves and fruit increased with exposure time and concn., while Br, Ca, Cl, K, Mn, P, and Zn increased at the highest SO_2 level only. Total (but not specific) peroxidase activity increased in all aerial fractions; soluble protein also increased. Seventeen studied amino acids all increased on the av. by 38% in mature bean pods. The observed effects may be parts of a reaction for survival and propagation of the plant, as fruit quality was not affected, indeed, it sometimes improved slightly. The latter observation is of commercial interest. (Author's summary) C03

0436

18737 SISTRUNK, W.A.; REDDY, K.B.; GONZALEZ, A.R. 1982. Relationship of cultivar and maturity to protein, fiber, and seed of canned green beans. Arkansas Farm Research 31(3):6. Engl.

Phaseolus vulgaris. Cultivars. Maturation. Protein content. Fibre content. Harvesting. Timing. Snap beans. Canned beans. Seed.

The effect of 7 green bean cv. (BBL-94, BBL-47, Tidalwave, Early Gallatin, BBL-92, E-6207, and Exp. 611), 3 harvests at 3-day intervals, and 3 sieve sizes (4, 5, and 6) on the quality of graded, snipped, and cut beans canned by standard commercial procedures was studied. Fiber, seed, DM, and shearpress values were higher in cv. BBL-94 (0.253%, 13.7%, 7.93%, and 123.4 lb/150 g, resp.), Early Gallatin (0.149%, 11.0%, 7.62%, and 106.5 lb/150 g, resp.), and Exp. 611 (0.179%, 10.2%, 7.39%, and 101.6 lb/150 g, resp.). Protein content was significantly higher in BBL-94 (1.35%) and Exp. 611 (1.27%). All quality parameters increased with a delay in harvest (fiber content increasing more) and an increase in sieve size. The mean max. protein content of 1.3% was attained in the 3rd harvest and in sieve size 6. Significant interaction was observed between cv. and harvest on fiber, seed, and protein contents. Quality parameters also differed among cv. depending on the sieve size. There was a highly significant correlation between the % seed and % fiber (r = 0.869), the % seed and shearpress (r = 0.859), the % seed and % protein (r = 0.887), and the % seed and the % DM (r = 0.929). Protein content of canned green beans can be increased significantly by delaying the harvest date without causing the beans to exceed the limits of fiber. Cv. with higher seed % reached higher levels of protein. (Summary by EDITEC. Trans. by L.M.F.) C03

See also 0428 0453 0455 0474 0478 0581 0582 0600

0437

17498 KENYA. MINISTRY OF AGRICULTURE. 1981. Grain Legume Project. Thika, Kenya, National Horticultural Research Station. Interim Report no.18. Short Rains 1980/1981. 74p. Engl., Sum. Engl.

Phaseolus vulgaris. Agricultural projects. Dung. Fertilizers. P. Weeding. Herbicides. Intercropping. Zea mays. Spacing. Cultivars. Selection. Resistance. Uromyces phaseoli. Bean common mosaic virus. Pseudomonas phaseolicola. Colletotrichum lindemuthianum. Germplasm. Backcrossing. Drought. Seed. Kenya.

Advances of the Short Rains 1980/81 program of the Grain Legume Project, carried out by the National Horticultural Research Station in Thika (Kenya), are highlighted. Drought was harmful to crops at Katumani, the other stations being favored by fair weather. FYM application at 10 t/ha was the most economical treatment to obtain substantially higher yields and even lower tonnages could be considered. Trials to determine the most economical one of 3 types of P fertilizers (single superphosphate, 20%; triple superphosphate, 46%; and diammonium phosphate, 46% P + 18% N) revealed no significant differences between the 1st 2. Single dose furrow application of diammonium phosphate at high and uneconomical rates over 200 kg/ha proved harmful to seed germination and reduced the no. of plants and yields. Results from chemical weed control trials were variable; bean yields and actual weed control by the different chemicals could not always be related. Trials on the effects of maize and bean ratios and time of planting in mixed stands failed due to labor shortages and disease problems. During the previous season, multiple hill planting of maize at 90 cm intrarow distance and interplanted beans in and between the maize rows gave the best overall returns/unit area of land. Major diseases during the Short Rains 1980/81 were rust (Uromyces phaseoli) at Thika and Kakamega, angular leaf spot (Isariopsis griseola) at Kakamega, and BCMV at Kisii and Kakamega. Black root rot (Thielaviopsis basicola) occurred only to a small % in plots planted with a var. that possesses the dominant I gene, both at Kisii and Kakamega, while Embu and Thika were almost or totally free from black root rot. Rust screening at Thika failed since the early planted screening plot had almost no rust symptoms. Results of the National Bean Performance Trial, carried out at 6 stations, confirmed the high yield potential of both GLP-X.92 and GLP-X.380, in monoculture as well as mixed cropping. GLP-X.92 is resistant to halo blight (Pseudomonas phaseolicola), but susceptible to BCMV. GLP-X.806, a zebra bean type, also performed well. The backcross program to incorporate anthracnose resistance into different types of local bean cv. was continued successfully. About 200 entries were added to the germplasm collection. More data were collected on the selections from the 1976 crossing program. The Shamba bean program at Kakamega met adverse conditions due to late planting, but was continued. For the new Phase III Breeding and Selection Program, F_1's of 1980 crosses were raised of which 17 were retained for further selection. Drought resistant F_7 and F_8 populations were one generation advanced, while from the F_7 population single plant selections were also made. A red haricot var. trial was started to identify materials suitable for future release. Longevity of bean seed is 3-4 yr under room conditions at Thika, but under low humidity conditions by storing under silica gel the seeds still germinated approx. 50% even after 5 yr. Improved seed was given out for advance multiplication pending official release. (Author's summary) D00

0438

17848 ANDERSON, G.D. 1972. A brief appraisal of potential navy bean areas in Northern Tanzania. Tanzania, Ministry of Agriculture. 40p. Engl., Sum. Engl., 14 Refs., Illus.

Phaseolus vulgaris. Soil requirements. Soil conservation practices. Climatic requirements. Ecology. Tanzania.

The soils and environments of potential navy bean areas in Northern Tanzania (Lower and Upper Kingori, lower slopes of Mt. Kilimanjaro between Kibongoto and Marangu, Oljoro-Kisongo, Monduli-Essimingore, Lower Rift and Kiru Valley, Karatu-Oldeani area, Naewa-Katesh-Endasak area on Mt. Hanang, Basotu Wheat Scheme) are briefly examined. Particular attention was paid to the intensity of land use and population density which could influence the area allotted to bean growing. Approx. 42,000 ac of navy beans could be produced on a sustained yield basis/yr. Major areas of potential production are the lower slopes of Kilimanjaro, Karatu-Oldeani-Mbulumbulu, Kiru-Derakuta-Shauri Moyo, and Galappo. An equation for estimating the climatic potential for bean yield/yr was suggested, this being equal to the mean annual rainfall (mm) x alt. (m) divided by 1,000,000. A scale for deducting yield from the above potential as a result of soil defects in texture, effective rooting depth, characteristics of the soil surface and fertility considerations, is given. Recommended bean acreages for areas already growing other crops varies between only 2.5-15% of the total acreage, the actual % depending on the density of settlement and the type of farming. Small proportions are also recommended due to the need of soil conservation. This problem should be tackled by a suitable crop rotation, strip cropping on the contour, and by leaving or planting grass strips parallel to the contour. Area-orientated research on beans and crops to be grown in rotation with beans is needed as well as soil surveys in potential areas, in particular, the Kiru-Derakuta-Shauri Moyo area if seed multiplication/research and unit farms are to be sited there. (Extracted from author's summary) D01

0439

18800 ANDREWS, D.J.; HARDWICK, R.C.; HARDAKER, J.M. 1983. An analysis of the seasonal variation in the dry seed yields of eleven cultivars of Phaseolus vulgaris. Annals of Applied Biology 102:203-211. Engl., Sum. Engl., 29 Refs., Illus.

Phaseolus vulgaris. Cultivars. Dwarf beans. Plant habit. Resistance. Temperature. Photoperiod. Genotypes. Yields. Maturation.

Nine determinate and 2 indeterminate bush bean cv. were grown in trials for 4 successive yr at the National Vegetable Research Station, Wellesbourne, England, to determine the genotypic potential and stability of cv. whose cold tolerance had previously been determined in lab. tests. The variation in yield was determined by examining the relationship between yield, temp., and sunshine duration and by applying the W parameter to the analysis of yield components. Mean annual yield of seed (15% MC) varied between 222-398 g/m^2. Most of the annual variation in yield was accounted for by differences in the quantity of N fertilizer applied and in the duration of bright sunshine during Aug. The annual mean harvest date varied between Sept. 20-Oct. 9. There was a significant negative correlation between the mean harvest date and the no. of Ontario heat units accumulated between May 20-July 20. There were significant interactions between genotype and environment for both yield and harvest date; joint regression analysis of the interactions showed that 5 of the cv., which had previously been

identified as cold-tolerant in lab. tests, all showed greater stability of yield and of maturity date than standard navy bean types. Environmental variation in the yield components of the cold-tolerant selections tended to be compensatory, while that of the standard navy beans was additive in its effects on yield. (Author's summary) D01

0440

19075 CHARLES, L.J.; ACEVES N., L.; TAH IUIT, J.F. 1982. Respuesta del fríjol a la fertilización (N.P.) bajo diferentes gradientes de potencial osmótico. (Response of bean to NP fertilization under different degrees of osmotic potential). Chapingo 7(35/36):37-39. Span., Sum. Span., Engl., 5 Refs., Illus.

Phaseolus vulgaris. Fertilizers. N. P. Osmotic potential. Dry matter. Mineral content. Water requirements.

The response of bean to NP fertilization under different degrees of osmotic potential was determined under greenhouse conditions. The following variables were measured: relative water uptake by bean, wt. of green material and DM, N and P concn. in plant material. Relative water uptake by the plants decreased as the osmotic potential increased. There was a differential response to NP fertilization regarding material wt. N and P uptake by the plants decreased as the osmotic potential increased. (Author's summary) D01

0441

18783 CHEN, H-H.; SHEN, Z-Y., LI, P.H. 1982. Adaptability of crop plants to high temperature stress. Crop Science 22(4):719-725. Engl., Sum. Engl., 21 Refs., Illus.

Phaseolus vulgaris. Cultivars. Adaptation. Temperature. Yields. Resistance.

Two lines each of French bean, potato, soybean, and tomato, with known differences in heat sensitivity as evaluated by their yield and fruit set under high temp. conditions, were studied. Heat tolerance was measured by 2,3,5-triphenyltetrazolium chloride reduction and conductivity tests on leaf tissue before and after high temp. treatments; both methods gave similar results. Heat tolerance was given as heat killing temp. for leaves immersed in water baths at 45-63°C or heat killing time for plants grown in growth chambers at 20-40°C for 0-48 h, the latter being a more sensitive indicator. Heat tolerant and susceptible lines did not differ in killing time when grown at 20/15°C day/night temp.; however, differences were clear after 24 h of acclimatization at over 30°C. The acclimatizing temp. giving the greatest difference in heat killing time was 37.5°C for soybean and potato and 40°C for tomato and bean. Rate of heat acclimatization was very fast, and continuous high temp. treatment was necessary to retain high tolerance. The heat tolerant and susceptible bean lines, resp., were: BBL415-1 and BBL47. It is suggested that, in screening for heat tolerance, the methods described can be applied at early growth stages, following acclimatization at above 30°C for 12-24 h. (Summary by Plant Breeding Abstracts) P01

0442

19329 FONTANILLA M., E.; MERCADO A., C.; SERPA A., H. 1979. Fertilización en la asociación de cultivos, leguminosa gramíneas en el Municipio de Santa Marta. (Fertilization in legume/gramineae intercropping in Santa Marta). Tesis Ing. Agron. Santa Marta, Colombia, Universidad Tecnológica del Magdalena. Facultad de Ingeniería Agronómica. 53p. Span., Sum. Span., Engl., 42 Refs.

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Phaseolus vulgaris. Intercropping. Zea mays. Fertilizers. N. Spacing. Yields. Colombia.

A trial was carried out at the Granja San Pedro Alejandrino, Santa Marta, Colombia, to (1) study legume/gramineae intercropping under different fertilizer rates, (2) select the most adequate combination to obtain highest yields, and (3) determine the amount of N supplied by legumes to the soil. Two planting distances (0.7 and 1 m) were used with 4 bean: maize ratios (1:2, 2:2, 2:3, and 3:2) and 3 levels of N (0, 45, and 65 kg/ha) with 40 kg each of P and K/ha. All cultural practices were carried out. Highest bean production (654,761 kg/ha) was reached with a planting distance of 1 m, a bean:maize ratio of 2:2, without N fertilization. (Extracted from author's summary. Trans. by L.M.F.) D01

0443

18751 HATFIELD, J.L. 1979. Canopy temperatures: the usefulness and reliability of remote measurements. Agronomy Journal 71(5):889-892. Engl., Sum. Engl., 12 Refs., Illus.

Phaseolus vulgaris. Leaves. Temperature. Canopy.

The measurement of leaf temp. with attached vs. remote measurements for a field row crop was evaluated and the relationship between angular and vertical temp. measurements for the seasonal growth of durum wheat was determined. Leaf temp., measured with attached thermistors and thermocouples, were compared with those remotely observed with infrared thermometers to determine the accuracy of a remote measurement of leaf temp. Small thermistors or thermocouples were attached to the underside of a leaf to measure leaf temp. and remote measurements were made with a Barnes PRT-5 infrared thermometer with 2° field of view and 10.5-12.5 microns wave band, sited on the same leaf. These data were continuously recorded for several days. These measurements were made on selected leaves from a field grown Gloria Pink bean canopy in Aug. 1976 in California (USA). Agreement was good for an individual leaf when the infrared measurement and attached thermistor measured the same location on an individual leaf. When the canopies or a composite of leaves were observed with infrared thermometers held vertically about 1 m above the canopy and only selected leaves were measured with attached thermistors, the agreement was less good. Correction of infrared measurements to an emissivity of 0.96 decreased the difference between the 2 measurements in the afternoon but increased the difference for the predawn readings. This suggests that one simple emissivity correction would not be sufficient. (Extracted from author's summary) D01

0444

18746 HOFFMAN, G.J.; JOBES, J.A.; HANSCOM, Z.; MAAS, E.V. 1978. Timing of environmental stress affects growth, water relations and salt tolerance of pinto bean. Transactions of the American Society of Agricultural Engineers 21(4):713-718,722. Engl., Sum. Engl., 22 Refs., Illus.

Phaseolus vulgaris. Temperature. Growth. Resistance. Salinity. Yields. Stomata. Water requirements. Transpiration. Osmotic pressure.

Growth and pod yields of Phaseolus vulgaris exposed to a hot, dry environment for 2 wk. during the vegetative stage were similar to those of plants continuously exposed in a cool, humid environment. Exposure to hot, dry conditions during flowering reduced yields significantly, but not to the level of plants exposed continuously in a hot, dry environment. Increasing salinity reduced growth of all plant parts and reduced pod yield more than vegetative growth. The interaction with environment was the same at all

salinity levels. Beans grown in the cool, humid environment tolerated higher salt levels than those predicted from published tolerance data. Transpiration rates changed rapidly in response to environmental changes. Differences in transpiration decreased as salinity increased. Leaf water potential and its components were linearly related to the osmotic potential of the root medium and to stomatal conductance. Stomatal conductance was higher in the cool, humid than in the hot, dry environment for all values of the root medium osmotic potential. (Extracted from author's summary) DOI

0445

18574 KIDDER, E.H.; SMUCKER, A.J.M. 1976. Water management. In Robertson, L.S.; Frazier, R.D., eds. Dry bean production—principles and practices. East Lansing, Michigan State University. Cooperative Extension Service. Agricultural Experiment Station. Extension Bulletin E-1251. pp.112-123. Engl., Sum. Engl., 5 Refs., Illus.

Phaseolus vulgaris. Irrigation. Drainage. Water requirements. USA.

Recommendations on establishing adequate management programs of irrigation water and drainage in Michigan, USA, are given. The benefits of drainage are listed: improved community sanitation by destroying the natural habitat of disease-carrying insects; increased movement of air into the soil and toxic gases out of the soil; increased depth of root penetration; lowered water levels which allow soil to warm faster for earlier planting of certain crops; improved environment for many soil microorganisms, especially those related to N fixation and the decay of crop residues and livestock manure; reduced erosion; reduced level of toxic substances; improved harvest conditions. The types of soils that need drainage are discussed as well as the planning for a drainage system, surface drainage, and tile drainage. The soils suitable for irrigation are indicated and the benefits of irrigation are given: improved quality, higher yields, planting on time, and use of longer-season var. Results of field research on irrigated beans are analyzed. (Summary by EDITEC. Trans. by L.M.F.) DOI

0446

18766 LIGERO, F.; LLUCH, C.; RECALDE, L. 1981. Efecto de la fertilización nitrogenada y azufrada sobre el crecimiento, superficie foliar y contenido de N, P, K, Ca, y Mg en hoja de plantas de judía (Phaseolus vulgaris, L.). (Effect of nitrogen and sulphur fertilizer applications on the growth, leaf area, and content of N, P, K, Ca, and Mg in bean leaves). Anales de Edafología y Agrobiología 40(7/8):1269-1280. Span., Sum. Engl., Span., 35 Refs., Illus.

Phaseolus vulgaris. Fertilizers. N. S. Growth. Leaf area. Mineral content. P. K. Ca. Mg.

Phaseolus vulgaris was grown in nutrient solution at N:S ratios of 6.15-0.21 and sampled after 26 and 44 days growth and at the beginning of senescence. Dry wt. of leaves, stems, roots and seeds, leaf area, stem length and P content increased with decreasing N:S ratios but N contents decreased. There were exceptions at the 1st sampling. K contents were max. at N:S ratio of 0.81 and Ca contents at 1.41-0.81. Mg contents were unaffected. Seed no./pot increased from 30 at N:S ratios of 6.25 and from 1.41 to 55 at 0.21. S deficiency symptoms occurred at 20 days in young leaves at N:S ratio of 6.25 but were less pronounced at other ratios. N deficiency symptoms only occurred at senescence. (Summary by Field Crop Abstracts) DOI

138

0447

18760 MARSOLEK, M.D.; HAGSTROM, G.R. 1982. Acidified mining residue for correction of iron chlorosis on calcareous soils. Journal of Plant Nutrition 5(4/7):941-948. Engl., Sum. Engl., 7 Refs., Illus.

Phaseolus vulgaris. Fertilizers. Fe. S. Chlorosis. Soil amendments. Mineral deficiencies.

The effects of various Fe fertilizers on grain and seed yields of maize, sorghum, and Phaseolus vulgaris are described. Field trials indicated that Iron-Sul placed close to seeds gave better results than when applied broadcast; 50 kg/ha added directly with seed was preferable to band placement. Iron-Sul applied broadcast at 200-400 kg/ha could cure Fe-chlorosis from grass swards. (Summary by Field Crop Abstracts) DOI

0448

18776 MOSS, G.I.; MULLETT, J.H. 1982. Potassium release and seed vigour in germinating bean (Phaseolus vulgaris L.) seed as influenced by temperature over the previous five generations. Journal of Experimental Botany 33(137):1147-1160. Engl., Sum. Engl., 9 Refs., Illus.

Phaseolus vulgaris. Seed. Temperature. Germination. Seed vigor. Cultivars.

Bean cv. Apollo, Goldcrop, and Oregon-1604 were grown under 4 day/night temp. regimes (21/16, 24/19, 27/22, 30/25°C) for 4 generations and then under each regime for one generation, to give 16 lines for each cv. Leaching of K^+ from imbibing seeds was less following the 27/22°C treatment and was unaffected by final temp. treatment. This effect was most pronounced in Apollo. In a germination test, effects of final temp. were inconsistent but in Apollo the highest % of highly vigorous seedlings was found following the 27/22°C main treatment. (Summary by Plant Breeding Abstracts) DOI

0449

18752 PEET, M.M.; OZBUN, J.L.; WALLACE, D.H. 1977. Physiological and anatomical effects of growth temperature on Phaseolus vulgaris L. cultivars. Journal of Experimental Botany 28(102):57-69. Engl., Sum. Engl., 40 Refs., Illus.

Phaseolus vulgaris. Growth. Temperature. Stomata. Enzymes. Chlorophyll. Leaves. Plant anatomy.

Phaseolus vulgaris cv. Michelite-62 and Redkote were grown at day/night temp. of 20/15, 25/20, and 30/25°C in growth chambers with a 16-h photoperiod. CER at 27°C and full light saturation, resistances of stomata and mesophyll, CO_2 compensation points, activities of ribulose diphosphate (RuDP) carboxylase, glycolate oxidase (GAO), malate dehydrogenase (MDH), and fructose-1,6-diphosphatase (FDP), chlorophyll content, Hill activity, and leaf anatomy were studied after the 1st trifoliate leaves expanded. CER in the light, transpiration, and chlorophyll content increased, while leaf thickness, specific leaf wt., RuDP carboxylase activity, compensation point, stomatal resistance and mesophyll resistance (the latter only when chloroplast CO_2 concn. was assumed equal to zero) decreased, with increase in temp. Av. leaf size was greatest in 25/20°C plants while dark respiration, MDH activity, stomatal density, and starch were low. Hill activity and the activities of GAO and FDP were not affected by temp. (Author's summary) DOI

0450

18743 PURCINO, J.R.C. 1982. Irrigacao do feijoeiro. (Irrigation in beans). Informe Agropecuário 8(90):36-39. Port., 18 Refs., Illus.

Phaseolus vulgaris. Irrigation. Developmental stages. Water requirements.

A comprehensive literature review is given on the expt. conducted on the water requirements of bean. Tables and diagrams are also included of the results of several trials. It was found that bean requires good moisture conditions, especially during flowering and pod development. (Summary by F.G. Trans. by L.M.F.) DOI

0451

19008 RESENDE, M. 1979. Effects of high and normal frequency deficit irrigation on crop development and yield of kidney bean (Phaseolus vulgaris L.). Ph.D. Thesis. Davis, Unversity of California. 94p. Engl., Sum. Engl., 92 Refs., Illus.

Phaseolus vulgaris. Water stress. Irrigation. Photosynthesis. Evapotranspiration. Dry matter. Yields. Growth.

The effect of normal and high frequency irrigation on plant water status, leaf growth, DM accumulation, and yield of Dark Red Kidney bean in the field was studied by using line-source sprinkler irrigation on a deep Yolo soil in Davis, California (USA) in 1977 and 1978. The treatments involved 2 frequencies with high frequency (HF) irrigated every other day and normal frequency (NF) irrigated every 7 days (1977) and 12 days (1978); within each frequency the amount of water applied was varied as % of the max. evapotranspiration (ET). More water was applied to HF plots, up to full ground cover on a 100% level treatment, to compensate for higher soil evaporation on these plots as compared with NF ones, based on lysimeter and class A pan evaporation data. No difference was found in midday leaf water potential between NF and HF treatments at the 100% ET level. But leaf water potential was about 2 bars lower in more stressed plots, with the lowest values around -12 bars. The leaf water potential value in all treatments recovered to about the same point (-4 bars) around 4 a.m. Leaf resistance and photosynthetic rate were not affected by irrigation regime nor by the degree of stress. On the other hand, source size as indicated by % of ground cover, LAI, and leaf dry wt. were reduced about the same proportion as the reduction in ET, independent of the frequency. Leaf enlargement was considered to be the main factor responsible for this difference in source size, and the pattern of leaf elongation rate was studied. Diurnally there were 2 elongation rate peaks, one in late afternoon and another before dawn. This change in leaf elongation rate at night (also common to 4 other var.) did not correlate with leaf water, solute or pressure potential, or leaf resistance but correlated reasonably well with changes in leaf angle at night. Total DM accumulation decreased in about the same proportion as the reduction in ET and presented a linear relationship when plotted against the integrated value of ground cover, independent of the irrigation frequency, indicating the importance of source size as affected by the degree of stress in determining total DM. HI was not affected by any treatment (1978), indicating no influence on dry wt. partitioning. Pods/plant decreased with increase in the degree of stress in both irrigation regimes and seed/pod tended to increase. The effect of source size on total DM was considered the main factor in explaining the linear decrease in seed yield with decrease in seasonal ET in both irrigation regimes. At the same seasonal ET level, the seed yield was significantly lower at 1% level in HF treatments than in NF, due to high soil evaporation. The lines of relative yield as a function of relative ET for HF treatments were significantly different at 1% level between 1977-78. No difference was found between the lines for NF treatments. The important factor in determining yield response

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to water stress was seasonal transpiration and irrigation frequency had no major effect other than increasing evaporation in the high frequency treatments. (Author's summary) D01

0452

18773 RESNIK, M.E.; BENEJAM, M.E.S. DE; RAYA, F.G.; VILLA, N.R. 1974. Ausencia de conexión vascular y de traslado de fósforo entre las hojas primarias de Phaseolus vulgaris L. (Absence of vascular connection and of phosphorus translocation between primary leaves of Phaseolus vulgaris). Revista Agronómica del Noroeste Argentino 11(3/4):325-326. Span., 3 Refs., Illus.

Phaseolus vulgaris. Leaves. Fertilizers. P. Mineral content. Nutrient transport. Nutrient absorption.

In 13-day-old bean cv. Bountiful plants with 2 primary leaves, ^{32}P was applied to the whole upper surface of the lamina of a fully-expanded primary leaf. After 48 h ^{32}P was present in the whole treated lamina and in the stem and apex, but not in the opposite leaf or its petiole. There was no vascular connection between the 2 primary leaves. (Summary by Field Crop Abstracts) D01

0453

19077 ROBINSON, R.G. 1983. Yield and composition of field bean and adzuki bean in response to irrigation, compost, and nitrogen. Agronomy Journal 75(1):31-35. Engl., Sum. Engl., 19 Refs.

Phaseolus vulgaris. Irrigation. Dung. Fertilizers. N. Yields. Mineral content. Protein content. Nutritive value. Amino acids.

Field bean (Phaseolus vulgaris) and adzuki bean (Vigna angularis) were grown on Udorthentic Haploborolls, sandy, mixed soils in central Minnesota, USA, to measure the effects of irrigation, rhizobial inoculant, and N on seed yield, protein concn., and nutritive value. Main plot treatments were rainfall of 16-36 cm during June, July, and Aug. and rainfall + irrigation of 24-30 cm. Subplot treatments for field bean were untreated, compost at 3-6 MT/ha, rhizobia, inorganic N at 74-310 kg/ha, SBM at 112 kg N/ha, corn grits + inorganic N at 112 kg N/ha, and compost + inorganic N. Subplot treatments for adzuki bean were untreated, rhizobia, and inorganic N at 112 kg/ha. Seed harvested from the treatments was analyzed by standard methods for amino acids, N, P, K, S, Ca, Mg, Fe, Zn, Mn, Al, B, Cu, Na, Mo, Ni, Pb, Cr, and Cd. Yield increases from irrigation ranged from 1198 to 1940 kg/ha. Yields from the subplot treatments differed significantly under irrigated but usually not under dryland treatment. Highest yields of field bean were obtained from compost + inorganic N. The effect of compost on seed yield and quality was equivalent to that of 74-112 kg/ha of inorganic N fertilizer. SBM, corn grits + N, and N fertilizer treatments at equal rates of N did not differ in field bean yield or protein %. Irrigation resulted in low-protein bean seed but compost and/or inorganic N at high rates usually maintained protein at acceptable levels. Amino acid composition of bean protein was not significantly affected by irrigation or other treatments. Bean seed from dryland plots was superior to seed from irrigated plots in protein and Zn concn. N to protein conversion factors among treatments ranged from 6.19 to 6.26 for field bean and from 6.06 to 6.24 for adzuki bean. (Author's summary) D01

0454

18508 SA, M.E.; CONSTANT, E.A.; MORELLO, S. 1981. Efeito da adubacao fosfatada e duas fontes de fertilizacao nitrogenada sobre a producao do feijoeiro (Phaseolus vulgaris L.) cv. Carioca. (Effect of phosphorus fertilization and two sources of nitrogen fertilizer on the yields of bean cultivar Carioca). In Campus de Ilha Solteira-SP, Brasil. Universidade Estadual Paulista. Relatório Técnico-Científico no.1. pp.32-33. Port.

Phaseolus vulgaris. Fertilizers. P. N. Yields. Brazil.

The effect of applying 0, 50, 100, and 150 kg P/ha combined with 2 sources and 2 methods of application of N [top-dressed 20 days after germination at 30 kg N (ammonium sulfate)/ha and as 3 spray applications of 3 kg N (urea 1%)/application] on the yield and wt. of 1000 seeds of bean cv. Carioca was studied. None of the treatments increased yields significantly. The wt. of 1000 seeds with 150 kg P/ha + N top-dressed (195 g/1000 seeds) differed significantly from treatments where no P was applied, regardless of the method of application of N (173 g/1000 seeds in both cases). The wt. of 1000 seeds tended to increase as P rate increased. (Summary by EDITEC. Trans. by L.M.F.) DOI

0455

19080 SAWAZAKI, H.E.; TEIXEIRA, J.P.F.; ALMEIDA, L.D'A. DE 1981. Estresse de água no crescimento, produtividade e acúmulo de prolina em feijao. (Effect of water stress on the growth, yield, and proline accumulation in bean). Bragantia 40:157-166. Port., Sum. Port., Engl., 9 Refs., Illus.

Phaseolus vulgaris. Cultivars. Water stress. Growth. Yields. Amino acids. Irrigation. Resistance.

The behavior of 10 dry bean cv. regarding plant growth, yield, and proline accumulation when subjected to water stress was studied under greenhouse conditions. Two treatments were used: irrigated and nonirrigated during certain intervals. Leaf area, dry wt., plant height, and leaf proline content were determined during the growth cycle and grain yield at the end of the cycle. Cv. Moruna and Aroana had the highest growth rate and the lowest accumulation of proline for both treatments. Cv. Jalo, Roseli, and Rosinha G_2 were the most affected by water stress. It was concluded that the cv. most affected by water stress also had the highest proline accumulation. Those accumulating more proline had greater overall growth. Cv. Moruna and Aroana showed the highest drought resistance. (Author's summary) DOI

0456

17445 SCARISBRICK, D.H.; OLUFAJO, O.O.; DANIELS, R.W. 1982. The effect of nitrogenous fertilizer on the seed yield, and yield components of Phaseolus vulgaris. Journal of Agricultural Science 99(3):665-668. Engl., 8 Refs.

Phaseolus vulgaris. Fertilizers. N. Cultivars. Yields. Yield components.

During 1978-80 several field trials were carried out at the Wye College Farm of the U. of London (England) to study the effect of N fertilizer on yield response of bean cv. Purley King and Cascade with 1000-seed wt. of 180-200 and 360-390 g, resp. A randomized block design was used with 4 replicates/treatment. Treatments varied with each growing season and included rates of 0, 50, 62.5, 100, 125, 150, 187.5, and 200 kg N/ha. The

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area also received a uniform application of 88 kg P and 88 kg K/ha. An area measuring 1 m^2 was removed from the middle of each plot and the no. of plants was recorded. A subsample of 10 plants was then taken from each sample quadrat and the no. of pods/plant, no. of seeds/pod, and seed wt. were determined. Purley King was used in 1973-76 and Cascade in 1978-80. The highest yield of Purley King was in 1973 with 465.8 g/m^2 at a rate of 125 kg N/ha for a total no. of 559 pods/m^2, 3.7 seeds/pod, and a 1000-seed wt. of 187.6 g. The highest yield of Cascade was obtained in 1979 with 457.9 g/m^2 at a rate of 200 kg N/ha for a total no. of 233 pods/m^2, 5 seeds/pod, and a 1000-seed wt. of 390.7 g. (Summary by EDITEC. Trans. by L.M.F.) DOI

0457

19059 URQUIAGA C., S.; REICHARDT, K.; LIBARDI, P.L. 1982. Efeito do fosfato-de-araxá e superfosfato simples em algumas propriedades físico-químicas e do fósforo residual disponível em um solo Oxic Paleudalf. (Effect of Araxa rock phosphate and simple superphosphate on some physicochemical properties and on the available residual P of an Oxic Paleudalf). Pesquisa Agropecuária Brasileira 17(2):195-202. Port., Sum. Port., Engl., 26 Refs.

Phaseolus vulgaris. Fertilizers. P. Soil fertility. Brazil.

A greenhouse expt. was carried out with surface soil samples (Terra Roxa Estruturada, Oxic Paleudalf) from the Agrometeorological Station of the Escola Superior de Agricultura Luiz de Queiroz, Piracicaba, SP, Brazil, that had received over a period of 3 yr 6 t Araxa rock phosphate (34.6% P)/ha or 1.2 t simple superphosphate (20% P)/ha while 3 bean crops were grown. The effect of these fertilizer applications on some physicochemical properties of the soil was evaluated and the residual P effect was studied using the Olsen and the A value methods. Results indicated that Araxa rock phosphate (48.4% CaO), although applied at a high rate, did not significantly affect soil reaction. On the other hand, both fertilizers increased the level of exchangeable Ca^{2+} by approx. 0.5 meq/100 g. In the short term (less than 3 yr), the response of Araxa rock phosphate corresponded to 2% of its citric acid-soluble P content (4%) rather than to its total P content. Through A values (using $KH_2{}^{32}PO_4$) it was shown that the residual effect of simple superphosphate (108.6 kg P/ha) was similar to that of Araxa rock phosphate (136.6 kg P/ha), but these were significantly greater than the natural P content of the soil (54.0 kg P/ha). The evaluation of available P in the soil (with and without fertilizer), by Olsen's method, had an efficiency of 64 and 94%, resp., as compared with the A value method. (Author's summary) DOI

0458

17345 VIEIRA, R.F.; FONTES, R.A.; KLUTHCOUSKI, J. 1980. Efeito do plantio de sementes de feijao (Phaseolus vulgaris L.), provenientes de diferentes níveis de fertilidade. (Effect of planting bean seed proceeding from different levels of fertility). Goiania-GO, Brasil, Empresa Brasileira de Pesquisa Agropecuária. Centro Nacional de Pesquisa-Arroz, Feijao. Pesquisa em Andamento no.24. 3p. Port.

Phaseolus vulgaris. Cultivars. Fertilizers. N. P. K. Mg. Agricultural lime. B. Cu. Mo. Zn. Seed production. Plant development. Brazil.

Trials were conducted in Goiania, GO, Brazil, to experimentally verify observations that the bean materials from different regions and countries, which form part of the international trials network, have higher yields than the local var. the 1st yr, but decrease their productivity in later

years. Var. Rio Tibagi and Carioca, produced during the rainy season of the 1978/79 crop year at 3 levels of soil fertilization, were used. The levels were: (1) no fertilization; (2) N, P, K, Mg, and lime; and (3) the same fertilizers applied in (2) + Cu, Zn, B, and Mo applied as solution to the seed. The seeds harvested in this trial were planted during the 1978/79 dry season with 2 levels of soil fertilization: (1) no fertilization and (2) NPK. Harvested seed from the unfertilized trial was planted during the 1979-80 rainy season to evaluate the effects of seed origin in relation to soil fertility on yields and plant populations. There was no effect of the micronutrients on production, but the wt. of 100 seeds increased. Without fertilization yields were low as well as plant population and height; seed appearance was not commercially acceptable either. The 2nd trial confirmed that there was an effect of seed origin on yield and plant population. Fertilization improved the commercial appearance of seed. Results of the third trial showed that the seed from the 1st trial with both fertilizer treatments tended to improve plant population and yield in the 2nd generation. (Summary by EDITEC. Trans. by L.M.F.) D01

0459

18049 VILLARROEL A., J.M. 1979. Respuesta del maíz y fríjol a la aplicación de gallinaza, estiércol vacuno, zinc, manganeso y hierro en suelos de Ciudad Serdán, Puebla, bajo condiciones de campo e invernadero. (Response of maize and bean to the application of chicken and cattle farmyard manure, zinc, manganese, and iron on soils of Ciudad Serdán, Puebla, under field and greenhouse conditions). Tesis Mag.Sc. Chapingo, México, Colegio de Postgraduados. 251p. Span., Sum. Span., 133 Refs., Illus.

Phaseolus vulgaris. Fertilizers. N. P. Zn. Fe. Dung. Planting. Spacing. Yields. Dry matter. Economics. Income. Mexico.

In the area of Ciudad Serdán, Puebla, Mexico, 2 field trials with bean were carried out in which 16 fertilizer treatments with N, P, Zn, Mn, Fe, and organic manures (chicken and bovine) were applied in different combinations and at different rates. Sources of N, P, Zn, Mn, and Fe were applied 20-30 days after planting and organic manures were band-applied at planting. Plant height, actual population density, bean and DM yields were registered. The micronutrients did not affect plant height, but taller plants (37-40 cm) were obtained with organic manures with or without chemical N compared with the unfertilized check (24 cm). The application of organic manures alone increased yields from 1290 kg/ha for the check to 2307 kg/ha for cattle manure (15 t/ha) and 1984 kg/ha for chicken manure (10 t/ha). The application of a basic treatment 60-60-0 + Zn + Mn + Fe did not affect yields significantly (1804 vs. 1829 kg/ha for 60-60-0 alone), but the addition of organic manure was favorable (2568 and 2413 kg/ha for cattle and chicken manure, resp.). Higher DM yields were obtained with 60-60-0 + Zn + Mn + Fe and chicken manure (8764 kg/ha) followed by 60-60-0 and chicken manure (8623 kg/ha). There were no symptoms of micronutrient deficiency. At San Juan Atenco economic analysis indicated that the micronutrients and organic manures did not increase profitability. Higher net profits were obtained with 90 and 60 kg N and P/ha, resp. At Morelos higher net profits were obtained with 10 t chicken manure/ha with 60 kg each of P and N/ha, resp. (Summary by EDITEC. Trans. by L.M.F.) D01

See also 0416 0427 0476 0478 0479 0504 0547 0551 0591

0460

18767 AYONOADU, U.W.U.; NORRINGTON-DAVIES, J.; EDJE, O.T.; MUGHOGHO, L.K. 1974. Weed control and its effects on yield of Phaseolus vulgaris beans in Malawi. Journal of Agricultural Science 82(2):283-286. Engl., Sum. Engl., 8 Refs.

Phaseolus vulgaris. Weeding. Herbicides. Yields. Malawi.

Beans cv. 253/1 were hand-weeded at 6 wk. after sowing or were given various rates of trifluralin, preforan, or preforan + igran presowing. Compared with unweeded control plots, no. of pods/plant and seed yields were increased by preforan + igran, but not by other treatments, including hand weeding. Weed control was effective in all herbicide treatments. (Summary by Field Crop Abstracts) D02

0461

18525 CONTO, A.J. DE; VIEIRA, E.H.N.; OLIVEIRA, E.T. DE; CASTRO, T. DE A.P.E. 1980. Aspectos técnicos e economicos da colheita mecanica e manual do feijao (Phaseolus vulgaris L.). (Technical and economic aspects of mechanical and manual bean harvesting). Goiania-GO, Brasil, Empresa Brasileira de Pesquisa Agropecuária. Centro Nacional de Pesquisa-Arroz, Feijao. Circular Técnica no. 02. 18p. Port., 6 Refs., Illus.

Phaseolus vulgaris. Harvesting. Plant habit. Costs. Yields. Brazil.

The factors that should be taken into account for the different harvesting systems of bean are given, with particular emphasis on combined manual and mechanical harvest and mechanical harvest alone. The harvesting system that should be used with the different growth habits are indicated. Technical data on the % of damaged grain and the % of yield loss for different harvesting machinery are given. An economic analysis of bean harvesting using several Brazilian systems is also included. (Summary by EDITEC. Trans. by L.M.F.) D02

0462

19022 CRUZ, L.S.P.; GRASSI, N. 1981. Controle de plantas daninhas com herbicidas na cultura do feijao (Phaseolus vulgaris L.). (Weed control in bean with herbicides). Planta Daninha 4(2):73-77. Port., Sum. Port., Engl., 6 Refs.

Phaseolus vulgaris. Weeding. Herbicides. Yields. Plant injuries. Brazil.

The effects of 3 herbicides incorporated prior to planting (EPTC at 3.6 kg/ha and nitralin and trifluralin at 0.76 kg/ha) and one preemergence herbicide (fluorodifen at 3.0 kg/ha) on bean yields were studied during 1970 in Campinas, SP, Brazil, on a aandy loam soil. A untreated check was used. Eleusine indica and Digitaria sanguinalis were efficiently controlled by all herbicides. More than 87% control was found in weed surveys 29 days after herbicide appiication. Amaranthus viridis was also efficiently controlled by all herbicides with control indexes above 92.0%. Ageratum conyzoides was efficiently controlled by fluorodifen (91.6%) and intermediately by EPTC (78.99%) and nitralin (79.83%). None of the herbicides tested controlled Ipomoea sp. and Chenopodium ambrosioides. EPTC and nitralin treatments showed the least % of weed infestation; 51 days after application there were 8.0 and 17.0% infestation, resp. Trifluralin and fluorodifen treatments needed a weeding 42 days after application and

the check plot at 29 days showed 25% or more infestation. The tested herbicides did not have a negative effect on germination, bean growth cycle or yields. (Author's summary. Trans. by L.M.F.) D02

0463

19415 CRUZ P., J.; ANDRADE L., J. 1979. Control químico de malezas en fríjol (Phaseolus sp.). (Chemical weed control in bean). Tesis Ing. Agron. Santa Marta, Colombia, Universidad Tecnológica del Magdalena. Facultad de Ingeniería Agronómica. 56p. Span., Sum. Span., Engl., 15 Refs.

Phaseolus vulgaris. Weeding. Herbicides. Toxicity. Yields. Colombia.

Trials were carried out at the exptl. farm of the U. Tecnológica del Magdalena, Santa Marta, Colombia, from Oct. 1978 to Jan. 1979 to test the selectivity of different herbicides in beans, determine the % weed control with the different treatments and the effect of herbicides on yield. A randomized block design was used with 3 replicates and 20 treatments. Variance analysis and Duncan's test at 5% significance were carried out. Products used were diuron (1.5, 1.0, and 0.5 kg/ha); alachlor (4.0, 3.0, and 2.0 l/ha); trifluralin (4.0, 3.5, and 3.0 l/ha); linuron (2.0, 1.5, and 1.0 kg/ha); dalapon (8.0, 4.0, and 2.0 kg/ha); and napropamide (4.0, 3.0, and 2.0 kg/ha). Plant height, index of injury, and weed control were measured 15, 30, and 45 days after application of chemicals. None of the products affected plant height; all were selective to the crop since no phytotoxicity was observed. The products which gave a good control up to 45 days after application were linuron (2.0 kg/ha), diuron (1.0 and 0.5 kg/ha), dalapon (2.0 kg/ha), and napropamide (3.0 and 2.0 kg/ha). Yield decreased more than 50% compared with the check with mechanical weeding when the crop competed directly with the weeds. (Author's summary) D02

0464

18772 DARIVA, T.; JOBIM, J.D.C.; SILVA, M.I. DA 1975. Efeito do espacamento e da densidade de plantio sobre o rendimento de graos na cultura do feijao (Phaseolus vulgaris L.). (Effect of spacing and plant density on seed yield of a bean crop). Revista do Centro de Ciencias Rurais 5(4): 259-263. Port., Sum. Port., Engl., 8 Refs.

Phaseolus vulgaris. Spacing. Yields. Brazil.

In field trials carried out at the U. Federal de Santa Maria, RS, Brazil, beans were grown at 10, 15, or 20 plants/m of row in rows 20, 40, 60, or 80 cm apart to determine the effect of spacing and plant density on bean yields. Av. yields were 1.43 t seed/ha with 10 plants/m of row, 1.37 t with 15 plants, and 1.32 t with 20 plants. Av. seed yields with 20, 40, 60, and 80 cm between rows were 1.30, 1.45, 1.37, and 1.38 t/ha, resp. (Summary by Field Crop Abstracts) D02

0465

19023 DIAS, C.A.; FLECK, N.G. 1982. Efeitos dos herbicidas glyphosate e paraquat, aplicados ao solo, sobre a emergencia de feijao e soja e de algumas espécies daninhas. (Effects of the herbicides glyphosate and paraquat, applied to the soil, on the emergence of bean, soybean, and some weed species). Planta Daninha 5(1):23-34. Port., Sum. Port., Engl., 18 Refs.

Phaseolus vulgaris. Weeding. Herbicides. Yields. Brazil.

A field expt. was conducted during the 1979/80 crop yr at the Agronomic Expt. Station of the U. Federal do Rio Grande do Sul, in Guaíba, RS, Brazil, to evaluate the effects of rates and times of application of herbicides glyphosate, paraquat, and their combination on bean and soybean, and on some soil nutrients. Glyphosate and paraquat were applied at 0, 1.2, 6, and 300 and 0, 0.4, 2, and 100 kg a.i./ha, resp. Results indicated no significant differences among the soybean treatments tested regarding plant population and shoot dry wt. No statistical differences occurred for dry bean plant population and for soil nutrients analyzed (Ca, Mg, and K). For bean shoot dry wt., there was an interaction of herbicides and rates; glyphosate sprayed alone and glyphosate + paraquat applied at max. rates tested caused significant decreases on that variable. For paraquat used alone, no significant effects were detected among the rates applied. (Author's summary) D02

0466

18578 LEEP, R.R.; MEGGITT, W.F.; ERDMANN, M.H. 1978. Weed control. In Robertson, L.S.; Frazier, R.D., eds. Dry bean production—principles and practices. East Lansing, Michigan State University. Cooperative Extension Service. Agricultural Experiment Station. Extension Bulletin E-1251. pp.152-157. Engl., Illus.

Phaseolus vulgaris. Weeding. Herbicides. Cultivation. Soil requirements. Climatic requirements. USA.

Some frequent causes of inconsistent weed control in dry beans are discussed and methods for improving herbicide performance are recommended. The economic impact of weeds on bean yields is discussed as well as environmental factors affecting herbicides (soil, climatic, cultural practices), cultivation, and current methods of herbicide application (preplant incorporated and preemergence). Basic aspects of a successful weed control program in Michigan, USA, are given. (Summary by EDITEC. Trans. by L.M.F.) D02

0467

19039 MONTERROSO, V.A.; OROZCO S., S.H. 1982. Evaluación de control de plagas, malezas y variedades en el cultivo de fríjol en el Departamento de Jutiapa, Guatemala. (Evaluation of weed and pest control and varieties of bean in Jutiapa, Guatemala). Guatemala, Instituto de Ciencia y Tecnología Agrícolas. 7p. Span., Sum. Span., 7 Refs.

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

Phaseolus vulgaris. Cultivars. Weeding. Herbicides. Insect control. Chemical control. Yields. Guatemala.

The principal factors limiting bean production in SE Guatemala are the whitefly (Bemisia tabaci), vector of BGMV, and weeds. Therefore 5 on-farm trials were conducted to attempt to minimize costs and find improved production alternatives. Improved var. Tamazulapa was compared with the local var. currently used by farmers. Four weed control treatments were included: metolachlor (4 l/ha), linuron (1 kg/ha), metolachlor + linuron (half the dosis of each one), and 2 hand weedings. Pest treatments were flowable carbofuran applied to the seed (40 cm^3/kg), carbofuran granules 5% applied to the soil (30 kg/ha), methamidophos (1 l/ha) in 3 applications, and a check (untreated). A split-strip design was used with 4 replications. Var. Tamazulapa yielded 20-46% more than the local var. Although there were no differences between insecticide-treated and untreated plots,

yields tended to decrease 200-300 kg/ha when flowable carbofuran was applied to the seed, in comparison with soil-applied carbofuran granules and the check; seed treatment was not more economical. Linuron and metolachlor did not affect yields and in general, metolachlor gave the best weed control with a lower cost than that of hand weedings. (Summary by F.G. Trans. by L.M.F.) D02

0468

18794 NOGUEIRA, F.D.; OLIVEIRA, I.P. DE; AZEVEDO, G.M. 1973. Efeito da cobertura morta na cultura do feijoeiro. (Effect of mulching on bean). Seiva 33(79):1-7. Port., Sum. Engl., 4 Refs.

Phaseolus vulgaris. Mulching. Yields. Brazil.

In trials in the Zona da Mata region, MG, Brazil, in 1968-70, mean Phaseolus vulgaris seed yields were 1.37 and 1.31 t/ha in plots mulched with Melinis minutiflora or rice husks, resp., compared with 0.87 t for unmulched controls. (Summary by Field Crop Abstracts) D02

0469

19019 PEREIRA, J.; VIEIRA, I.F.; GUAZZELLI, R.J. 1974. Epoca de plantio de feijao (Phaseolus vulgaris, L.) no planalto central brasileiro. (Bean planting time on the Brazilian central plain). Sete Lagoas-MG, Brasil, Empresa Brasileira de Pesquisa Agropecuária. Instituto de Pesquisa Agropecuária do Centro-Oeste. Boletim Técnico no. 25. 4p. Port., Sum. Port., Engl., 12 Refs., Illus.

Phaseolus vulgaris. Planting. Timing. Yields. Brazil.

The response of beans to 5 different planting dates between Jan. 15 and March 15 was studied for 7 yr on a dark red Latosol at the Anapolis Exptl. Station, GO, Brazil, in a randomized block design with 6 replications. Best planting time was determined to be the last 2 wk. of Jan. Results indicated that the factor planting time could possibly duplicate bean yields in this region. (Author's summary. Trans. by L.M.F.) D02

0470

18572 ROBERTSON, L.S.; CHRISTENSON, D.R.; SMUCKER, A.J.M.; MOKMA, D.L. 1978. Tillage systems. In _____.; Frazier, R.D., eds. Dry bean production—principles and practices. East Lansing, Michigan State University. Cooperative Extension Service. Agricultural Experiment Station. Extension Bulletin E-1251. pp.78-93. Engl., 12 Refs., Illus.

Phaseolus vulgaris. Land preparation. Cultivation. USA.

The criteria used to determine the tillage system required for bean cultivation in Michigan, USA, are discussed and results of research on these systems are given. Tillage time and the effects of wind and water erosion, deep tillage, primary tillage, supplemental tillage, and secondary tillage, and cultivation are discussed. The 4 major tillage systems available to Michigan bean producers and the convenience of their use are discussed; choice depends on the characteristics of the soil and the nature of the crop residues. Power requirements (gallon of diesel fuel/ac) for selected field operations and for 7 bean tillage systems are included. (Summary by EDITEC. Trans. by L.M.F.) D02

0471

19021 RODRIGUES, B.N.; VICTORIA FILHO, R. 1981. Efeitos de misturas de bentazon e paraquat no controle de plantas daninhas e na cultura do feijao (Phaseolus vulgaris L.). (Effect of bentazon and paraquat mixtures on weed control and on bean yield). Planta Daninha 4(2):87-91. Port., Sum. Port., Engl., 6 Refs.

Phaseolus vulgaris. Weeding. Herbicides. Plant injuries. Yields.

The selectivity of the mixture bentazon + paraquat on bean var. Carioca and Moruna, the effect of the mixture on weed control, and the possible synergistic effects on weeds were studied under field conditions at the Escola Superior de Agricultura Luiz de Queiroz, Piracicaba, SP, Brazil and under greenhouse conditions. A randomized complete block design with 4 replications was used. The % of injury to the var. and the weeds was assessed using a visual scale. Data were analyzed by the Gowing formula. By this method, the injury observed on the var. was less than that expected due to an antagonistic effect. This effect was also observed with Digitaria sanguinalis. A synergistic effect was observed with Sida glaziovii and Portulacca oleracea mainly with the mixture of 0.48 + 0.05 kg a.i. of bentazon and paraquat/ha, resp., at 6 and 8 days after application. The mixture of 0.96 + 0.10 kg a.i. of bentazon and paraquat/ha had an antagonistic effect on Cassia tora. (Author's summary) D02

0472

18762 ROUANET, G. 1972. Avantages et inconvénients de l'utilisation d'un herbicide prélevée (métobromuron) dans la culture du haricot a Awassa (Ethiopie). [Advantages and disadvantages of using a preemergence herbicide (metobromuron) in snap bean crops at Awassa, Ethiopia]. L'Agronomie Tropicale 2:239-248. Fr., Sum. Fr., Engl., Span., 5 Refs.

Phaseolus vulgaris. Weeding. Herbicides. Snap beans. Ethiopia.

Proliferation of weeds is a prioritary problem in Phaseolus vulgaris crops in Awassa in southern Ethiopia. A crop of cv. Canallini grown in the wet season of 1967 and given 3, 4, or 5 kg metobromuron/ha yielded 0.87, 0.82, and 0.89 t dry beans/ha, resp., compared with 0.49 t/ha for the unweeded control. In an expt. in the dry season, 1.25 kg metobromuron/ha caused slight phytotoxicity and higher rates killed some plants; the crop was destroyed by frost, a recurrent risk in this area. It was found possible to resow the sprayed areas without further tillage. In a var. trial, the Michigan-type cv. MPBT showed 50% survival with 1.25 kg metobromuron/ha and 5% survival with 2.5 kg; plants of cv. Canallini, SATINP, and HLN all survived the high rate of herbicide but with slight yellowing of the 1st leaves. In the wet season of 1969, cv. SATINP yielded 1.03 t/ha unweeded, 1.1 t/ha when hand-weeded once, 1.25 t/ha when hoed once, and 1.44 and 1.61 t/ha with 1 and 2 kg metobromuron/ha, resp. It was concluded that the cost of the metobromuron treatment can successfully compete with the cost of hand weeding. Chemical weeding is therefore technically and economically feasible. Consequential effects of labor employment, however, should be taken into account. (Summary by Field Crop Abstracts) D02

0473

16465 VERHAY, E.W.M. 1973. A herbicide trial in green beans. Ethiopia, Horticultural Project H.V.A. Research Report no.6. 4p. Engl., Sum. Engl.

Phaseolus vulgaris. Snap beans. Weeding. Herbicides. Yields. Cultivars. Plant injuries. Ethiopia.

Trifluralin (1 and 2 l/ha) and nitralin (1 and 2 kg/ha) incorporated before growing, and fluorodifen (7 and 10.1 l/ha), metobromuron (3 and 4.5 kg/ha), methabenzthiazuron (2 and 4 kg/ha) and monolinuron + dinoseb-acetate (4 and 6 kg/ha), applied before germination, were tried on bean var. Sprite, Gardol, Harvester, and Slimgreen in comparison with a hand-weeded control. Trifluralin, nitralin, fluorodifen, and metobromuron all checked weed growth notably, although most plots badly needed a weeding by the time the trial was completed (approx. 70 days after treatment). Differences among these products and between varying application rates of each product were rather erratic presumably due to an unfavorable grouping of the replications. Weed control by methabenzthiazuron and monolinuron + dinosebacetate was inadequate. None of the products caused clear symptoms of crop damage on any of the 4 cv. Yields were in the order of 10 t/ha; the control lagged behind with a yield of 8.5 t/ha, suggesting that the single hand weeding had been performed too late to safeguard yield. It is concluded that chemical weed control is currently uneconomical. (Author's summary) D02

0474

19064 WATERS JUNIOR, L.; GRAHAM, P.H.; BREEN, P.J.; MACK, H.J.; ROSAS, J.C. 1983. The effect of plant population density on carbohydrate partitioning and nitrogen fixation of two bean (Phaseolus vulgaris L.) cultivars in two tropical locations. Journal of Agricultural Science 100:153-158. Engl., Sum. Engl., 23 Refs.

Phaseolus vulgaris. Cultivars. Spacing. Carbohydrate content. Nitrogen fixation. Growth. Yields. Colombia.

The effect of plant population density on carbohydrate distribution and N fixation of beans with different growth habits was studied using cv. Cargamanto (CIAT P590, indeterminate climbing, Type IV) and Puebla 152 (CIAT P498, indeterminate large vine, Type III), grown at 20 and 60 plants/m^2 at 2 locations in Colombia: a cool, high rainfall, mountainous area (Popayan) and a hot, medium rainfall, valley (Palmira). Crop growth period was compressed and P590 failed to flower at Palmira, where plant shoot wt. tended to be higher and root wt. lower than at Popayan. Midday soil temp. at 10 cm averaged 7.8°C lower and $N_2(C_2H_2)$ fixation rate and nodule fresh wt. over 10-fold higher at Popayan than at Palmira. Increasing the plant population density increased yield but reduced seed wt./plant and the fresh wt. of all other plant parts, with shoots more severely affected than roots. Density had little effect on carbohydrate concn. or $N_2(C_2H_2)$ fixation/plant. The cv. accumulated carbohydrates in different amounts but had similar rates of $N_2(C_2H_2)$ fixation. Concn. of ethanol-insoluble carbohydrates were several times higher in all plant parts at Popayan. Soluble carbohydrates showed similar, but smaller, differences. (Author's summary) D02

See also 0442 0480 0508 0544 0594 0595

D03 Cultivation Systems: Intercropping, Rotational Crops

0475

18736 AIDAR, H.; KLUTHCOUSKI, J. 1983. Multiple cropping systems in Brazil. Goiania-GO, Brazil, Centro Nacional de Pesquisa de Arroz e Feijao. 12p. Engl.

Paper presented at the International Workshop on Integrated Pest Control for Grain Legume, Goiania, Goiás, Brazil, 1983.

Phaseolus vulgaris. Intercropping. Zea mays. Empoasca kraemeri. Isariopsis griseola. Disease control. Insect control. Planting. Agricultural equipment. Brazil.

The different multiple cropping systems commonly practiced by farmers in Brazil, especially bean intercropped with maize, are described. Major results of research regarding pest and disease incidence and agronomic aspects of these systems are also given. Two basic cropping systems can be distinguished in Brazil: intercropping systems in the NE (bean or cowpea/maize; bean or cowpea/maize intercropped in perennial crops) and in the central east, south, and SE (intercropping and/or relay cropping of bean/maize or bean/perennial crops). In bean/maize intercropping or relay cropping trials, the no. of Empoasca kraemeri nymphs decreased at least 50%; however, angular leaf spot (Isariopsis griseola) increased by 40% compared with bean in monoculture. Reduced bean yields in intercropping systems with maize depend on relative planting time, plant populations, fertilization, spacing between rows, plant types, and environmental factors. Although the practices of decreasing maize plant populations and increasing bean plant populations, and planting bean a few days before maize, increased bean yield, maize yield decreased and therefore their adoption by farmers depends of the relative market prices of the 2 products and on their relative risk. The relay cropping system with bean planted at the time of physiological maturity of maize is well adapted to regions with 2 rainy seasons. The use of short maize plant type to help conserve soil moisture, lower microenvironmental temp., and give physical protection to bean against several insect pests, is under study. At the Centro Nacional de Pesquisa de Arroz e Feijao (CNPAF) several bean lines with higher yield stability over different systems have been identified. Studies on the nontraditional multiple cropping system of maize/bean strip cropping (reduced competition and independent management of each component) have been conducted. The drawback of this system is that beans must compensate economically the decrease in area planted to maize. LER of 1.5 and 2.0 were found for intercropped maize/bean and for intercropped bean/maize later relayed with the same maize, resp. At the CNPAF, a planter that simultaneously plants both crops was developed. (Summary by EDITEC. Trans. by L.M.F.) D03

0476

19016 CECILIA, F.C.S.; RAMALHO, M.A.P.; GARCIA, J.C. 1982 Adubacao nitrogenada e fosfatada na consorciacao milho-feijao. (Effect of nitrogen and phosphorus applications on maize/bean intercropping). Pesquisa Agropecuária Brasileira 17(9):1285-1291. Port., Sum. Port., Engl., 10 Refs., Illus.

Phaseolus vulgaris. Zea mays. Intercropping. Fertilizers. N. P. Planting. Economics. Brazil.

During the 1978/79 crop yr, field expt. were conducted in 2 regions of the state of Minas Gerais (Brazil), Lavras and Patos de Minas, to provide fertilizer recommendations in the maize/bean intercropping system. A randomized block design was used, arranged in a split plot scheme, with 4 replications. The split plot treatments were a combination of 3 levels of N (0, 75, and 150 kg/ha) with 3 levels of P (0, 150, and 300 kg/ha). For beans, a significant interaction between the fertilizer level and the arrangement used was found. In the expt. conducted in Lavras, best responses were obtained for P, and in Patos de Minas, for N. The estimates of levels of fertilizers which guaranteed bigger profits varied in relation to the arrangement, and the highest values were found in the arrangement where bean and maize were planted in the same row. Results indicate the possibility of increasing farmers' income by using modern technologies,

even in a traditional practice such as intercropping. (Author's summary) D03

0477

19011 DAVIS, J.H.C.; GARCIA, S. 1983. Competitive ability and growth habit of indeterminate beans and maize for intercropping. Field Crops Research 6:59-75. Engl., Sum. Engl., 18 Refs., Illus.

Phaseolus vulgaris. Intercropping. Zea mays. Yields. Cultivars. Plant habit. Indeterminate cultivars. Colombia.

Two trials of 10 and 21 bean cv., resp., planted with 3 maize cv., were grown at CIAT-Palmira (3°31'N, 1001 m.a.s.l.), and a trial of 114 bean cv. planted with 1 maize cv. was grown at Obonuco (1°13'N, 2710 m.a.s.l.), Colombia. The relationship between the yield of bean cv. and maize when intercropped was negative. For each additional kg of bean yield, between 1-2 kg of maize yield were lost due to competition. The regression slope could be used to predict the yield of maize in monoculture, and the maize yield reduction served as an index of the competitive ability of bean var. Bean yields averaged 1000 kg/ha, with max. yields up to 2400 kg/ha, when intercropped with maize. Maize yields were 3500 kg/ha on av., up to a max. of 5500 kg/ha, when intercropped with beans. The yield reduction of maize was between 15-30% when intercropped with beans, but there was no reduction in yield with relay cropping. The most competitive bean var. yielded the most when intercropped with maize, but these var. were not necessarily the highest yielding in monoculture. The most competitive bean var. were taller, more vigorous, and later to maturity. The most competitive maize genotypes were also tall plant types. Somewhat shorter maize plants can give improved net income when intercropped with climbing beans, provided they are resistant to stem lodging. It is probable that greater efficiency of production could be obtained by breeding genotypes, both of beans and maize, which are somewhat less competitive, paying special attention to lodging resistance in maize, and in beans to physiological efficiency under shade, and improved N fixation. (Author's summary) D03

0478

18999 GLIESSMAN, S.R. 1982. Nitrogen distribution in several traditional agro-ecosystems in the humid tropical lowlands of south-eastern Mexico. Plant and Soil 67(1-3):105-117. Engl., Sum. Engl., Span., 11 Refs.

Phaseolus vulgaris. Intercropping. Zea mays. N. Mineral content. Soil fertility. Biomass. Roots. Stems. Flowers. Mexico.

N distribution was examined in 5 local agroecosystems typical of the lowlands of tropical SE Mexico: monoculture maize, maize/bean polyculture, cassava, taro, and upland rice. Total biomass and N content were determined monthly for standing live, standing dead, and litter biomass of both crop and noncrop components of each system. The crop component was further divided into roots, crown, stem, leaves, fruits, and flowers. Soil N determinations were also made monthly. Results demonstrated that N maintenance in the system is highly dependent on the proportion of the net biomass produced which is returned to the system. Leguminous and weed components may reduce net N losses from these systems. (Author's summary) D03

0479

18792 GOMINHO, M.S.F.; MAFRA, R.C. 1979. Uma metodologia de análise agroeconomica para culturas consorciadas em experimentos de adubacao.

152

(Methodology of agroeconomic analysis for intercropping in experiments on fertilizer application). Pesquisa Agropecuária Pernambucana 3(2): 161-182. Port., Sum. Port., Engl., 7 Refs., Illus.

Phaseolus vulgaris. Zea mays. Intercropping. Fertilizers. P. Yields. Economics. Statistical analysis. Brazil.

In a field trial at Sao Joao, PE, Brazil, in 1978, bean cv. IPA-1 at 200,000 plants/ha were intercropped with maize cv. Centralmex at 25,000 plants/ha and 41.2, 82.4, or 123.6 kg P/ha was applied as FYM or 41.2 kg P as FYM + 14 kg P as single superphosphate, or 2 or 3 times these rates were applied. Yield data of the maize/bean association regarding the levels of P selected, contained in organic manures and fertilizers, were used to show a methodology of exptl. analysis; the statistical and economic analyses were combined. Treatments were examined through contrasting orthogonals. Regression analysis involved a quadratic function compared with Mitscherlich's equation and a square root function. The optimum rates of fertilizer to obtain higher bean and maize yields in intercropping were estimated. Alternating procedures of fertilization were considered, taking into account the variations in product prices, inputs, and cultivation costs. (Summary by F.G. Trans. by L.M.F.) D03

0480

17490 GROOT, W. DE 1980. Density of dry beans (Phaseolus vulgaris) interplanted in maize (Zea mays). In Kenya. Ministry of Agriculture. Grain legume project. Thika, Kenya, National Horticultural Research Station. Interim Report no. 16. Short Rains 1979/80. pp.1-16. Engl., Sum. Engl., 18 Refs.

Phaseolus vulgaris. Planting. Spacing. Intercropping. Zea mays. Yields. Kenya.

The optimum planting density for beans in association with maize was studied in 2 sets of expt., carried out in the various bean growing areas of Kenya. In the 1st series of expt. treatments were interplanting of 0, 1, 2, 3, and 4 rows of bean, resp., in between the maize rows. Beans were planted at an intrarow distance of 10 cm, giving bean densities of 0, 133, 267, 400, and 533 thousand plants/ha, resp., with the normal maize density of 44,000 plants/ha (75 x 30 cm). In the 2nd series of trials densities of interplanted beans were reduced (0, 89, 133, 178, and 267 thousand plants/ha) as the 1st series had shown that densities over 300,000 plants/ha did not increase bean yields further. Beans were interplanted at both 1 and 2 rows in between the maize rows at intrarow distance of 10 and 15 cm. Both crops were also grown in pure stands. In the 1st series, bean yields increased with density, although the increase was not significant in all expt. At Kisii and Kakamega, yield levels for beans were rather low and C.V. were high. LER values clearly showed the advantage of mixed cropping over growing pure stands in 6 out of 9 trials, while in all trials mixed stands had LER values of more than 1. In the 2nd series, a significant treatment effect was found in all expt. due to the great differences between pure stand yields and that of interplanted beans. Bean yields increased significantly when densities were doubled by interplanting 2 rows instead of one. A bean density of 178,000 plants/ha in 2 rows at 15 cm intrarow is recommended. (Summary by L.M.F.) D03

0481

19015 RISCH, S.J. 1980. Fewer beetle pests on beans and cowpeas interplanted with banana in Costa Rica. Turrialba 32(2):210-212. Engl., Sum. Span., Engl., 3 Refs.

Phaseolus vulgaris. Intercropping. Vigna unguiculata. Diabrotica balteata. Cerotoma ruficornis rogersi. Costa Rica.

The density of the beetles Diabrotica balteata and Cerotoma ruficornis rogersi in bean and cowpea in monoculture and in polyculture with banana was studied at the Centro Agronómico Tropical de Investigación y Enseñanza (CATIE) in Costa Rica. Samples were collected with a sweep net. There were approx. 3 times as many beetles in monocrops than in polycrops, accounting for the yield difference obtained when intercropping legumes in the tropics. (Author's summary) D03

0482

19049 RISCH, S.J.; HANSEN, M.K. 1982. Plant growth, flowering phenologies, and yields of corn, beans and squash grown in pure stands and mixtures in Costa Rica. Journal of Applied Ecology 19(3):901-916. Engl., Sum. Engl., 34 Refs., Illus.

Phaseolus vulgaris. Intercropping. Zea mays. Growth. Biomass. Flowering. Yields. Costa Rica.

Maize cv. Tuxpeño Crema-1, bean cv. CATIE-1, and squash cv. Golden Nugget were grown in pure stands and in 2- and 3-species mixtures for 3 seasons in Costa Rica. Per plant vegetative biomass of beans and maize was not affected by treatment (pure stand or mixture). Bean plants initiated flowering later in mixtures with maize but total bean flower production was not significantly affected by treatment. The effect of treatment on bean yield/plant varied from season to season, possibly due to the fact that bean yield from all treatments was significantly less during the 2nd and 3rd season than the 1st season. Although intercropping significantly decreased per plant yields of maize and squash while significantly increasing it for beans, the total yield in terms of gross return/ha (LER) was greater for all mixtures (maize-bean mixture, 2.32), with the exception of the maize-squash intercrop, than their resp. pure stands. (Author's summary) D03

0483

18741 VIEIRA, C.; RAMALHO, M.A.P.; CHAGAS, J.M. 1982. Milho e feijao em cultivo consorciado. (Maize/bean intercropping). Informe Agropecuário 8(90):13-15. Port., 17 Refs., Illus.

Phaseolus vulgaris. Intercropping. Zea mays. Spacing. Fertilizers. N. P. Planting. Mechanization. Agricultural equipment. Brazil.

A brief literature review is given of the results of research carried out in the state of Minas Gerais, Brazil, on maize/bean intercropping systems regarding the type of maize cv. (tall, short, and intermediate growth habit), planting density, fertilization, and mechanized planting. An implement designed by the Centro Nacional de Pesquisa de Milho e Sorgo that simultaneously plants intercropped maize and beans is explained in detail. (Summary by F.G. Trans. by L.M.F.) D03

0484

19097 ZUÑIGA V., H.; MANTILLA G., C.E.; RAIGOSA, J. DE D. 1981. Factibilidad agronómica y entomológica de la siembra intercalada caña de azúcar (Saccharum officinarum L.) y fríjol (Phaseolus vulgaris L.). (Agronomic and entomological feasibility of intercropping sugarcane and beans). Acta Agronómica (Colombia) 31(1/4):67-77. Span., Sum. Span., Engl., 10 Refs.

154

Phaseolus vulgaris. Intercropping. Saccharum officinarum. Planting. Timing. Yields. Empoasca kraemeri. Bemisia tabaci. Insect control. Diabrotica balteata. Biological control. Colombia.

This study was carried out at the Ingenio Providencia, Valle del Cauca, Colombia, in intercrops of sugarcane var. POJ 2878 and bean var. Diacol Calima to determine the optimum planting date for beans regarding sugarcane. The effect of planting dates and systems on major insect pest populations was also studied and yields of both cv. were assessed. A randomized complete block design was used with 8 treatments and 4 replications. Planting beans 10 days after sugarcane was the best planting date. Insect pest populations of Empoasca kraemeri, Diabrotica sp., Cerotoma sp., and Maecolaspis sp. were lower in the intercropping, although no significant differences were detected. The activity of the parasite Anagrus sp. on eggs of E. kraemeri was not affected by intercropping or planting dates. Yields of both crops were satisfactory and above national av. (Author's summary) D03

See also 0542

D04 Seed Production

0485

18576 COPELAND, L.O.; SAETTLER, A.W. 1978. Seed quality. In Robertson, L.S.; Frazier, R.D., eds. Dry bean production—principles and practices. East Lansing, Michigan State University. Cooperative Extension Service. Agricultural Experiment Station. Extension Bulletin E-1251. pp.134-142. Engl., Illus.

Phaseolus vulgaris. Seed. Seed characters. Mechanical damage.

The components to determine bean seed quality are indicated: germination, physical and var. purity, and phytosanitary quality. The Michigan Certified Bean Seed Program (USA) is described. Aspects discussed include: the use of breeder and foundation seed from western states, maintenance of disease-free certified seed, considerations on var. purity, germination and seed quality aspects, and the need for genetic diversity. Mechanical damage, visible and invisible, of the seed, considered a severe production problem, is discussed. Ways to prevent or minimize mechanical injury are also suggested. (Summary by EDITEC. Trans. by L.M.F.) D04

0486

18718 POLANIA F., F. 1981. Producción de semilla de fríjol. (Bean seed production). 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. Seed production. Legal aspects. Cultivation.

The 1st 2 stages of seed production and certification are analyzed in detail: verification of seed source and field inspection of the crop. The different types of seed are described according to the techniques and care used in its production: genetic, basic, registered, certified, official, and common. Field requirements established for seed production are listed: localization, rotation or left fallow, isolation, cultural practices, var. purity, harvesting, and postharvest operations. (Summary by F.C. Trans. by L.M.F.) D04

0487

18749 SANCHEZ M., F.R.; PINCHINAT, A.M. 1974. Bean seed quality in Costa Rica. Turrialba 24(1):72-75. Engl., Sum. Engl., Span., 13 Refs.

Phaseolus vulgaris. Seed characters. Seed. Seed production. Water content. Germination. Seed vigor. Bean common mosaic virus. Costa Rica.

A survey of Phaseolus vulgaris seed quality was carried out on 77 farms in 5 regions of Alajuela, one of the main bean-producing provinces of Costa Rica, in 1971. MC, purity, standard germination, and viability were analyzed and seedling vigor measured both by the indirect (speed of germination) and direct (cold) tests. Incidence of the BCMV was recorded on plants grown under controlled greenhouse conditions. Additional information was obtained on other aspects of seed quality through a questionnaire that was filled in when the samples were being taken. Purity (98.9%) was satisfactory but MC (16.4%) was too high and germination (72%) too low. Seedling vigor was also low and 16.9% of the samples carried BCMV. It was concluded that poor seed quality is a basic factor limiting bean production in Costa Rica. (Summary by Field Crop Abstracts) D04

See also 0458

E00 PLANT PATHOLOGY

0488

19073 LOZANO, J.C.; SCHWARTZ, H.F. 1981. Limitaciones a la resistencia a enfermedades de varios cultivos alimenticios de América Latina. (Factors limiting disease resistance in several food crops in Latin America). Fitopatología Colombiana 10(1/2):33-38. Span., 10 Refs.

Also in Fitopatologia Brasileira 7(3):327-332. 1982.

Phaseolus vulgaris. Ecology. Resistance. Diseases and pathogens. Latin America. Colombia.

Common problems in the tropics regarding the stability of bean and cassava commercial crops are discussed considering biotic, abiotic, cultural, and socioeconomic factors. This is related to the problems of stability that improved var. generally show in different ecosystems where they are introduced and selected on the basis of potential yield, and with the application of a great amount of inputs demanded by modern agriculture. General ideas on crop improvement in the tropics are given. There is a trend to maintain the stability reached in traditional farming. (Author's summary. Trans. by L.M.F.) E00

See also 0437 0560

E02 Bacterioses

0489

18765 SMIDT, M.L.; VIDAVER, A.K. 1982. Bacteriocin production by Pseudomonas syringae PsW-1 in plant tissue. Canadian Journal of Microbiology 28(6):600-604. Engl., Sum. Engl., Fr., 25 Refs., Illus.

Phaseolus vulgaris. Pseudomonas syringae. Inoculation. Symptomatology. Toxins.

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The production and activity of syringacin W-1, a particulate bacteriocin made by Pseudomonas syringae PsW-1, was studied in plant tissue. The bacteriocin is rod shaped, approx. 20 nm wide and 75 nm long, and composed of an outer sheath and inner core. Both the producing strain, PsW-1, and a sensitive strain, 16, grew within red kidney bean stems. Strains PsW-1 and 16, or mutants derived from them, were injected into bean stems singly or in mixtures. All singly inoculated strains grew well. When the bacteriocin-producing strain was co-inoculated with the sensitive strain, the latter grew poorly, if at all. This was not due to competition for available nutrients, since the sensitive strain grew as well in the presence of a bacteriocin-nonproducing mutant as it did alone. Also, a bacteriocin-resistant mutant grew as well in the presence of the producing strain as it did alone. Bacteriocin activity and particles were recovered from infected plant tissue. (Author's summary) E02

0490

18308 TAM, L.Q.; PATIL, S.S. 1972. Mode of action of the toxin from Pseudomonas phaseolicola. 2. Mechanism of inhibition of bean ornithine carbamoyltransferase. Plant Physiology 49(5):808-812. Engl., Sum. Engl., 20 Refs., Illus.

Phaseolus vulgaris. Pseudomonas phaseolicola. Toxins. Enzymes. Inhibitors.

The kinetics of inhibition of ornithine carbamoyltransferase by a toxin from Pseudomonas phaseolicola, which induces chlorosis in Phaseolus vulgaris, were examined. (Summary by Field Crop Abstracts) E02

0491

19082 TRUJILLO, G.E.; SAETTLER, A.W. 1981. Un nuevo método para el mantenimiento de bacterias fitopatógenas que atacan el cultivo de la caraota (Phaseolus vulgaris L.). (A new method of maintaining phytopathogenic bacteria that attack bean). Revista de la Facultad de Agronomía (Maracay) 12(1/2):23-33. Span., Sum. Span., Engl., 13 Refs., Illus.

Phaseolus vulgaris. Isolation. Corynebacterium flaccumfaciens. Xanthomonas phaseoli. X. phaseoli var. fuscans. Pseudomonas phaseolicola. P. syringae. Culture media. Inoculation. Symptomatology. Pathogenicity.

Isolates of Corynebacterium flaccumfaciens, Xanthomonas phaseoli, and X. phaseoli var. fuscans were grown in plates of YCA (yeast extract, calcium carbonate, agar) and isolates of Pseudomonas phaseolicola and P. syringae in plates of King's Medium B. Cultures were incubated in the lab. at 24 ± 1°C until the agar was completely dry (between 5-6 wk.). The dry agar was removed with sterile forceps, cut into small pieces with sterile scissors, and aseptically ground to a fine powder with mortar and pestle. The fine powder cultures were stored in sterile glass vials at 24 ± 1°C. At various intervals, samples of the powder were suspended in sterile buffered saline, and aliquots of the suspensions were transferred to the appropriate medium to test their viability. Isolates of X. phaseoli, X. phaseoli var. fuscans, and C. flaccumfaciens bacteria were easily recovered from powder stored 14 mo., at concn. greater than 10^3 cells/mg of powder. All bacterial isolates were pathogenic when inoculated to bean var. Red Kidney plants. Several other isolates of phytopathogenic bacteria maintained viability for at least 4 mo. when stored in a similar manner. (Author's summary) E02

159

0492

17774 WYMAN, J.G.; VAN ETTEN, H.D. 1982. Isoflavonoid phytoalexins and nonhypersensitive resistance of beans to Xanthomonas campestris pv. phaseoli. Phytopathology 72(11):1419-1424. Engl., Sum. Engl., 35 Refs., Illus.

Phaseolus vulgaris. Phytoalexins. Xanthomonas phaseoli. Inhibitors. Inoculation. Cultivars. Resistance. Pathogenicity. Isolation.

Bean phytoalexins, phaseolinisoflavan and kievitone, strongly inhibited Xanthomonas campestris pv. phaseoli in liquid culture while phaseolin and coumestrol were not inhibitory. When phytoalexin accumulation and xanthomonad multiplication in unifoliate leaves of the susceptible bean cv. Dark Red Kidney and the resistant bean cv. Tara were compared, none of the known isoflavonoid phytoalexins were found in Dark Red Kidney tissue exhibiting typical common blight symptoms. Hypersensitively reacting tissue of Tara contained significant amounts of phaseolin and phaseolinisoflavan, lower amounts of coumestrol, and an unidentified, moderately inhibitory coumestan. However, Tara tissue which did not react hypersensitively did not contain detectable levels of any of the isoflavonoids 5 days after inoculation with 10^6 colony-forming units of X. campestris pv. phaseoli/ml. At this time populations of X. campestris pv. phaseoli had attained stable levels, indicating that resistance had been induced and was well established. The limited antibacterial activity of phaseolin and coumestrol and the absence of all 4 characterized isoflavonoids in nonhypersensitive resistant Tara tissue suggest that the 4 phytoalexins studied do not contribute significantly to nonhypersensitive resistance of beans to X. campestris pv. phaseoli. (Author's summary) E02

0493

19040 ZAPATA, M.; FREYTAG, G.F.; WILKINSON, R.W. 1980. Determinación de resistencia en frijol, Phaseolus vulgaris L., a la bacteria Xanthomonas phaseoli (E.F. Smith) Dowson. (Bean resistance to the bacterium Xanthomonas phaseoli). Mayagüez, Estación Experimental Agrícola. Universidad de Puerto Rico. 14p. Span., 11 Refs.

Paper presented at Reunión Anual del PCCMCA, 26a., Guatemala, 1980.

Phaseolus vulgaris. Resistance. Xanthomonas phaseoli. Inoculation. Pathogenicity. Crossbreeding. Symptomatology.

Six pure strains of Xanthomonas campestris pv. phaseoli from Phaseolus vulgaris, P. coccineus, Vigna unguiculata, and Glycine max were differentiated according to their degree of pathogenicity and serological relationship. Leaves of seedlings and excised leaves and pods of different cv. and lines of P. vulgaris, P. coccineus, P. acutifolius, and G. max were inoculated using the following methods: infiltration with pressure, vacuum infiltration, wound inoculation, and multiple needle inoculation. Excised leaves and pods were incubated in chambers under controlled conditions while plants with inoculated leaves (intact) were kept under normal conditions in the greenhouse. The differential reaction of leaves and pods regarding resistance to the different bacterial strains was evaluated and the differences in growth and symptom expression induced by the different strains were determined. In the F_4 material from P. vulgaris x P. coccineus crossings, some selections with high resistance (immunity) to all the tested strains were found. (Author's summary. Trans. by L.M.F.) E02

See also 0545 0550 0576

158

0494

18704 BARMAN, B.; ROY, A.K. 1978. Corynespora leaf spot of French bean and tomato. Science and Culture (India) 44(9):411. Engl., 3 Refs.

Phaseolus vulgaris. Snap beans. Corynespora casiicola. Symptomatology. Isolation. Etiology. India.

The symptomatology and etiology of a leaf spot disease of French bean reported in 1976 in Nowgong, district of Assam, India, are briefly discussed. Isolations from these spots, inoculated into snap bean, were identified as Corynespora sp. (Summary by EDITEC. Trans. by L.M.F.) E03

0495

19081 CARDOSO, J.E.; OLIVEIRA, E.B. DE 1982. Controle da mela do feijoeiro através de fungicidas. (Controlling web blight of beans with fungicides). Pesquisa Agropecuária Brasileira 17(12):1811-1813. Port., Sum. Port., Engl., 2 Refs.

Phaseolus vulgaris. Rhizoctonia solani. Disease control. Chemical control. Brazil.

The efficiency of the fungicides thiabendazole (0.25 kg a.i./100 l water), benomyl (0.05 kg a.i./100 l water), mancozeb (0.15 kg a.i./100 l water), and PCNB (0.30 kg a.i./100 l water) in controlling web blight (Thanatephorus cucumeris) in bean cv. Rosinha was assessed. All fungicides were applied varying the date of 1st application, intervals, and no. of applications. Unsprayed plots were used as control. Thiabendazole and benomyl showed superior control regardless of time, intervals, and no. of applications. Mancozeb and PCNB did not differ from the control regarding web blight incidence. (Author's summary) E03

0496

18785 CERVONE, F.; ANDEBRHAN, T.; COUTTS, R.H.A.; WOOD, R.K.S. 1981. Effects of French bean tissue and leaf protoplasts on Colletotrichum lindemuthianum polygalacturonase. Phytopathologische Zeitschrift 102(3/4):238-246. Engl., Sum. Engl., Germ., 21 Refs., Illus.

Phaseolus vulgaris. Colletotrichum lindemuthianum. Enzymes. Plant tissues. Rhizoctonia solani.

The activity of polygalacturonase from Colletotrichum lindemuthianum was greatly decreased following exposure to intact tissue and isolated living protoplasts from bean cv. Canadian Wonder plants but not by tissue from potato, carrot, and turnip. Polygalacturonases from Rhizoctonia fragariae, R. solani, and Trichoderma koningii were little affected by bean tissues. Decrease of enzyme activity caused by bean tissue was partially nullified by certain sugars or by treating tissue with heat, chloroform, or sodium periodate. The permeability of bean cotyledon cells was increased by polygalacturonase from C. lindemuthianum but not by polygalacturonases from R. fragariae and R. solani. (Author's summary) E03

0497

19092 ECHEVARRIA, E.; GONZALEZ A., M.; MARRERO, H. 1982. Dos métodos de lucha contra el hongo causante del tizón sureño en fríjol. (Two methods of controlling the causal agent of southern blight of beans). Ciencias de la Agricultura (Cuba) 12:11-16. Span., Sum. Span., Engl., 10 Refs.

Phaseolus vulgaris. Cultivars. Sclerotium rolfsii. Disease control. Biological control. Resistance. Germplasm. Cuba.

During 1978 and 1979 expt. were carried out under lab. and field conditions to study the performance of a group of commercial and unreleased bean var. from the collection at the Instituto de Investigaciones Fundamentales en Agricultura Tropical Alejandro de Humboldt, in the presence of the fungus Sclerotium rolfsii, and likewise investigate the possibility of using Trichoderma sp. as a biological control of southern blight under Cuban conditions. The expt. with different var. showed highly significant differences regarding the resistance of the var. Selección 11 compared with the others. Lab. essays demonstrated antagonism between Trichoderma sp. and S. rolfsii. Likewise, highly significant differences were detected among variants (Trichoderma sp., Trichoderma sp. + S. rolfsii, and S. rolfsii and the noninoculated control) when a susceptible var. was sowed in inoculated soil. Therefore the artagonistic effect of Trichoderma sp. on S. rolfsii was verified, making the use of this fungus for controlling this pathogen in bean feasible. (Author's summary) E03

0498

18550 FUKUDA, W.M.G. 1982. Heranca da resistencia a tres racas fisiológicas de Colletotrichum lindemuthianum (Sacc. et Magn.) Scrib. em feijoeiro (Phaseolus vulgaris L.). (Inheritance of resistance to three physiological races of Colletotrichum lindemuthianum in bean). Tese Mag.Sc. Vicosa-MG, Brasil, Universidade Federal de Vicosa. 29p. Port., Sum. Port., 32 Refs., Illus.

Phaseolus vulgaris. Colletotrichum lindemuthianum. Inheritance. Cultivars. Crossbreeding. Resistance. Backcrossing. Brazil.

The inheritance of the resistance to 3 physiological races of Colletotrichum lindemuthianum, BA-1 (belonging to the alpha group), BA-4 (from the Brazilian group), and BA-8 (from the Mexican II group), was studied using crosses between bean var. Dark Red Kidney and Costa Rica 1031, and Perry Marrow and Michelite. Dark Red Kidney is resistant to races BA-1 and BA-4 and susceptible to BA-8; Costa Rica 1031 is susceptible to races BA-1 and BA-4 and resistant to BA-8, and Perry Marrow is resistant to BA-1 and BA-8 while Michelite is susceptible to these 2 races. Inoculations were made in the F_1 and F_2 generations and in backcrosses. All plants were resistant in F_1. F_2 of the cross between Perry Marrow and Michelite showed a segregation of 3 resistant and 1 susceptible plants regarding races BA-1 and BA-8, while in the cross Dark Red Kidney and Costa Rica 1031, the same ratio was observed for races BA-1 and BA-4. The action of a single dominant gene controlling the resistance to each one of these races was confirmed in these crosses. Resistance to BA-8 in the cross between Dark Red Kidney and Costa Rica 1031 was controlled by the interaction of 2 complementary dominant genes; F_2 included 9 resistant and 7 susceptible plants. (Extracted from author's summary. Trans. by L.M.F.) E03

0499

19419 GALINDO, J.J.; ABAWI, G.S.; THURSTON, H.D.; GALVEZ, G. 1982. Characterization of Thanatephorus cucumeris isolates causing web blight of beans in Costa Rica. Turrialba 32(4):447-455. Engl., Sum. Span., Engl., 25 Refs., Illus.

Phaseolus vulgaris. Isolation. Rhizoctonia solani. Etiology. Pathogenicity. Costa Rica.

160

Seventy-one isolates of Thanatephorus cucumeris were obtained from naturally infected bean leaf tissues collected from several bean growing areas of Costa Rica that ranged from 50 to 1200 m.a.s.l. Two other isolates were obtained from lesions on leaves of the weed species Sida acutifolia and Rhotboelia exaltata in a bean field near Esparza. Based on mycelial characteristics, multinuclear condition, and presence of the dolipore-type septal structures, all isolates were typically R. solani which is the imperfect state of T. cucumeris. Linear growth rate, as determined on PDA at 25°C, varied greatly among these isolates ranging from 10 to 29 mm in 24 h. All isolates produced brown to dark brown sclerotia which varied in size from 0.5 to 9.0 mm in diameter. All isolates were pathogenic to leaf and hypocotyl tissues of bean cv. Mexico 27, but their virulence varied significantly. There was a positive correlation between growth rate of an isolate and its virulence to bean leaves and hypocotyls. Of the 73 isolates tested, 26 and 38 isolates belonged to anastomosis groups (AG) 1 and 2, resp. The remaining 9 isolates failed to anastomose with any of the 4 AG testers used. (Author's summary) E03

0500

19403 GALINDO, J.J.; ABAWI, G.S.; THURSTON, H.D.; GALVEZ, G. 1983. Effect of mulching on web blight of beans in Costa Rica. Phytopathology 73(4):610-615. Engl., Sum. Engl., 27 Refs., Illus.

Phaseolus vulgaris. Rhizoctonia solani. Disease control. Chemical control. Mulching. Cultivation systems. Disease transmission. Costa Rica.

The relative effect of the covered bean (fríjol tapado) cropping system and the effect of mulches and chemicals applied to the soil or bean seeds on web blight (Rhizoctonia solani, the imperfect state of Thanatephorus cucumeris) incidence and severity were evaluated in fields near Esparza, Puntarenas, Costa Rica, with a history of repeated incidence of the disease. Mulching was highly effective and superior to chemical treatments for the control of web blight. Soilborne sclerotia and colonized debris spread by splashing rain were the main sources of inoculum for web blight in these fields. Mulching with rice husks (2.5 cm thick) greatly reduced splashing of inoculum and lowered disease severity. At harvest, severity of web blight in nontreated and mulched plots planted to cv. Porrillo 70 was 100 and 13%, and seed yield was 0 and 655 kg/ha, resp. In a 2nd field with a lower level of inoculum, yield in the nontreated and mulched areas averaged 273 and 835 kg/ha, resp. Similar results were obtained with cv. Mexico 27. Mulching with rice husks was superior to PCNB soil drench (40 kg 75% WP/ha) in controlling web blight. Seed treatment with benomyl (1 g benomyl, 50% WP/kg seed) and soil application of paraquat (1 kg a.i./ha) were ineffective. The local production practice of covered bean, in which seeds are broadcast in vegetation that is later cut and left as mulch, was as effective as rice husk mulching in reducing the incidence and severity of web blight but yields were lower. (Author's summary) E03

0501

19094 GONZALEZ A., M.; MARRERO, H.; HERRERA, F. 1982. Incidencia de distintos hongos del suelo en las zonas frijoleras de la Provincia de Holguín. (Incidence of different soilborne fungi in bean growing areas of the province of Holguín, Cuba). Ciencias de la Agricultura 12:17-21. Span., Sum. Span., Engl., 6 Refs., Illus.

Phaseolus vulgaris. Isolation. Sclerotium rolfsii. Macrophomina phaseoli. Rhizoctonia solani. Inoculation. Cultivars. Pathogenicity. Cuba.

During 1973-77 research was conducted on bean under lab. and field conditions in bean growing areas of the province of Holguín, Cuba, to determine the incidence of different soilborne fungi. The prevalence of Sclerotium rolfsii was greater than that of other isolated pathogens. The fungus Macrophomina phaseolina, also isolated from the tested soils, was considered the most important due to its easy seed transmission. M. phaseolina showed a higher selectivity to different bean types (black, red, and white) compared with S. rolfsii. The use of black-seeded var. is recommended in order to reduce M. phaseolina inoculum in contaminated soils. (Author's summary) E03

0502

18519 HUNTER, J.E. 1980. The battle against white mold disease on snap beans. American Vegetable Grower and Greenhouse Grower 28(3):8-9. Engl., Illus.

Phaseolus vulgaris. Whetzelinia sclerotiorum. Symptomatology. Epidemiology. Disease control. Chemical control.

The epidemiology and symptomatology of white mold on snap beans, caused by Sclerotinia sclerotiorum, are described as a 1st step in finding adequate control measures. Available disease control measures are explained, including an integrated approach that combines cultural practices and chemical control. Cultural practices should promote drying of soil and plant surfaces such as avoiding cultivation in small fields surrounded by dense woods; planting rows in the direction of prevailing winds; not planting var. that develop a dense canopy; using low plant populations and wide row spacing; deep plowing immediately after harvest; crop rotation with a nonsusceptible crop. Chemical control was successful with a single spray of benomyl at a rate of 1.5 lb/ac or with 2 sprays applied 1 wk. apart at a rate of 1 lb/ac/application, when 70-80% of the plants showed the 1st open blossoms and assuring thorough coverage. Research is underway to identify sources of resistance to incorporate into cv. (Summary by EDITEC. Trans. by L.M.F.) E03

0503

19060 IMHOFF, M.W.; LEONARD, K.J.; MAIN, C.E. 1982. Patterns of bean rust lesion size increase and spore production. Phytopathology 72(4):441-446. Engl., Sum. Engl., 10 Refs., Illus.

Phaseolus vulgaris. Uromyces phaseoli. Temperature. Relative humidity. Leaves. Epidemiology.

Urediospores of Uromyces phaseoli var. typica were collected daily from 1st trifoliolate leaves of Phaseolus vulgaris grown under controlled conditions at 16, 21, 24, and 27°C. Nine lesion densities ranging from 11 to 107 lesions/leaflet, 3 RH ranging from 51 to 87%, and 2 leaf ages were incorporated into the 4 temp. treatments. The latent period varied from 9 days at 16°C to 7 days at 24°C. Sporulation/lesion occurred in waves of decreasing amplitude over time in most treatments. Increase of total lesion area, sporulating area, and cumulative no. of spores, however, was nearly linear with time in all treatments, except at 27°C where lesions did not develop. The av. ratio of sporulating area to total lesion area was 0.27. RH between 51-87% and lesion densities ranging from 11 to 107 lesions/leaflet significantly affected cumulative spore production, but accounted for only a small part of the variation among treatments. The rates of increase of both sporulating area and total infected area could be described by quadratic temp. functions (r^2 = 0.988 and 0.956, resp.). Efficiency of both sporulating and total infected areas (sporulation/unit

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area) varied negatively quadratically with temp., inversely with lesion density, and positively with leaf age. The av. rate of sporulation/day appeared to be inversely proportional to lesion density over all temp. and humidity treatments. Quantitative information obtained in this study can be used to form a preliminary mathematical description of sporulation in the bean rust pathosystem. (Author's summary) E03

0504

19414 KOBRIGER, K.M.; HAGEDORN D.J. 1983. Determination of bean root rot potential in vegetable production fields of Wisconsin's Central Sands. Plant Disease 67(2):177-178. Engl., Sum. Engl., 8 Refs., Illus.

Phaseolus vulgaris. Rhizoctonia solani. Pythium ultimum. Aphanomyces euteiches phaseoli. Laboratory experiments. USA.

A greenhouse bioassay was developed to determine the bean root rot potential of central Wisconsin (USA) vegetable-production fields. Greenhouse and field disease severities were shown to be highly and positively correlated during 3 yr of testing in 83 commercial snap bean fields. As field and greenhouse disease severity indices increased, there was a corresponding trend toward decreased yields. This bioassay can be used by growers as part of an integrated program for bean root rot control by estimating the risk factors of fields. (Author's summary) E03

0505

18797 MOHAMED, H.A.; ABDELAL, H.R.; SHATTA, H.A.; FADL, F.A.; NAGI, I. 1983. Chemical control of kidney bean rust. Cairo, Egypt, Al-Azhar University. Faculty of Agriculture. Al-Azhar Agricultural Research Bulletin no.75. 8p. Engl., Sum. Engl., 6 Refs.

Phaseolus vulgaris. Uromyces phaseoli. Disease control. Chemical control. Yields. Egypt.

Six fungicides were tested to determine their effect on germination of urediospores of Uromyces phaseoli and rust severity, and on bean yield under field conditions at Kafr El-Zayat, Egypt. Oxycarboxin, triforine, and benomyl inhibited urediospore germination at 100 ppm while thiophanate-methyl inhibited urediospore germination at 1000 ppm. Carbendazim and elemental S did not inhibit germination even at the highest concn. (1000 ppm). The most effective fungicides in decreasing % of infection were oxycarboxin, triforine, and benomyl followed by thiophanate-methyl and elemental S. Carbendazim was the least effective in controlling rust. All fungicides significantly increased seed production. Highest seed yield was obtained when oxycarboxin, triforine, and benomyl were sprayed followed by thiophanate-methyl, elemental S, and carbendazim which gave the lowest yield in the sprayed plots. (Author's summary) E03

0506

19061 MONTECILLO, C.M.; BRACKER, C.E.; HUBER, D.M. 1982. An improved technique for inoculating plant surfaces with fungal zoospores. Phytopathology 72(4):403-406. Engl., Sum. Engl., 13 Refs., Illus.

Phaseolus vulgaris. Inoculation. Leaves. Synchytrium macrosporum.

Infection of Pinto bean leaves by zoospores of Synchytrium macrosporum was enhanced by Gelgard, a highly cross-linked hydrophilic polyacrylamide gel mixed with the inoculum. Infection loci were more uniformly distributed and occurred at a higher frequency on the leaf surface when Gelgard was added.

The gel restricted zoospore motion, shortened their swimming time, and held the inoculum in place on the plant surfaces. Gelgard or other similar materials that maintain moisture near infection sites and prevent zoospores from being washed off the plant surface should prove useful for enhancing infection by zoosporic fungi. (Author's summary) E03

0507

19027 MORA B., B. 1983. Estimativa de perdas no rendimento de feijoeiro-comum (Phaseolus vulgaris L.) causadas pela mancha-angular (Isariopsis griseola Sacc.). [Estimation of yield loss in common bean due to angular leaf spot (Isariopsis griseola)]. Tese Mag. Sc. Vicosa-MG, Brasil, Universidade Federal de Vicosa. 60p. Port., Sum. Port., Engl., 51 Refs., Illus.

Phaseolus vulgaris. Isariopsis griseola. Cultivars. Inoculation. Yields. Crop losses. Colombia.

The influence of angular leaf spot (Isariopsis griseola) on yield loss in dry beans was studied at the CIAT exptl. substation in Popayan, Colombia, during 1982-83. Inoculations 18, 30, and 42 days after sowing had no significant effect on yield. However, for yield loss studies inoculation at the age of 30 days is more reliable. Inoculation studies under greenhouse conditions with susceptible cv. Cauca 27a and Zacatecano indicated that a min. concn. of 2×10^4 conidia/ml was needed to induce severe disease incidence, this concn. being also recommended for other biological studies. Under field conditions a concn. of 0.5×10^4 conidia/ml was sufficient to cause substantial yield loss in cv. Zacatecano, when conditions were moderately favorable for disease development. However, for evaluating and selecting breeding lines resistant to the pathogen, a concn. of $8\text{-}10 \times 10^4$ conidia/ml was recommended. Several bean cv. when inoculated with the fungus showed a yield loss of 51-70%. There was a positive correlation ($r = 0.31$) between the severity of angular leaf spot and yield; Carioca, Chorotega, and Corobací, with diseases indexes of 8.6, 16.5, and 17.6%, resp., gave the highest yields. The general discoloration of leaves and premature defoliation are considered important parameters in the evaluation and correlation of disease incidence to yield loss. The Ascochyta leaf spot, caused by Ascochyta spp., is also prevalent in the region and under natural conditions is more severe than angular leaf spot, possibly affecting the results obtained. (Author's summary) E03

0508

19071 NAVARRO A., R.; PUERTA E., O.D.; ISAZA, L. 1981. Efecto combinado de las densidades de población y el control químico en las enfermedades foliares y el rendimiento del fríjol. (Combined effect of population densities and chemical control of diseases attacking foliage and bean yield). Fitopatología Colombiana 10(1/2):7-9. Span., Sum. Engl., Span., 3 Refs.

Phaseolus vulgaris. Planting. Spacing. Colletotrichum lindemuthianum. Disease control. Chemical control. Isariopsis griseola. Ascochyta fabae. Yields. Colombia.

The combined effect of planting densities (20,000-83,333 plants/ha) and chemical control of anthracnose (Colletotrichum lindemuthianum), angular leaf spot (Isariopsis griseola), and Ascochyta leaf spot (Ascochyta sp.) in bean var. ICA-Viboral was studied in field trials at the Centro Regional de Investigación La Selva, Antioquia, Colombia. Highest yields were obtained with benomyl applied at 15-day intervals and a planting distance of 60 cm

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between furrows and 60 cm between plants, for a population density of 55,555 plants/ha. (Author's summary) E03

0509

19070 NAVARRO A., R.; PUERTA E., O.D.; ISAZA, L. 1981. Uso alternado de fungicidas para el control de la antracnosis (Colletotrichum lindemuthianum) en fríjol (Phaseolus vulgaris) en el oriente antioqueño. [Alternate use of fungicides to control anthracnose (Colletotrichum lindemuthianum) in bean in eastern Antioquia]. Fitopatología Colombiana 10(1/2):3-6. Span., Sum. Engl., Span., 10 Refs.

Phaseolus vulgaris. Colletotrichum lindemuthianum. Disease control. Chemical control. Yields. Colombia.

A trial was carried out in 4 farm plots in the municipality of El Carmen de Viboral (Antioquia, Colombia), located at an alt. of 2200 m.a.s.l. and with a mean annual rainfall of 1800 mm, to observe the effect of alternate use of fungicides on the control of anthracnose (Colletotrichum lindemuthianum) in bean. The following fungicide rotations were applied: benomyl-fentin hydroxide, benomyl-captafol, mancozeb-mancozeb, and an untreated check. Spraying began approx. 30 days after planting and continued at 15-day intervals up to 4 applications/treatment. The alternate use of benomyl-captafol did not differ significantly from benomyl-fentin hydroxide, whereas the mancozeb-mancozeb treatment (1.93 t/ha) was similar to the check. There were significant differences between rotations including benomyl and other products. Although the best control of anthracnose was obtained with the benomyl-captafol treatment, higher yields were reached with the benomyl-fentin hydroxide treatment. (Author's summary. Trans. by L.M.F.) E03

0510

19072 OLARTE M., D.; OSORIO, G.; PUERTA, O.D.; ISAZA, L. 1981. Mecanismos para la infección primaria de la antracnosis (Colletotrichum lindemuthianum) en fríjol (Phaseolus vulgaris) en el oriente antioqueño. [Mechanisms for primary infection of bean anthracnose (Colletotrichum lindemuthianum) in eastern Antioquia]. Fitopatología Colombiana 10(1/2):23-28. Span., Sum. Engl., Span., 20 Refs.

Phaseolus vulgaris. Disease transmission. Colletotrichum lindemuthianum. Inoculation. Symptomatology. Colombia.

Two expt. were carried out at the La Selva Regional Research Center of the Instituto Colombiano Agropecuario in Rionegro (alt., 2200 m.a.s.l.; mean temp., 18°C; rainfall, 1800 mm) to determine the sourcea of infection for anthracnose (Colletotrichum lindemuthianum) in bean producing areas of eastern Antioquia, Colombia. In the 1st expt. primary infection was obtained applying spores of C. lindemuthianum to the soil. The degree of infection was directly proportional to the increase in spore concn. In the 2nd expt. infected crop residues played a very important role as source of infection whereas seed did not seem to be important for primary infection by C. lindemuthianum. (Author's summary) E03

0511

19074 PLOPER, L.D. 1981. La mustia hilachosa, nueva enfermedad en los cultivos de poroto (Phaseolus vulgaris L.) del noroeste argentino. (Web blight, a new disease of beans in northwestern Argentina). Revista Industrial y Agrícola de Tucumán 58(2):101-111. Span., Sum. Engl., Span., 10 Refs., Illus.

Phaseolus vulgaris. Rhizoctonia solani. Etiology. Symptomatology. Plant injuries. Pathogenicity. Argentina.

A disease that has recently appeared in bean growing areas of NW Argentina, web blight caused by Thanatephorus cucumeris, is reported. Losses caused during the 1980-81 planting season were economically important, especially in some areas in the east and south of the province of Tucuman. The pathogen, bean plant symptoms, and favorable environmental conditions for the pathogen are described. The presence of the fungus inside bean seed was also detected. (Author's summary) E03

0512

17386 PRABHU, A.S.; POLARO, R.H.; CORREA, J.R.V.; SILVA, J.F. DE A.F. DA; ZIMMERMANN, F.J.P. 1982. Relacao entre murcha da teia micélica e producao no feijoeiro comum. (Relationship between web blight disease and yield in bean). Pesquisa Agropecuária Brasileira 17(11):1607-1613. Port., Sum. Port., Engl., 25 Refs., Illus.

Phaseolus vulgaris. Rhizoctonia solani. Yields. Crop losses. Brazil.

Disease-yield relationship was studied regarding web blight (Thanatephorus cucumeris) in bean under humid tropic conditions of the Transamazonic region. Data obtained from 24 different epidemics, regulated by the application of fungicidal sprays, were utilized. Three methods were tested for relating disease severities to grain yield: (1) critical-point method, (2) multiple-point method, (3) area under disease progress curve. There was no correlation between disease severities at vegetative growth stage and yield. Pod-filling stage was identified as critical for relating disease to grain yield in cv. Rico-23. The results further demonstrated that the loss in yield could be determined with reasonable accuracy utilizing the critical-point model. (Author's summary) E03

0513

19404 SILVA, S.D.V.M.; LOCH, L.C. 1982. Alguns aspectos de epidemiologia da antracnose do feijoeiro (Phaseolus vulgaris L.) e influencia do uso de benomyl sobre componentes do rendimento. (Some epidemiological aspects of bean anthracnose and influence of the use of benomyl on yield components). Fitopatologia Brasileira 7(3):427-435. Port., Sum. Port., Engl., 19 Refs.

Phaseolus vulgaris. Colletotrichum lindemuthianum. Disease control. Chemical control. Cultivars. Soil amendments. Epidemiology. Yields. Brazil.

Two expt. were performed with bean cv. Maquiné, Tambó, and Turrialba, grown on amended and unamended soil, to evaluate yield losses due to Colletotrichum lindemuthianum. Half of the plants on each soil were sprayed with benomyl (50 g a.i./100 l), 24 h before artificially inoculating 20- and 24-day old plants with the fungus. These plants were maintained for 5 days under growth chamber conditions and then transferred to the field. Highest yields were achieved in plants on amended soil, sprayed with benomyl. No statistical difference in yield or disease severity were observed among cv. (Author's summary) E03

0514

19401 TU, J.C. 1983. Epidemiology of anthracnose caused by Colletotrichum lindemuthianum on white bean (Phaseolus vulgaris) in southern Ontario: survival of the pathogen. Plant Disease 67(4):402-404. Engl., Sum. Engl., 11 Refs., Illus.

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Phaseolus vulgaris. Colletotrichum lindemuthianum. Epidemiology. Etiology. Disease transmission. Canada.

Survival of the anthracnose fungus Colletotrichum lindemuthianum, race delta, in the field and in the lab. was investigated. Three series of expt. were designed to determine: (1) the longevity of the pathogen in infected seeds and pods in cool storage conditions or when incorporated with debris in the field; (2) the rate of seed transmission relative to the degree of seed infection. Longevity of C. lindemuthianum varied greatly depending on environmental conditions. Moisture had a profound effect on its longevity. The fungus survived at least 5 yr in infected pods and seeds of Phaseolus vulgaris that were air-dried and kept in storage at 4°C or in dry infected plant materials left in the field in sealed polyethylene envelopes that had no contact with water. In infected materials placed in nylon-mesh pouches and buried in the field in Nov., C. lindemuthianum could not be isolated after mid-May. Lab. tests showed that an alternating wet-dry cycle was detrimental to survival of the fungus. The fungus in the infected pod segments lost viability after 3 cycles of 72 h wet and 72 h dry. In the field, there was no sign of anthracnose throughout the 1979 and 1980 growing seasons in plots on sites with heavily infected crops the previous year. The degree of transmission by seeds increased with increasing severity of infection and density of conidia in the infected seeds. (Author's summary) E03

0515

18778 VULSTEKE, G.; MEEUS, P. 1982. Chemical control of Botrytis cinerea and Sclerotinia sclerotiorum on dwarf snap beans. Netherlands Journal of Plant Pathology 88:79-85. Engl., Sum. Engl., Dutch., 3 Refs.

Phaseolus vulgaris. Snap beans. Botrytis cinerea. Whetzelinia sclerotiorum. Disease control. Yields. Chemical control.

The efficacy of different new fungicides against Botrytis cinerea and Sclerotinia sclerotiorum on dwarf snap beans, their influence on crop, pod yield and quality, and residue levels in the pods were studied in order to find an effective spraying scheme for farmers in West-Flanders, Belgium. Two sprays of vinclozolin (0.5 kg a.i./ha) or procymidone (0.5 kg a.i./ha), the 1st at the beginning of flowering and the 2nd 2 wk. later, gave the best control of B. cinerea. Good results were also obtained with iprodione and with thiophanate-methyl. Vinclozolin and procymidone at the same program were the most active fungicides against S. sclerotiorum. Treatments with the latter 2 fungicides resulted in increased pod yields and had no influence on pod color and quality. Residue levels were below the tolerance level. (Author's summary) E03

See also 0555 0556 0563 0568 0573

E04 Viroses

0516

19088 ABDEL-SALAM, A.; WHITE, J.A.; SEHGAL, O.P. 1982. Interaction of southern bean mosaic virus with lipids. Phytopathologische Zeitschrift 105(3/4):336-344. Engl., Sum. Engl., Germ., 19 Refs., Illus.

Phaseolus vulgaris. Bean southern mosaic virus. Pathogenicity. Analysis. RNA. Fatty acids.

Approx. 40% of ^{125}I-labelled BSMV virions contained in a population interact strongly with a composite of phosphatidylcholine, cholesterol, and stearylamine (PC/C/SA). Such particles appear individually coated by the lipids and resist neutralization by anti-BSMV serum. The coated virions may exist as monomers but more frequently aggregate in a linear array, aa rosettes, or into larger discoidal structures. BSMV RNA also interacts strongly with PC/C/SA and is protected from ribonuclease attack. Treatment with PC/C/SA causes no alterations in BSMV stability or infectivity. Besides the electrostatic linkages other forces appear to be involved in stabilizing the BSMV:lipid complex. (Author's summary) E04

0517

18781 BLANCO S., N.; BENCOMO P., I. 1981. Presencia del virus del mosaico dorado del fríjol (BGMV) en Cuba. [Presence of bean golden mosaic virus (BGMV) in Cuba]. Ciencias de la Agricultura (Cuba) 9:118-119. Span., 5 Refs.

Phaseolus vulgaris. Bean golden mosaic virus. Bemisia tabaci. Vectors. Crop losses. Cuba.

BGMV, which is transmitted by Bemisia tabaci, has been found to occur in bean crops throughout Cuba; in some fields, 100% of the plants were affected, with consequent severe yield losses. B. tabaci appeared to be the only vector. (Summary by Review of Applied Entomology) E04

0518

19025 CARDENAS A., M. 1982. Enfermedades virales del fríjol transmitidas por la mosca blanca, Bemisia tabaci Genn., con énfasis en Latinoamérica. (Viral diseases in bean transmitted by the whitefly, Bemisia tabaci emphasizing Latin America). Chapingo 7(31/34):15-40. Span., Sum. Span., Engl., 46 Refs.

Phaseolus vulgaris. Bean golden mosaic virus. Bean chlorotic mottle virus. Euphorbia mosaic virus. Symptomatology. Disease transmission. Vectors. Bemisia tabaci. Mexico.

On the basis of a literature review, 3 Bemisia tabaci-transmitted viral diseases are discussed: BGMV, bean chlorotic mottle virus, and Euphorbia mosaic virus. The following aspects are examined: symptomatology, transmission, host range, virus-vector relationships, and biochemical and physicochemical characteristics of the 3 viruses. Their ability to adapt by means of a divided genome is discussed. These 3 viral diseases occur in Mexico and there are reports of severe damage in some regions. (Author's summary. Trans. by L.M.F.) E04

0519

19085 CASTAÑO J., M.; TAMAYO M., P.J.; MORALES G., F.J. 1982. Monroe bean (Phaseolus vulgaris): a local lesion assay variety for bean common mosaic and soybean mosaic viruses. Turrialba 32(3):329-332. Engl., Sum. Span., Engl., 7 Refs., Illus.

Phaseolus vulgaris. Inoculation. Bean common mosaic virus. Soybean mosaic virus. Symptomatology. Colombia.

Bean var. Monroe, recommended as an indicator plant of local lesions for BCMV, reacted with local ringed necrotic lesions, both to inoculation of 5 different strains of BCMV and to 5 isolations of the soybean mosaic virus (SMV). The inoculated seedlings were placed under 2 different

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environmental conditions: a glasshouse with a 19-28°C temp. range and a growth room with a mean temp. between 16-19°C and 12,500 lx 8 h/day. The environmental conditions under which these tests were done had a striking effect on the appearance and development of local ringed necrotic lesions, especially for SMV. (Author's summary) E04

0520

18784 CHESSIN, M. 1982. Interference in plant virus infection: ultraviolet light and systemic acquired resistance. Phytopathologische Zeitschrift 104(3):279-283. Engl., Sum. Engl., Germ., 16 Refs.

Phaseolus vulgaris. Tobacco mosaic virus. Inoculation. Leaves. Temperature. Light. Photoperiod. Resistance.

UV light markedly increased size of local lesions produced on leaves of Pinto beans when they were irradiated 24 h after inoculation with tobacco mosaic virus. However, UV light had no effect on systemic acquired resistance. Results indicated that virus localization and systemic acquired resistance were not based on identical mechanisms. They were compatible with the hypothesis that the substances producing systemic acquired resistance were produced more than 24 h after inoculation or that the hypersensitive response to plant virus infection resulted in the production of 2 kinds of substances. One would be diffusible, insensitive to UV light, and able to elicit the systemic synthesis of a 2nd, nondiffusible, UV-sensitive substance directly responsible for localization, and possibly related to the proteinaceous animal interferon. (Author's summary) E04

0521

18536 IKEGAMI, M.; HABER, S.; GOODMAN, R.M. 1981. Isolation and characterization of virus-specific double-stranded DNA from tissues infected by bean golden mosaic virus. Proceedings of the National Academy of Sciences of the United States of America 78(7):4102-4106. Engl., Sum. Engl., 26 Refs., Illus.

Phaseolus vulgaris. Bean golden mosaic virus. Isolation. DNA. Analysis.

A double-stranded (ds)DNA which may be a replication intermediate was isolated from bean cv. Top Crop leaves systemically infected with BGMV, a whitefly-transmitted plant virus with a genome of circular single-stranded (ss)DNA. The isolation method used phenol/chloroform extraction, hydroxyapatite column chromatography, and rate-zonal centrifugation. The dsDNA had sequences complementary to those of viral DNA. The guanine + cytosine content was 35%, and the sedimentation coefficient in alkaline sucrose density gradients was similar to that of viral ssDNA. Digestion of the dsDNA by Hha I endonuclease produced fragments that corresponded exactly in no. and size with those produced by complete digestion of circular viral ssDNA by Hha I, when the fragments were denatured and analyzed in polyacrylamide gels. The dsDNA molecule was a circular structure with one discontinuity in one strand; hybridization results suggest that some of the dsDNA has a discontinuity in the viral strand and some has a discontinuity in the nonviral strand. On the basis of these structures for the dsDNA, a preliminary model for replication of viral DNA is discussed. (Author's summary) E04

0522

19093 LASTRES G., N. 1982. Daños producidos por el virus del mosaico común del fríjol (BCMV) en cinco variedades de Phaseolus vulgaris L. [Damage caused by the bean common mosaic virus (BCMV) to five Phaseolus vulgaris varieties]. Ciencias de la Agricultura (Cuba) 12:3-9. Span., Sum. Span., Engl., 4 Refs., Illus.

Phaseolus vulgaris. Cultivars. Bean common mosaic virus. Plant injuries. Yields. Resistance. Cuba.

During 1974-77 the damage caused by BCMV to 5 commercial Phaseolus vulgaris var. (Cuba C-25-9, Bolita 41, Borinquen jaspeado, Velasco, and Bonita 11) was evaluated. Damage was determined in field trials in Santiago de las Vegas, Cuba, by artificial inoculations. Yield components were affected in var. Borinquen jaspeado, Velasco, and Bonita 11, yields decreasing 100, 80, and 27%, resp. Var. Cuba C-25-9 and Bolita 41 were resistant to BCMV. (Author's summary) E04

0523

19017 TAMAYO, P.J.; GOMEZ, L.F.; MORALES, F.J. 1980. Reacción de algunas variedades de Phaseolus vulgaris L. a aislamientos del virus del mosaico de la soya. (Reaction of some varieties of Phaseolus vulgaris to isolates of the soybean mosaic virus). Fitopatología Colombiana 9(2): 71-79. Span., Sum. Engl., Span., 10 Refs., Illus.

Phaseolus vulgaris. Cultivars. Viroses. Soybean mosaic virus. Isolation. Inoculation. Resistance. Symptomatology. Colombia.

Local vein necrosis symptoms were induced by local isolates of soybean mosaic virus (SMV) on the inoculated leaves of the bean var. Jubila, Topcrop, and Improved Tendergreen, under glasshouse conditions (19-28°C) at CIAT, Palmira, Colombia. Var. Widusa only reacted with local vein necrosis to 4 of the 11 isolates tested. None of the 11 isolates of SMV selected caused systemic necrosis in these bean var. Some SMV isolates, however, caused partial systemic necrosis in bean var. Double White and Monroe which do not possess the dominant necrosis gene and, therefore, never react hypersensitively when inoculated with known BCMV strains. These var. showed severe necrotic symptoms under high temp. conditions (24-33°C) during a shorter period of time. (Author's summary) E04

See also 0542 0543 0554 0559 0576

E05 Nematodes

0524

19435 CABANILLAS, E. 1982. Selección de líneas y cultivares de fríjol para resistencia a Meloidogyne incognita en Lambayeque. (Screening bean lines and cultivars for resistance to Meloidogyne incognita in Lambayeque, Peru). In Taller Nacional sobre Manejo de Plagas en Fríjol, 1er., Vista Florida, Chiclayo, Perú, 1972. Estrategias a desarrollar, conclusiones y recomendaciones. Chiclayo, Centro de Investigación y Promoción Agropecuaria. 6p. Span., Sum. Span., 6 Refs.

Phaseolus vulgaris. Cultivars. Selection. Resistance. Meloidogyne incognita. Peru.

Fifteen local and introduced bean lines and cv. were evaluated for resistance to Meloidogyne incognita in 6 different areas (Lambayeque, Túcume,

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Ferreñafe, Motupe, Reque, and Tumán) in the Lambayeque region in Peru. Five were resistant and none were immune. Small root galls and scattered mature females with eggs were found on the roots of these 5 lines and cv. Cv. Muy Finca and EE.UU. I-263 were highly resistant to M. incognita and EE.UU. I-310, Pirata 2, and 51051-I-1138 were moderately resistant. M. incognita was distributed in all the sample areas, and M. arenaria was found mixed with M. incognita populations in Motupe and Reque. (Author's summary. Trans. by L.M.F.) E05

0525

18717 HERRERA, E.; SALAS, J. 1981. Importancia del conocimiento y medidas de control de los principales fitonematodos en fríjol. (Information on and control measures of major plant nematodes in bean). 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. Nematodes. Nematode control. Chemical control. Peru.

General morphological characteristics of nematodes, classification and biology, life cycle of phytoparasite species, and the relationship between the plant and the nematode are described in detail. The morphological characteristics, parasitism, and habitat of the major nematodes attacking beans in Peru are included: root knot nematode (Meloidogyne spp.); root lesion nematode (Pratylenchus spp.); and spiral nematode (Helicotylenchus spp.). Recommended control measures (agronomical, chemical, and through genetic resistance) are also given. (Summary by F.G. Trans. by L.M.F.) E05

E06 Physiological Disorders

0526

18779 DAVIS, D.D.; RIST, D.L.; DAVIDS, J.A. 1981. Moisture and temperature affect plant sensitivity to sulfur dioxide toxins. Science in Agriculture 28(3):10. Engl., Illus.

Phaseolus vulgaris. Temperature. Relative humidity. SO_2. Plant injuries. Plant physiological disorders.

Pinto bean plants were grown in controlled environment at 50, 70, or 90°F and 40, 60, or 80% RH and exposed to 1 ppm SO_2 for 1-4 h. Leaf injury was much greater at 90° than at lower temp. and was severe at 80% RH but only slight at 60 and 40% RH. Plants grown in soil at MC below 23% were uninjured by SO_2 whereas at higher soil MC injury was more severe. (Summary by Field Crop Abstracts) E06

0527

18756 PAULS, K.P.; THOMPSON, J.E. 1982. Effects of cytokinins and antioxidants on the susceptibility of membranes to ozone damage. Plant and Cell Physiology 23(5):821-832. Engl., Sum. Engl., 65 Refs., Illus.

Phaseolus vulgaris. Ozone. Plant injuries. Cytokinins. Plant physiological disorders.

Treatment of microsomal membranes isolated from Phaseolus vulgaris cotyledons with O_3 induces a lateral phase separation of lipids into discrete liquid-crystalline and gel phase domains. This effect is

accompanied by production of malondialdehyde and extensive dismantling of the membranes. All of these deleterious effects of O_3 were attenuated by the addition of cytokinins (benzyladenine or zeatin) or antioxidants (sodium benzoate or propyl gallate) to the reaction mixture. The results support previous proposals that the toxic effects of O_3 are mediated by the products of its breakdown in water, and that cytokinins may act as radical scavengers to protect plant tissue against the effects of O_3 or senescence. (Author's summary) E06

0528

18750 PERCHOROWICZ, J.T.; TING, I.P. 1974. Ozone effects on plant cell permeability. American Journal of Botany 61(7):787-793. Engl., Sum. Engl., 16 Refs., Illus.

Phaseolus vulgaris. Leaves. Ozone. Air pollution. Plant assimilation. Cell structure. Plant physiological disorders.

In a study of the uptake of 2 forms of ^{14}C-labelled glucose by leaf disks of Phaseolus vulgaris cv. Pinto, uptake of both forms at 24 h after exposure to 0.4 ppm O_3 for 1 h was 3 times higher in exposed tissue than in the controls. By measuring the uptake in 1 h at various times after exposure up to 20 h it was concluded that permeability did not increase until several hours after the end of exposure. An examination of the internal distribution of ^{14}C showed that the increase in permeability was not a function of increased metabolic activity. It was concluded that the primary targets for O_3 are cell membranes, resulting in alterations in membrane permeability. (Summary by Field Crop Abstracts) E06

0529

19462 PIERRE, M.; QUEIROZ, O. 1982. Modulation by leaf age and SO_2 concentration of the enzymic response to subnecrotic SO_2 pollution. Environmental Pollution (Series A) 28(3):209-217. Engl., Sum. Engl., 28 Refs., Illus.

Phaseolus vulgaris. Leaves. Air pollution. Plant physiological processes. Enzymes. SO_2. Mineral content. S. Plant physiological disorders.

An increase in the capacity of several enzymes was observed in bean leaves under continuous subnecrotic pollution by SO_2 at 0.06, 0.1, and 0.15 ppm. The kinetics, amplitude, and duration of this functional readjustment depend on the level of pollutant in the air and on the developmental stage of the leaf at the onset of pollution. Young, metabolically active leaves can undergo pollution with only a slight readjustment of enzyme capacity; in contrast, as leaves age and the level of their metabolic functioning becomes lower, a larger enzymic readjustment is required in response to pollution. Results suggest that this enzymic readjustment would contribute to stabilize the internal S content. (Author's summary) E06

F00 PEST CONTROL AND ENTOMOLOGY

See 0560

F01 Injurious Insects, Mites and their Control

0530

18716 AVALOS, F. 1981. Conceptos básicos sobre entomología en fríjol: control integrado. (Basic concepts of entomology in bean: integrated

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control). 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. Entomology. Biological control. Injurious insects. Injurious mites. Integrated control. Peru.

The following concepts of entomology are analyzed: ecological theory (agrosystems); identification of pests (key, occasional, or potential); economical effect of pests on the crop; sampling and assessment of pests. A categorization of bean pests occurring on the Peruvian coast as well as a list of beneficial species in bean in Peru and their host plants or animal of prey are included. (Summary by F.G. Trans. by L.M.F.) FOl

0531

18715 AVALOS, F. 1981. Métodos y estrategias para la investigación en el control de plagas en fríjol. (Research methods and strategies of pest control in bean). 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. Integrated control. Pest control. Peru.

The determination and use of the economic injury threshold and economic threshold level of pests in any crop are discussed. The different methods of pest control are analyzed: var. resistance, biological or natural control, and chemical control. The steps involved in establishing a project on pest resistance are listed: (1) identification of sources of resistance; (2) characterization of resistance mechanisms; (3) sequential improvement of characteristics of resistance; (4) genetic analysis of traits or sources of resistance; and (5) physical or chemical identification of bases of resistance. An outline of a pest management program in soybean is included. (Summary by F.G. Trans. by L.M.F.) FOl

0532

19078 BARRETO, B.A.; SILVA, T.L. DA; TEIXEIRA, R.M. DE C. 1980. Ocorrencia de mosca branca Bemisia tabaci (Gennadius, 1889) (Homoptera: Aleyrodidae) em feijoeiro (Phaseolus vulgaris L.) no Estado do Rio Grande do Sul. [Occurrence of the whitefly Bemisia tabaci (Homoptera: Aleyrodidae) in bean in the state of Rio Grande do Sul]. Agronomia Sulriograndense 16(2):363-365. Port., Sum. Engl., Port., 7 Refs.

Phaseolus vulgaris. Bemisia tabaci. Insect biology. Brazil.

The occurrence of the whitefly Bemisia tabaci (Homoptera:Aleyrodidae) in field beans in the state of Rio Grande do Sul (Brazil) in 1979 is reported. The respective characterization of the species is included. (Author's summary) FOl

0533

18725 BIEMONT, J.C.; BONET, A. 1981. The bean weevil populations from the Acanthoscelides obtectus Say. group living on wild or subspontaneous Phaseolus vulgaris L. and Phaseolus coccineus L. and on Phaseolus vulgaris L. cultivated in the Tepoztlan region state of Morelos-Mexico. In Labeyrie, V., ed. International Symposium on the Ecology of

Bruchids Attacking Legumes (Pulses), France, 1980. Proceedings. The Hague, Junk. pp.23-41. Engl., 46 Refs., Illus.

Phaseolus vulgaris. Acanthoscelides obtectus. Insect biology. Stored grain pests. Mexico.

Results of observations on population dynamics, biology, and host plants of Acanthoscelides obtectus living on wild or subspontaneous Phaseolus vulgaris and P. coccineus and on bean cultivated in Tepoztlán, Morelos, Mexico, are discussed. Studies were conducted on: (1) population development of these plant species in the area, (2) cycle of A. obtectus on these plants, and (3) A. obtectus populations in Tepoztlán compared with a strain collected in France. The host plant of A. obtectus has 2 different modes of reproduction: an annual cycle of wild populations with ripe pods and grains available for a short period of time during the dry season, and possibilities for germination throughout the year for stored grains of cultivated bean. Two types of bean weevils were found: wild populations on P. vulgaris and P. coccineus that are univoltine with imaginal diapause when ripe pods are absent and those developing on stored grains that are multivoltine without imaginal diapause. The 2 populations types are sympatric. Hypotheses on the possible interrelationships of the 2 types of bean weevil populations and their host plants are given. (Summary by EDITEC. Trans. by L.M.F.) F01

0534

19418 BLICKENSTAFF, C.C.; PECKENPAUGH, R.E. 1981. Insecticide tests for control of the western bean cutworm. Oakland, California, U.S. Department of Agriculture Science and Education Administration. Agricultural Research Results. ARR-W-21. 31p. Engl., Sum. Engl., 14 Refs., Illus.

Phaseolus vulgaris. Loxagrotis albicosta. Chemical control. Insect control.

A series of lab. and field tests was carried out in southern Idaho, USA, from 1950 to 1980 on the insecticidal control of Loxagrotis albicosta on beans and sweet maize. Of 53 compounds evaluated in the lab., 24 were found to be as effective as, or more effective than, the standards DDT and carbaryl. When sprays of 26 compounds were applied by ground equipment to beans, 7 that were tested extensively were found to be equal to or better than carbaryl and 9 that were less extensively tested were found to be highly effective. Although 3 formulations of carbaryl did not differ significantly in their performances in individual tests, newer formulations (such as SL-2) appeared to be an improvement. Insecticide effectiveness decreased as the time between application and peak moth flight increased; this was due to a combination of increased larval size and increased foliage density. (Summary by Review of Applied Entomology) F01

0535

18761 CARDONA, S.; SCHOONHOVEN, A. VAN; GOMEZ, L.; GARCIA, J.; GAMZON, F. 1981. Effect of artificial mulches on Empoasca kraemeri Ross and Moore populations and dry bean yields. Environmental Entomology 10(5):705-707 Engl., Sum. Engl., 11 Refs., Illus.

Phaseolus vulgaris. Empoasca kraemeri. Mulching. Insect control. Yields. Colombia.

Four field studies were conducted to determine the effect of artificial mulches on Empoasca kraemeri populations and bean yields. Aluminum foil and rice straw mulches significantly reduced adult populations for at least 30 days after planting. This regulatory effect was directly related to the

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amount of light reflected by the different mulches studied; thus, the aluminum foil, which reflected up to 20.3% of the light, effectively repelled adult leafhopper, whereas the black plastic, with only 5.3% light reflection, did not. Highest yields were obtained from aluminum foil-mulched plots. With a susceptible var., the Al and rice straw treatments increased yields by 212 and 107%, resp. With a tolerant var., plots mulched with aluminum foil and rice straw yielded 26 and 31% more than the nonmulched plots, resp. (Author's summary) F01

0536

19063 COSTA, E.C.; LINK, D.; MARIO, J.L. 1981. Efeitos de níveis de Piezodorus guildinii (Westwood, 1837) sobre feijoeiro (Phaseolus vulgaris L.) cultivar Rio Tibagi. (Effect of Piezodorus guildinii on bean cultivar Rio Tibagi). Revista do Centro de Ciencias Rurais 11(4): 251-256. Port., Sum. Port., Engl., 10 Refs., Illus.

Phaseolus vulgaris. Piezodorus guildinii. Injurious insects. Plant injuries.

A field survey was carried out at Sao Sepe, RS, Brazil, to evaluate the damage caused by Piezodorus guildinii on black bean var. Rio Tibagi. Nylon cages 0.40 m in diameter were placed over 3 plants 30 days after emergence. Adult insects were placed inside the cages at the pod filling stage at infestation levels of 0, 2, 4, and 6 insects/cage. The expt. lasted 7 days. Results were evaluated by the % of empty pods, total no. of pods, and grain yield/ha. A significant effect of treatments was observed as shown by the regression equations on the % of empty pods and yield. It was observed that the total no. of pods and seeds were not affected by P. guildinii. (Author's summary) F01

0537

17412 ESPINOSA G., O.; SANCHEZ V., J. 1982. El minador del fréjol Liriomyza sp. (Agromyzidae-Diptera), una plaga de interés económico en el Valle del Catamayo. [The leafminer Liriomyza sp. (Agromyzidae-Diptera), a bean pest of economic importance in the Valle del Catamayo]. Anales de la Facultad de Ciencias Agropecuarias de la Universidad Nacional de Loja 10(1):81-92. Span., 9 Refs., Illus.

Phaseolus vulgaris. Liriomyza. Insect biology. Insect control. Chemical control. Yields. Ecuador.

The life cycle of the leafminer Liriomyza sp. was studied under greenhouse and lab. conditions at the U. Nacional de Loja, Ecuador, at different temp. (20 and 26°C) and in the field to evaluate the efficiency of 5 insecticides (3 synthetic pyrethroids, 2 phosphated insecticides, 1 check) in its chemical control. A randomized block design was used with 6 treatments and 4 replications. Females differ from males in their larger size and the ovipositor located on the last abdominal segment. At 26°C insect development lasted 2-3, 7-9, 5-7, and 3-6 days for the egg, larval, pupal, and adult stages, resp., totalling 18-27 days. At 20°C this cycle is longer. An unidentified hymenopteran was found parasitizing the pest. Two pyrethroids (permethrin and cypermethrin) gave a mortality of 73.8 and 76.8, 79.7 and 88, 90.5 and 100%, resp., 24, 48, and 72 h after their application. Phosphated insecticides gave lower mortality rates (62% approx.) and their effect decreased with time. With the 2nd application, 10 days later, all insecticides controlled the pest at levels between 85-99%. A better control is reached with permethrin, beans yielding 1443 kg/ha. Insecticides should be applied when the critical level of

infestation (1-2 larvas/foliole) is reached. (Summary by EDITEC. Trans. by L.M.F.) F01

0538

19052 GALWEY, N.W. 1983. Characteristics of the common bean, Phaseolus vulgaris, associated with resistance to the leafhopper Empoasca kraemeri. Annals of Applied Biology 102(1):161-175. Engl., Sum. Engl., 19 Refs., Illus.

Phaseolus vulgaris. Empoasca kraemeri. Cultivars. Genotypes. Plant injuries. Resistance. Selection. Plant habit. Maturation. Seed color. Flowers. Colombia.

Field expt. were conducted at CIAT using the common bean and its most important pest in L.A., Empoasca kraemeri, in order to assess the value of insect counts and various plant characteristics as selection criteria in a plant breeding program. The combination of insect counts with measurements of damage symptoms should make it possible to distinguish tolerance from the resistance mechanisms of antibiosis and nonpreference. By this means, and by a knowledge of the plant characteristics associated with resistance, different forms of resistance may be combined in the progeny of crosses. In a comparison of 2 contrasting genotypes the more severely damaged genotype was the more heavily infested at early stages of plant growth, but had the lower level of infestation at later stages. The association of high early counts with high subsequent damage was not confirmed in an expt. on 6 genotypes, but the association of high damage with low late counts was partially confirmed. These results indicate that the level of early infestation of E. kraemeri is not consistently reflected in the subsequent levels of damage which P. vulgaris genotypes display. This suggests that these 2 criteria represent distinct forms of resistance which can be combined in hybrid progeny. Resistance was also associated with late maturity, indeterminate growth habit, purple flowers, and black or beige seeds. However, consumer preferences and the requirements of agricultural systems place constraints upon the use of these relationships in resistance breeding. (Author's summary) F01

0539

19020 GONZALEZ, R.; CARDONA, C.; SCHOONHOVEN, A. VAN 1982. Morfología y biología de los crisomélidos Diabrotica balteata LeConte y Cerotoma facialis Erickson como plagas del fríjol común. (Morphology and biology of the chrysomelids Diabrotica balteata and Cerotoma facialis as common bean pests). Turrialba 32(3):257-264. Span., Sum. Engl., Span., 17 Refs., Illus.

Phaseolus vulgaris. Diabrotica balteata. Cerotoma facialis. Insect biology. Colombia.

The morphology, biology, and habits of the chrysomelids Diabrotica balteata and Cerotoma facialis, common bean pests, are described under lab. (27°C; 80% RH) and greenhouse conditions. It was found that larvae of D. balteata do not survive when feeding on bean roots, whereas C. facialis does not attack maize seedlings. Eggs of D. balteata and C. facialis lasted an av. of 5.1 and 6.4 days, resp. Both species have 3 larval instars which lasted 14 days in the case of D. balteata and 10.6 days for C. facialis. Pupae form in a cell in the ground and this stage lasts between 6-7 days. In both species the sex ratio was 1:1. When fed bean foliage, female D. balteata lived an av. of 37 days and female C. facialis, 52 days. In both species the preoviposition period varied between 5-12 days. Max. egg production/adult D. balteata fed on bean leaves was 144/female; C. facialis

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females laid up to 532 eggs. Both species consume more foliage during the 1st 2 wk. of their life span. (Author's summary) F01

0540

18726 STAMOPOULOS, D.; DESROCHES, P. 1981. Influence of the tegument of Phaseolus vulgaris seeds and of larval density on the development of Acanthoscelides obtectus Say. In Labeyrie, V., ed. International Symposium on the Ecology of Bruchids Attacking Legumes (Pulses), France, 1980. Proceedings. The Hague, Junk. pp.165-174. Engl., 13 Refs., Illus.

Phaseolus vulgaris. Acanthoscelides obtectus. Seed. Insect biology.

The mortality of larvae of Acanthoscelides obtectus caused by the tegument of bean var. Soisson was studied: (1) in the course of penetration, (2) in artificial mixtures with the cotyledon in the meal, (3) by overpopulation of the bruchids. The effects of overpopulation on the rate of development and wt. of adults were also studied. In the 1st expt., half of the seeds used was artificially bored with a needle (0.2 mm in diameter) at 4 sites/seed, and the other half was left intact. Each seed was placed separately in chambers and 1 or 2 fertile A. obtectus eggs were placed per seed. In the absence of a previous boring, mortality before penetration was very high, either with 1 or 2 larvae (77 and 71%, resp.), but in both cases 51 and 53% of the larvae tried to bore the tegument. On previously bored seed 62 and 86% (1 or 2 larvae/seed, resp.) of the larvae penetrated the seed. Finely ground tegument (10.2%) was mixed with cotyledon meal and whole seed powder in expt. 2, resulting in a larval mortality of 98.5 and 98.1%, resp. In expt. 3, groups of 6, 12, 24, and 40 fertile eggs were placed on isolated seeds that had been previously bored (20 replicates); 2 batches of 12 fertile egg were introduced at a 13-day interval. Larval mortality was the same at 6, 12, and 24 eggs/seed (13, 12, and 17%, resp.) and higher for 40 eggs (40%). Mortality inside the cotyledons for the 2 batches that were introduced was 14% for the 1st and 81% for the 2nd. The wt. of adults was not affected by larval density up to 12 larvae/seed. Mean duration of development was similar for both sexes in all the groups of expt. It was concluded that the tegument of bean seeds which have been ripe for 2 mo. or more, does not only act as a mechanical barrier, but also contains unknown toxic substances that cannot be degraded by A. obtectus. However, it is necessary to verify these results on other bean var. (Summary by EDITEC. Trans. by L.M.F.) F01

See also 0467 0481 0561 0562

G00 GENETICS AND PLANT BREEDING

G01 Breeding, Selection and Germplasm

0541

18577 ADAMS, M.W. 1978. Varieties. In Robertson, L.S.; Frazier, R.D., eds. Dry bean production—principles and practices. East Lansing, Michigan State University. Cooperative Extension Service. Agricultural Experiment Station. Extension Bulletin E-1251. pp.143-151. Engl., Illus.

Phaseolus vulgaris. Agronomic characters. Cultivars. Resistance. Diseases and pathogens. Processing. USA.

Characteristics of successful bean var. for cultivation in Michigan, USA, are described: uniformly sized and ripened seeds, uniform and vigorous

seedlings that emerge quickly, early vigorous vegetative growth, adaptation to soil/environmental conditions, row coverage by the crop at flowering, high density of stem/unit area, short seed-filling period, erect plants at maturity, uniform maturity, with all of the leaves dropping before harvest, maturity at 80 or 100-110 days from planting. Disease resistance (Fusarium sp., Xanthomonas phaseoli, Colletotrichum lindemuthianum, BCMV) as well as O_3 resistance are also major requirements. Beans must possess attributes which favor processing quality and consumer acceptance: uniformity of size, shape, and color of seed; resistance to splitting or cracking; uniform water absorption; wholeness and firmness of grain in the cooking and canning process; and no development of a disagreeable physical appearance, flavor, or color. Advances in this field are discussed. Classes of beans in Michigan and relative acreages are listed. Predominant var. grown of each class (navy, red kidney, and other colored beans) are described. (Summary by EDITEC. Trans. by L.M.F.) G01

0542

18585 ALDANA, L.F.; SALGUERO, V.; MASAYA, P. 1982. Aspectos de la protección química y la tolerancia en el control del virus del mosaico dorado del fríjol. (Aspects of the chemical protection and tolerance to the control of the bean golden mosaic virus). Guatemala, Instituto de Ciencia y Tecnología Agrícolas. 16p. Span., Sum. Span., 7 Refs., Illus.

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

Phaseolus vulgaris. Cultivars. Bean golden mosaic virus. Bemisia tabaci. Resistance. Intercropping. Zea mays. Disease control. Insect control. Yields. Guatemala.

Due to the development of tolerant varieties (currently used commercially in Guatemala) and new lines and the existence of several products for the control of the vector of BGMV, whitefly Bemisia tabaci, the combination of both control methods has been studied in production systems in SE Guatemala. Three expt. were conducted in Monjas to assess the level of tolerance of several bean genotypes. The effects of BGMV incidence on the 2 production systems (associated with maize and in monoculture), and several chemical control treatments of the vector were also assessed. When several bean genotypes were grown without chemical protection to control B. tabaci, lines D-145, Ju 80-11, and var. ICTA Jutiapán, and ICA Pijao showed a significantly lower no. of diseased plants (4, 5, 5, and 6 plants/m^2, resp.) than susceptible var. Rabia de Gato (17 diseased plants/m^2). Another 5 var. and lines showed intermediate values. When var. ICTA Tamazulapa and Rabia de Gato were planted in association with maize or in monoculture, Rabia de Gato had 22 diseased plants/m^2 and var. ICTA Tamazulapa had 8 diseased plants/m^2. No differences attributable to the production systems used were observed. Carbofuran in granules, incorporated into the soil at planting, or flowable, applied to the seed, produced the best control of B. tabaci, although carbofuran applied to the seed reduced yields of ICTA Tamazulapa. (Author's summary. Trans. by L.M.F.) G01

0543

19038 ALDANA, L.F.; SALGUERO, V.; BEEBE, S.; MASAYA, P.; TEMPLE, S.; GALVEZ, G.E.; OROZCO S., S.H. 1982. Avances en la selección para el aumento del nivel de tolerancia al virus del mosaico dorado (BGMV) en Guatemala. [Advances in screening for increasing tolerance to the bean golden mosaic virus (BGMV) in Guatemala]. Guatemala, Instituto de Ciencia y Tecnología Agrícolas. 6p. Span., Sum. Span.

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

Phaseolus vulgaris. Cultivars. Resistance. Bean golden mosaic virus. Selection. Crossbreeding. Guatemala.

Tolerant and adapted germplasm was crossed to determine levels of tolerance to BGMV higher than those of var. ICTA-Quetzal, ICTA-Jutiapán, and ICTA-Tamazulapa. Different generations of these 3 var. and high-yielding, erect, early-maturing breeding lines resistant to rust (Uromyces phaseoli) and/or anthracnose (Colletotrichum lindemuthianum) were assessed in a BGMV nursery. BGMV infector furrows of Phaseolus lunatus and P. vulgaris were planted to uniform virus incidence. Castor oil plant (Ricinus communis), cassava, and cotton were planted to distribute the whitefly Bemisia tabaci. A total of 1256 populations, progenies, families, and lines in the 1st planting season (May-Aug.) were assessed, from which 69 F_4 and F_5 lines and 472 progenies were selected. A preliminary yield trial, with and without BGMV pressure, was organized in the 2nd planting season with the best lines. Based on readings and yield, 13 of these lines were found to outyield by 6-23% ICTA-Quetzal under BGMV pressure. A total of 48 new lines and 237 segregating progenies were selected from the previous 472. These lines and families had a higher level of resistance than the check. Previous results indicate that it is possible to increase levels of tolerance through selective transgressive segregation to higher levels than those of the tolerant var. previously selected. (Author's summary. Trans. by L.M.F.) GO1

0544

19470 ALVARADO A., D. 1981. Determinación de la época óptima de siembra para las variedades de fríjol Matamoros, Delicias-71 y línea avanzada Mantequilla x Matamoros-64, bajo condiciones de riego. (Optimum planting time for bean varieties Matamoros, Delicias-71, and advanced breeding line Mantequilla x Matamoros-64 under irrigated conditions). In Centro de Investigaciones Agrícolas del Norte. Informe de investigación agrícola: fríjol y soya 1976-1978. México, Instituto Nacional de Investigaciones Agrícolas. pp.33-42. Span., Sum. Span.

Phaseolus vulgaris. Cultivars. Planting. Timing. Irrigation. Mexico.

Six planting dates, spaced at 20-day intervals beginning on April 5, were assessed during the 1976 crop year to determine the optimum planting date for the bean var. recommended for the Comarca Lagunera, Mexico. Var. Matamoros-64, Delicias-71, and the advanced breeding line Mantequilla x Matamoros-64 were assessed under irrigated conditions. A randomized split plot design was used with 4 replications. The best planting time for bean in this region was considered to be from April 5 to June 5. (Summary by F.G. Trans. by L.M.F.) GO1

0545

19468 ALVARADO A., D. 1981. Evaluación de rendimiento y características agronómicas de líneas avanzadas resistentes al chauixtle de la hoja del fríjol en siembras de primavera-verano. (Evaluating advanced, rust-resistant breeding lines for yield and agronomic characteristics in spring/summer plantings). In Centro de Investigaciones Agrícolas del Norte. Informe de investigación agrícola: fríjol y soya 1976-1978. México, Instituto Nacional de Investigaciones Agrícolas. pp.10-16. Span., Sum. Span.

Phaseolus vulgaris. Cultivars. Germplasm. Yields. Resistance. Xanthomonas phaseoli. Pseudomonas phaseolicola. Mexico.

Forty-six bean linea, 2 collections, and 1 introduced var. were tested during the spring of 1976 at the Campo Agrícola Exptl. of the Comarca Lagunera (Mexico) to determine high-yielding var. for both spring and summer plantings. A simple 7 x 7 lattice design was used with 4 replications. Max. yields were reached with var. Matamoros (3731 kg/ha). Lines Canario 107 x Matamoros 64-3-2-17-2, II-F x Pinto Nacional 2-13-22-11-2, and Bayomex x Bayo-158-1-16-34-8, in addition to being higher yielders (3613, 3414, and 3351 kg/ha, resp.), have a good grain type and are resistant to the common blight (Xanthomonas phaseoli) and the halo blight (Pseudomonas phaseolicola). (Summary by F.G. Trans. by L.M.F.) GOl

0546

19467 ALVARADO A., D. 1981. Evaluación de rendimiento y características agronómicas de 35 líneas tolerantes o resistentes a altas temperaturas en siembras de primavera bajo cordiciones de riego en la Comarca Lagunera. (Evaluating yield and agronomic characteristics of 35 bean lines tolerant or resistant to high temperatures in spring plantings under irrigated conditions in the Comarca Lagunera). In Centro de Investigaciones Agrícolas del Norte. Informe de investigación agrícola: fríjol y soya 1976-1978. México, Instituto Nacional de Investigaciones Agrícolas. pp.4-9. Span., Sum. Span.

Phaseolus vulgaris. Cultivars. Yields. Agronomic characters. Resistance. Temperature. Selection. Mexico.

Since 1975, 35 advanced breeding lines of bean have been tested at the Campo Agrícola Exptl. of the Comarca Lagunera (Mexico) under irrigated conditions in spring plantings. Line Mantequilla x Pinto Matamoros-64-18-14 gave the highest yield (2506 kg/ha); 24 other lines gave similar yields. In the spring of 1976 (May 5), a similar expt. was conducted to verify the results of the 1st year, using a randomized 6 x 6 simple lattice design with 4 replications. Planting was done in beds spaced at 1.40 m, planting 2 rows on the ridges between the furrows. During this cropping cycle, line Canario 101 x Matamoros-64-12-8 had the highest yield (3418 kg/ha); 17 other lines, in addition to the check var. Matamoros 64, had similar yields at a 5% level of probability. (Author's summary. Trans. by L.M.F.) GOl

0547

19466 ALVARADO A., D. 1981. Observación preliminar de rendimiento y características agronómicas de nuevas líneas de fríjol con tolerancia o resistencia a altas temperaturas en siembras de primavera. (Preliminary observation of yield and agronomic characteristics of new bean lines tolerant or resistant to high temperatures in spring plantings). In Centro de Investigaciones Agrícolas del Norte. Informe de investigación agrícola: fríjol y soya 1976-1978. México, Instituto Nacional de Investigaciones Agrícolas. pp.1-3. Span., Sum. Span.

Phaseolus vulgaris. Cultivars. Resistance. Temperature. Yields. Agronomic characters. Selection. Mexico.

During the 1976 crop year 393 bean lines, selected for their tolerance or resistance to high temp., healthiness, plant type, and max. yields/unit area, were established on a sandy clay soil at the Campo Agrícola Exptl. of the Comarca Lagunera, Mexico. A check arrangement was used, planting the var. Matamoros between every 5 bean lines. Lines were planted in 6 m single rows with 0.80 m interrow. Based on yield, healthiness, and pod fill, 76

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selections were made in comparison with the check var. These were assessed during the spring of 1977. (Author's summary. Trans. by L.M.F.) G01

0548

18521 BARIGOZZI, C.; CONTI, L. 1981. Heredity of seed coat colour in Ph. vulgaris. Variegation and limitation of the coloured field. Genetica Agraria (Italia) 35(2):209-217. Engl., Sum. Engl., 5 Refs., Illus.

Phaseolus vulgaris. Cultivars. Crossbreeding. Inheritance. Seed coat. Seed color. Genes. Italy.

The 1st results of striping and spotting of bean in studies on the inheritance of seed coat color among crosses of Italian var. are given. The phenotype is described for each of the var. used: (1) Borlotto, (2) Fagiolo degli Ortolani, (3) Monachello, and (4) Aquila Rossa. Crosses tested during 4 generations were 1 x 2 and 3 x 4, brought about by artificial fertilization (35% success). Gene timing (the relative time during which genes for both background color and variegation act) was also studied. The variegation of Borlotto is due to a single locus just as the background color is. The extension of pigmented area in var. Monachello and Aquila Rossa is also controlled by an allele pair. Heterozygotes are spotted. The white area in Monachello is determined early and later on the variegation appears; background color is produced last. The action of the genes is confined to the dorsal portion of the seed coat, which seems to be composed of 2 compartments. (Summary by EDITEC. Trans. by L.M.F.) G01

0549

17456 BASSETT, M.J. 1982. A dwarfing gene that reduces seed weight and pod length in common bean. Journal of the American Society for Horticultural Science 107(6):1058-1061. Engl., Sum. Engl., 5 Refs., Illus.

Phaseolus vulgaris. Genotypes. Genes. Crossbreeding. Cultivars. Backcrossing. Inheritance.

Common bean genotype MITA 10597 has small seeds (av. seed wt., 122 mg; s = 31) and short, narrow pods (av. pod length, 44 mm, s = 13.2) with tight constrictions between seeds. A bean breeding line, 7-1404, has longer pods (av. pod length, 99 mm; s = 18.4) and larger seeds (av. seed wt., 269 mg; s = 32). The inheritance of the dwarf seed and pod type of MITA 10597 was studied in the F_2 and backcross populations from the cross MITA 10597 x 7-1404 and also from F_2 populations from backcrosses of 7-1404 to an F_3 plant (from 7-1404 x MITA 10597) selected for the dwarf seed (DS) character. The DS character was found to be controlled by a single, recessive gene that restricts development in seeds with the ds//ds genotype. The apparent phenotypic segregation for seed size in the pods of heterozygous (+//ds) F_1 plants was found to be under genetic control. (Author's summary) G01

0550

19032 BEEBE, S. 1982. Progreso en el CIAT Palmira, Colombia en mejoramiento de resistencia a Xanthomonas campestris phaseoli (X. phaseoli) en frijol para la zona tropical. [Advances in breeding for resistance to Xanthomonas campestris phaseoli (X. phaseoli) in bean for tropical areas at CIAT, Palmira]. Guatemala, Instituto de Ciencia y Tecnología Agrícolas. 6p. Span., Sum. Span., 6 Refs.

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

Phaseolus vulgaris. Cultivars. Resistance. Xanthomonas phaseoli. Selection. Crossbreeding. Adaptation. Guatemala.

Crosses were made and cv. and lines selected to combine the existing resistance to Xanthomonas campestris pv. phaseoli with adaptation to the tropics and to determine new sources of resistance. Crosses were made between adapted lines and sources of resistance, some with Great Northern genes. The greenhouse inoculation method was modified for field use thus allowing large F_2 populations to be inoculated and seed setting, plant architecture, and agronomic value of these selections to be monitored. After 2 yr there are lines with intermediate to resistance reactions, better adapted to CIAT conditions and with a broad color range, including red brilliant and black opaque. In Sept. 1981 some of these lines were planted in Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica and several showed a better adaptation to Central American conditions than to those at CIAT. Other possible sources of resistance were evaluated as parent materials but most of them did not combine well in crosses. Some sources were eliminated on the basis of their performance in crosses. Other sources with progenies as advanced breeding lines are G04826, G05147, G04399, and ICA Línea 23. (Author's summary. Trans. by L.M.F.) G01

0551

19455 BOUWKAMP, J.C.; SUMMERS, W.L. 1982. Inheritance of resistance to temperature-drought stress in the snap bean. Journal of Heredity 73(5): 385-386. Engl., Sum. Engl., 15 Refs.

Phaseolus vulgaris. Inheritance. Resistance. Cultivars. Drought. Genes. Temperature. Yields. Seed color. Seed coat. Snap beans. Crossbreeding.

Studies were carried out under greenhouse conditions to identify stress-resistant snap beans and to determine the mode of inheritance of resistance to stress caused by high temp. (38-43°C, day time; 25°C, night) and low moisture. It was found that resistance to stress was due to a single dominant gene in PI 297079 and 2 genes with epistatic action in PI 151062. Av. pod production/plant in the F_2 populations exceeded the appropriate midparent av. Combination of resistance from both sources did not appear to result in increased resistance. Stress resistance does not appear to be genetically linked to seed coat color. (Author's summary) G01

0552

18598 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1982. Programa de Fríjol; Ensayos Preliminares EP 1981. (Bean Program; Preliminary Trials EP 1981). Cali, Colombia. 63p. Engl., Span., Illus.

Phaseolus vulgaris. Cultivars. Technology evaluation. Adaptation. Yields. Resistance. Diseases and pathogens. Pests. Colombia.

Preliminary Trials (EP) are annual nurseries designed to (1) evaluate the response of advanced exptl. bean lines developed by CIAT and national programs to main limiting factors to production; (2) provide sources of improved genetic material to select candidates for international nurseries; and (3) identify sources of germplasm for resistance to diseases and insect pests and other agronomic characteristics for breeding purposes and direct use by national programs. The 1981 EP consisted of 190 test materials, assessed at different locations in Colombia, Costa Rica, Guatemala, and Peru. These were grouped according to their grain characteristics (color and size) and growth habit (climbing and bush). Each entry was evaluated for 27 characteristics and the way of recording each is described. This included identification and coding, growth habit, grain characteristics

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(color, brilliance, and size), yield, days to flowering and to maturity, adaptation, reaction to diseases (Xanthomonas phaseoli, Uromyces phaseoli, Colletotrichum lindemuthianum, Isariopsis griseola, Thanatephorus cucumeris, Ascochyta phaseolorum, BCMV, and BGMV) and insects (Apion godmani and Empoasca kraemeri), cooking quality, and N fixation. Tables of the results obtained are included. (Summary by EDITEC. Trans. by L.M.F.) G01

0553

18729 CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. UNIDAD DE SEMILLAS. 1983. Frijol (Phaseolus vulgaris L.). (Beans). In _____. Metodología para obtener semillas de calidad; arroz, frijol, maíz, sorgo. Cali, Colombia. pp.49-86, 177-181. Span., Illus.

Phaseolus vulgaris. Cultivars. Agronomic characters. Plant anatomy. Technology. Plant breeding. Genetics. Colombia.

A methodology to describe quality and quantity characteristics of bean var. is presented. A complete list of data that should be taken is included and each item is explained. Data are classified according to the growth stage in which they should be taken: seedling, flowering, pod fill, physiological maturity, and at harvest. Other data include the reaction to diseases and pests, way of consumption, and var. that most resemble the described characteristics. Model formats for data recording are included as well as guidelines and requirements for bean seed production. (Summary by EDITEC. Trans. by L.M.F.) G01

0554

16449 COSTA, A.S. 1955. Feijoeiro Manteiga, planta-teste para os vírus de vira-cabeca e da necrose branca. (Bean cultivar Manteiga, test plant for the tomato spotted wilt virus and the tobacco streak virus). Tese Doutorado. Campinas-SP, Brasil, Escola Superior de Agricultura Luiz de Queiroz da Universidade de Sao Paulo. 34p. Port., Sum. Port., 29 Refs., Illus.

Phaseolus vulgaris. Cultivars. Tobacco streak virus. Tomato spotted wilt virus. Resistance. Etiology. Symptomatology. Inoculation. Brazil.

More than 200 bean var. were tested to verify their susceptibility to the tomato spotted wilt virus and the tobacco streak virus. A higher % of var. were susceptible to the latter (52%) than to the former (26%). It was found that the var. most susceptible to both diseases was Manteiga, local lesions being formed on primary leaves adapted as a source of contamination. The lesions of the tomato spotted wilt virus appear 3-6 days after inoculation in the form of chlorotic spots, sometimes with necrotic rings. Those of the tobacco streak virus appear at 1-4 days in the form of necrotic points, small necrotic rings, or chlorotic spots. Best inoculation results with the tomato spotted wilt virus were obtained on leaves extended 2/3 or more of their total length and those for the tobacco streak virus on leaves extended 2/3 or less of their total length. The majority of the virus strains do not cause systemic infection when inoculated mechanically. For both viruses the no. of lesions increased when the inoculum was extracted with 0.025 or 0.0125 M sodium sulfite but was higher in the phosphate buffer solution at 0.05 or 0.025 M, pH 7 or 8, and slightly higher when these were combined. Under light conditions with a 48 h dark period, Manteiga had a higher no. of lesions caused by the tomato spotted wilt virus than check plants under normal light conditions. The increase in the no. of lesions was not as pronounced with the tobacco streak virus. For both viruses, the

inoculation made on the upper leaf surface caused a higher no. of lesions than when made on the underside. (Summary by EDITEC. Trans. by L.M.F.) G01

0555

19036 DIAZ, J.M.; SOTO, J.J.; FIGUEROA, G.; MASAYA, P.; OROZCO S., S.H. 1982. Avances en la selección para el aumento del nivel de resistencia múltiple en Chimaltenango, Guatemala. (Advances in screening for increased multiple resistance in Chimaltenango, Guatemala). Guatemala, Instituto de Ciencia y Tecnología Agrícolas. 6p. Span., Sum. Span., 4 Refs.

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

Phaseolus vulgaris. Cultivars. Resistance. Uromyces phaseoli. Colletotrichum lindemuthianum. Ascochyta sp. Selection. Germplasm. Guatemala.

A total of 300 bean materials (253 from Guatemalan germplasm banks and 47 from CIAT) was assessed for levels of multiple resistance to pathogenic fungi (Uromyces phaseoli, Colletotrichum lindemuthianum, and Ascochyta sp.) in Chimaltenango. One 6-m-long furrow was planted per cv. and every 4 furrows, one of mixed susceptible materials (spreader row). Among local germplasm, 141 cv. were selected for resistance to Uromyces phaseoli, 37 for resistance to C. lindemuthianum, and 4 for resistance to Ascochyta sp. Thirteen lines from CIAT were selected for resistance to U. phaseoli, 5 for resistance to C. lindemuthianum. None of the lines were resistant to Ascochyta sp. Cv. Guate 192, Guate 232, Guate 417, and Guate 1339 were selected for resistance to all 3 pathogenic fungi. CIAT lines BAT 67 and BAT 68 were selected for resistance to U. phaseoli and C. lindemuthianum and intermediate resistance to Ascochyta sp. and BAT 330 and BAT 525, immune to U. phaseoli and resistant to C. lindemuthianum and Ascochyta sp. The selected materials are ready to be included in crossbreeding programs. (Author's summary. Trans. by L.M.F.) G01

0556

19037 DIAZ, J.M.; SOTO, J.J.; FIGUEROA, G.; MASAYA S., P.; OROZCO S., S.H. 1982. Avances en la selección por resistencia múltiple y rendimiento de segregantes en fríjol arbustivo, Chimaltenango, 1981. (Advances in screening for multiple resistance and yield of segregants in bush beans). Guatemala, Instituto de Ciencia y Tecnología Agrícolas. 9p. Span., Sum. Span., 6 Refs.

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

Phaseolus vulgaris. Cultivars. Selection. Resistance. Uromyces phaseoli. Colletotrichum lindemuthianum. Ascochyta sp. Adaptation. Yields. Genotypes. Guatemala.

Thirty-seven F_2 populations and 610 F_3 families were planted at the Centro de Producción Agrícola, Chimaltenango, Guatemala, to identify and specify genotypes that combine resistance to major fungal pathogens in bean (Uromyces phaseoli, Colletotrichum lindemuthianum, and Ascochyta sp.) and also show good adaptation and high yield potential. For every F_2 population a furrow 2.5 m long was planted to the mother plant and one 2.5-m long to the father plant. Parent plants were not included for the F_3 families. Single plant selections were made among the F_2 populations. Fourteen single plant selections were made for early maturity and 5 for multiple

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resistance from the cross San Martin x Canario 101. Two single plant selections were made for early maturity, 6 for multiple resistance, and 5 for early maturity and multiple resistance from the cross P-616 x San Martin. Seven were selected for early maturity, 2 for multiple resistance, 4 for yield potential, and 1 for early maturity and multiple resistance from the cross 1468-N-CB x P-616. Mass selections were only made from 76 families regarding multiple resistance, early maturity, and yield potential. F_3 and F_2 selections that generated F_4 and F_3 progenies, resp., will be evaluated for adaptation and yield in several sites of the Guatemalan altiplano and subjected to new screening trials. (Author's summary. Trans. by L.M.F.) G01

0557

14292 FLESCH, R.D.; ESPINDOLA, E.A.; MONDARDO, E.; PACHECO, A.C. 1980. Indicacao de cultivares de feijão para o Estado de Santa Catarina, ano agrícola 1980-81. (Description of bean cultivars for the state of Santa Catarina, 1980-81 crop year). Florianópolis-SC, Brasil, Empresa Catarinense de Pesquisa Agropecuária. Comunicado Técnico no.35. 11p. Port., 6 Refs., Illus.

Phaseolus vulgaris. Cultivars. Yields. Agronomic characters. Resistance. Uromyces phaseoli. Colletotrichum lindemuthianum. Climatic requirements. Brazil.

Expt. were conducted in the municipalities of Chapecó, Agronomica, Papanduva, and Urussanga, SC, Brazil, during 1977-81 to test and recommend bean cv. for the region. A randomized block design was used with 4 replications; rows were spaced at 0.5 m with 200,000 plants/ha. Check cv. were Rio Tibagi and Carioca. Yields of 7 cv. (Rio Tibagi, Iguacu, Turrialba 4, Costa Rica, Rica 23, Carioca, and Paraná 1) are given. These cv. showed differential performance among sites. Iguacu and Turrialba 4 gave outstanding yields of 1015-2516 and 1205-2445 kg/ha, resp. Several agronomic characteristics of the cv. are described, namely, resistance to major diseases [bacteriosis, anthracnose (Colletotrichum lindemuthianum), and rust (Uromyces phaseoli)]; performance in different areas and during different crop years; flower and seed color, growth habit; 100-seed wt., and growth cycle duration. Santa Catarina is divided into 5 agroclimatic zones on the basis of mean temp. and water vapor tension. (Summary by EDITEC. Trans. L.M.F.) G01

0558

19051 HUCL, P.; BEVERSDORF, W.D. 1982. The inheritance of ozone insensitivity in selected Phaseolus vulgaris L. populations. Canadian Journal of Plant Science 62(4):861-865. Engl., Sum. Engl., Fr., 7 Refs.

Phaseolus vulgaris. Inheritance. Ozone. Cultivars. Crossbreeding. Resistance. Selection.

Information on the mode of inheritance of O_3 insensitivity in Phaseolus vulgaris was determined as a basis for establishing a breeding program aimed at transferring O_3 resistance into sensitive white bean lines. Three reciprocal crosses of the O_3-sensitive cv. Seafarer x 3 insensitive bean cv. (Narda, Calima, and Gold Crop) were used. Broad sense heritability estimates for O_3 insensitivity in the 4 F_2 populations were high (0.66-0.88) under artificial fumigation conditions. In the F_3, under field conditions, broad sense heritability estimates in 2 populations had declined to 0.16 and 0.21, probably as a result of the interaction of maturity and injury. The results suggest that selection for O_3 insensitivity in early generations should be conducted under controlled

fumigation conditions followed by field evaluations as lines approach homozygosity. (Author's summary) G01

0559

19002 INNES, N.L.; WALKEY, D.G.A. 1980. The genetics of resistance to two strains of bean common mosaic virus in three cultivars of Phaseolus vulgaris L. Journal of Agricultural Science 95:619-630. Engl., Sum. Engl., 16 Refs., Illus.

Phaseolus vulgaris. Cultivars. Bean common mosaic virus. Inoculation. Resistance. Inheritance. Crossbreeding. Symptomatology. Genes.

A high level of resistance to BCMV strains NL3 and NL4 when inoculated separately or together was confirmed in navy bean cv. Turkish Brown, Valja, and 1750-73. Following crosses between susceptible cv. The Prince and all 3 resistant cv., inoculation of F_2 and [illegible] populations revealed that cv. Turkish Brown and Valja each differed fro[illegible] The Prince in being homozygous for a major recessive gene conferring resistance to both NL3 and NL4. Homology tests indicated that the same gene was present in both Turkish Brown and Valja. Polygenes in Turkish Brown and Valja also appeared to confer some resistance to NL3, or environmental variation led to continuous distribution patterns in the F_2's of resistant parents crossed with The Prince. Although a major recessive gene controlled resistance to NL3 in cv. 1750-73, it differed from that in the 2 other resistant cv. In addition, cv. 1750-73 carried a dominant gene determining reaction to the virus; probably the I gene originally found in Corbett Refugee. An attempt is made to relate these results to Drijfhout's (1978) gene-for-gene model. Using Drijfhout's gene nomenclature all the cv. tested appear to carry the strain nonspecific gene bc-u. Further genetical tests will be necessary to determine with certainty which, if any, of Drijfhout's strain-specific resistant bc-genes are present in the 3 resistant cv. studied here. (Author's summary) G01

0560

18091 INSTITUTO DE CIENCIA Y TECNOLOGIA AGRICOLAS. GUATEMALA. 1976. Programa de producción de fríjol. (Bean production program). Guatemala. 99p. Span., Illus.

Phaseolus vulgaris. Plant breeding. Cultivars. Resistance. Selection. Diseases and pathogens. Injurious insects. Insect control. Intercropping. Guatemala.

Research activities of the bean program of the Instituto de Ciencia y Tecnología Agrícolas (ICTA) of Guatemala in 1976 are described. These were carried out in the SE region of the country and in part of the Central Altiplano. Results of work in genetic breeding, plant pathology, entomology, and agronomy are given. In the SE area, research was concentrated on the solution of problems related to: (1) the use of local var. susceptible to pests and diseases; (2) irregular rainfall distribution and drought during critical plant growth periods; (3) high pest incidence (Bemisia tabaci, Apion godmani, Empoasca sp., and Diabrotica sp.); (4) high disease incidence (especially BGMV); (5) naturally low fertility soils; and (6) lack of var. that are: tolerant to excess or deficient rainfall, pests, and diseases; early-maturing; and efficient in nutrient utilization. (Summary by EDITEC. Trans. by L.M.F.) G01

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0561

18003 JARA, B.; ACOSTA, A.; CARDONA, C. 1981. Efecto de cinco variedades de fríjol, sobre la biología y la fecundidad de la arañita roja, Tetranychus desertorum Banks. (Acari, Tetranychidae). [Effect of five bean varieties on the biology and fertility of the red spider mite, Tetranychus desertorum (Acari, Tetranychidae)]. Revista Colombiana de Entomología 7(1/2):33-39. Span., Sum. Engl., Span., 15 Refs., Illus.

Phaseolus vulgaris. Cultivars. Resistance. Tetranychus desertorum. Insect biology. Colombia.

The biology of the red spider mite (Tetranychus desertorum) was studied under lab. conditions (24 ± 1°C; 80 ± 5% RH) on 5 bean var. These had previously been rated as resistant or susceptible under field conditions. BAT 53, a resistant var., had a significant effect on the biological cycle and fertility of the red spider mite. Its resistance was verified due to the lower oviposition rate, smaller size of the adults, shorter adult cycle, longer life cycle, and higher adult mortality. These results suggest a possible antibiosis effect. Var. BAT 82 and BAT 417 showed an intermediate effect whereas BAT 280 and ICA-Pijao were susceptible. (Author's summary) G01

0562

18015 LYMAN, J.M.; CARDONA, C.; GARCIA, J. 1981. Estudios sobre la resistencia del fríjol lima al Empoasca kraemeri Ross and Moore. (Studies on the resistance of lima bean to Empoasca kraemeri). Revista Colombiana de Entomología 7(1/2):27-32. Span., Sum. Engl., Span., 17 Refs., Illus.

Phaseolus lunatus. Empoasca kraemeri. Cultivars. Resistance. Crossbreeding. Inheritance. Hybridizing. Colombia.

The degree of resistance of 185 lima bean var. (Phaseolus lunatus) to the leafhopper Empoasca kraemeri was studied under CIAT conditions (av. temp. 24°C; 80% RH). Resistant lines were identified by a visual rating system. Resistance levels were higher than those of common bean (P. vulgaris). Nymph populations correlated significantly with visual damage. Hooked trichome density on leaf undersides was highly and negatively correlated with damage. Reciprocal crosses were made between a resistant and a susceptible line. Continuous segregation for reaction to leafhoppers was observed in F_2 plants, indicating quantitative inheritance of this trait in lima beans with dominance of the susceptible reaction. The low trichome density trait was dominant. Regression of parental and progeny damage on trichome density was highly negative, confirming the important role of trichomes in leafhopper resistance. The use of these concepts in var. breeding programs for leafhopper resistance is discussed. (Author's summary) G01

0563

17879 MACARTNEY, J.C.; HOWLAND, A.K. 1963. East African bean rust studies. Tanzania. Miniatry of Agriculture, Forests and Wildlife. Tengeru Report no.76. 7p. Engl., Sum. Engl., 18 Refs.

Phaseolus vulgaris. Uromyces phaseoli. Cultivars. Selection. Inoculation. Resistance. Tanzania.

Lab. screening of field resistance to rust (Uromyces phaseoli) of Tengeru (Tanzania) selections of haricot beans is described. Twenty-six var. suitable for canning and showing field resistance were used. Six American

bean rust differentials and Tengeru No. 8 were inoculated at 10 days and symptom expression recorded 16 days later. A classification of the bean rust races present within East Africa was also carried out. Two prevalent races were found in rust samples collected from the bean growing area of N. Tanzania in 1960, classified as race B and A. By 1966, 8 races had emerged designated A to H. Six of the resistant imported var. from Tengeru were tested for resistance to 1st 6 races. No. 8, 9, 14, and 19 were highly resistant to all 6 races, while No. 16 was susceptible to D and F and No. 21 to E and F. (Summary by L.M.F.) G01

0564

19050 McKERSIE, B.D.; BEVERSDORF, W.D.; HUCL, P. 1982. The relationship between ozone insensitivity, lipid-soluble antioxidants, and superoxide dismutase in Phaseolus vulgaris. Canadian Journal of Botany 60(12): 2686-2691. Engl., Sum. Engl., Fr., 25 Refs., Illus.

Phaseolus vulgaris. Leaves. Ozone. Resistance. Cultivars. Plant injuries. Enzymes. Plant physiological disorders.

O_3 insensitivity was assessed by 3 methods (visual rating, leakage of amino acids, and leakage of total electrolytes from leaf discs), and related to the levels of lipid-soluble antioxidants and superoxide dismutase activity in the primary leaves of different ages and of different cv. of Phaseolus vulgaris. The most sensitive indicator of O_3 injury was visual rating. The increased variability associated with measurements of amino acid or total electrolyte leakage masked differences among cv. which could be detected by visual rating. The correlations among the 3 measures of injury were high. O_3 tolerance of the primary leaf decreased between 8-18 days after planting and varied significantly among the 10 cv. tested. Similarly, significant differences in lipid-soluble antioxidant content and superoxide dismutase activity were measured, but a correlation with O_3 insensitivity was not established. Exposure to 20 pphm O_3 for 24 h induced higher quantities of lipid-soluble antioxidant in the susceptible cv. Seafarer but not in the tolerant cv. Goldcrop. Superoxide dismutase increased similarly in both cv. The physiological mechanism of O_3 insensitivity in the primary leaves of these cv. of P. vulgaris was not shown to involve increased levels of lipid-soluble antioxidants or superoxide dismutase. (Author's summary) G01

0565

19024 MOSELEY, F.; FAURE, B.; IRANETA, M. 1981. Estudio preliminar de 21 variedades de fríjol negro (Phaseolus vulgaris). (Preliminary study on 21 black bean varieties). Ciencia y Técnica en la Agricultura: Viandas, Hortalizas y Granos 4(2):7-23. Span., Sum. Span., Engl., 12 Refs.

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

An expt. was conducted at El Tomeguín Potato and Grain Exptl. Station, Alquízar (La Habana, Cuba) to compare the yield and performance of 16 introduced black bean var. (BAT 64, BAT 76, BAT 271, BAT 140, BAT 240, BAT 261, BAT 448, BAT 450, G. 1753, BAT 445, BAT 304, BAT 58, DOR 15, BAT 179, and BAT 518) with 3 local checks (C-25-9, Bolita 42, and V-8) and 3 international checks (Porrillo Sintético, Jamapa, and ICA Pijao). The most outstanding var., BAT 304, outyielded the highest yielding check, ICA Pijao, by 28% (2850 vs. 2220 kg/ha). The no. of pods/plant and the wt. of 100 seeds were the yield components that most affected the highest yielding var. Var. ICA Pijao showed the greatest resistance to anthracnose (Colletotrichum lindemuthianum), rust (Uromyces phaseoli), and bacteriosis (Xanthomonas phaseoli). Var. BAT 304, BAT 58, BAT 518, BAT 450, BAT 448,

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BAT 64, BAT 240, and BAT 179 are recommended for zonal ecological trials. (Summary by F.G. Trans. by L.M.F.) G01

0566

18799 NUILA N., L.R.; VASQUEZ F., N. 1980. Resultados del Vivero Internacional de Rendimiento y Adaptación de Variedades de Fríjol (IBYAN) en El Salvador. [Results of the International Bean Yield and Adaptation Nursery (IBYAN) in El Salvador]. El Salvador, Centro Nacional de Tecnología Agropecuaria. 11p. Span., 8 Refs., Illus.

Paper presented at Reunión Anual del PCCMCA, 26a., Guatemala, 1980.

Phaseolus vulgaris. Cultivars. Adaptation. Yields. Planting. Timing. Selection. El Salvador.

In 1979 during 2 different planting seasons (May and Aug.) bean yield and adaptation nurseries were established in the localities of Ahuachapán and Nueva Guadalupe (El Salvador) at 725 and 482 m.a.s.l., resp., to assess the adaptability of new common bean cv. During May at both sites a 5 x 5 triple lattice design was used with 25 treatments; 2 colored-bean nurseries and 2 black bean nurseries were planted. During the Aug. planting at both sites, a randomized block design was used with 21 and 32 treatments for the black bean and the colored-bean nurseries, resp. Diseases were assessed using CIAT scales and agronomic variables (bean yield, final stand, wt. of 100 seeds, and no. of pods/plant) were recorded. Mean yields in kg/ha were analyzed for the mo. of May and it was concluded that the best treatments for IBYAN-C-79A were FF2605-CB-4-CM(9-B)-M and FF670-13-2-M. For IBYAN-N-79A these were FF1322-CB-25-CM(10-B)-M and FF1238-CB-18-CM(7-B)-CM(4-B)-M. Best treatments for IBYAN-N-79B for the Aug. planting were BAT 304, BAT 450, and BAT 58 and for IBYAN-C-79B were G2618, BAT 93, and BAT 614. (Author's summary. Trans. by L.M.F.) G01

0567

19003 OCKENDON, D.J.; CURRAH, L. 1982. Inbreeding depression in runner beans (Phaseolus coccineus L.). Horticultural Research 22:19-26. Engl., Sum. Engl., 14 Refs., Illus.

Phaseolus coccineus. Pollination. Hybrids. Cultivars. Plant fertility. Plant breeding.

Existing runner bean (Phaseolus coccineus) cv. need insect pollination to set pods. If lines could be developed which set pods without insect pollination they might show inbreeding depression. To assess the likely degree of this depression, the yield of 3 cv. (Emergo, Prizewinner, White Achievement) was compared for 2 successive years with that of 7 inbreds derived from them, ranging from I_1 to I_3. In 7 out of 11 comparisons the inbreds showed no significant inbreeding depression in yield of fresh pods; in 3 cases the depression was 13% and in 1 case 36%. The degree and variability of inbreeding depression found suggest that it should be possible to select autofertile lines almost as vigorous as the parent cv., provided that large nc. of such lines are available. (Author's summary) G01

0568

18600 PACOVA, B.E.V.; SANTOS, A.F. DOS; CANDAL NETO, J.F. 1982. Introducao e selecao de genótipos avancados de feijoeiro no Estado do Espírito Santo. (Introduction and selection of advanced bean genotypes in the state of Espírito Santo). Campo Grande, Cariacica-ES, Brasil, Empresa Capixaba de Pesquisa Agropecuária. Pesquisa em Andamento no.06. 4p. Port.

Phaseolus vulgaris. Cultivars. Adaptation. Yields. Resistance. Colletotrichum lindemuthianum. Isariopsis griseola. Uromyces phaseoli. Selection. Brazil.

As of 1981, the Empresa Capixaba de Pesquisa Agropecuária subdivided its activities in bean genetic improvement into 3 related phases, introduction, preliminary trials, and regional trials of advanced genotypes, in an intent to solve major problems of the bean producing regions of Espírito Santo, Brazil. Introductions proceed from international and national entities with research programs in bean. Advanced lines selected for their outstanding performance and good health in comparison with local checks undergo preliminary trials on exptl. plots, replicated at the exptl. station for a new selection. These selected lines are subjected to regional trials carried out at different sites and on farms in order to select cv. that have a wide range of adaptability and to multiply the seed of the most outstanding genotypes. In 1981, 61 lines were received from the Centro Nacional de Pesquisa de Arroz, Feijao; these were selected for their reaction to anthracnose (Colletotrichum lindemuthianum), angular leaf spot (Isariopsis griseola), and rust (Uromyces phaseoli) and for their growth habits and pods set/plant. Eight of these lines (CNF 0119, CNF 0121, CNF 0122, CNF 0123, CNF 0166, CNF 0167, CNF 0168, and CNF 0177) were selected for preliminary trials; of these only 3 outyielded the check Rio Tibagi (2300 kg/ha): CNF 0123 (2842 kg/ha), CNF 0121 (2726 kg/ha), and CNF 0122 (2492 kg/ha). However, CNF 0121 was the only line that showed resistance to anthracnose and angular leaf spot, while the other 2 showed slight reactions. The 3 lines were submitted to regional trials in 1982-83. To increase genetic variability a total of 439 lines were received from different national and international institutions for the 1982-83 selection. (Summary by EDITEC. Trans. by L.M.F.) GOl

0569

17830 PLOPER, L.D.; DANTUR, N. 1981. Poroto: visita al norte argentino de científicos del C.I.A.T. (Beans: CIAT scientists visit northern Argentina). Avance Agroindustrial 2(5):3-5. Span., Illus.

Phaseolus vulgaris. Germplasm. Adaptation. Resistance. Diseases and pathogens. Cultivars. Technology evaluation. Argentina.

Observations and recommendations made by CIAT researchers on bean crops in northern Argentina are reported. Diseases, pests, and characteristics of adaptation of the major producing areas (Salta, Tucumán, Santiago de Estero, and Cordoba) are given. Current bean projects and different germplasm nurseries, such as the improvement nursery, the IBYAN, the International Empoasca Nursery, the International Bean Rust Nursery (IBRN), and the International Bean Inoculation Trial (IBIT) at CIAT, were observed and assessed at the Estación Exptl. Agroindustrial Obispo Colombres (EEAOC). It was recommended to: (1) impose strict quarantine measures to all introductions into the country; (2) plant disease-free seed; (3) diversify bean var.; (4) study planting times and population densities for recommended var.; (5) continue studies on chemical control of Empoasca kraemeri and other leaf-piercing insects; (6) carry out studies on soil management and use of agricultural machinery regarding erosion control; (7) delimit bean and soybean production zones in order to prevent the occurrence of whiteflies in bean and thus facilitate the control of the bean chlorotic mottle virus; (8) maintain collaborative links. (Summary by EDITEC. Trans. by L.M.F.) GOl

0570

18742 RAMALHO, M.A.P.; SANTOS, J.B. DOS 1982. Melhoramento do feijao.(Bean improvement). Informe Agropecuário 8(90):16-19. Port., 18 Refs., Illus.

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Phaseolus vulgaris. Plant reproduction. Genetics. Plant breeding. Selection. Hybridizing. Adaptation. Brazil.

Aspects of botany and reproduction in bean plants, genetic variability existing in the cv. used by the farmers, and major breeding methods used in autogamous plants (introduction of cv., selection in populations composed of a mixture of pure lines, and hybridization) are briefly discussed. (Summary by F.G. Trans. by L.M.F.) G01

0571

17416 RICCI, J.R.; PLOPER, L.D. 1982. Poroto: evaluación de nuevas variedades para el NOA. (Bean: assessment of new varieties for northwestern Argentina). Avance Agroindustrial 8:17-20. Span., Illus.

Phaseolus vulgaris. Cultivars. Technology evaluation. Germplasm. Selection. Adaptation. Argentina.

The activities of assessment of new materials, through the Bean Project of the Estación Exptl. Agroindustrial Obispo Colombres (EEAOC) in NW Argentina, are described. Research is directed towards the evaluation of large, medium, and small white beans, small black beans, medium and large red beans, and pinto beans. Tested material is from the Breeding Program at EEAOC, the germplasm bank at CIAT, lines from CIAT's breeding program and other national programs of other countries. A multidisciplinary team in agronomy and breeding, plant pathology, entomology, soil and plant nutrition carries out the evaluations in 7 areas with different ecological characteristics. The process of evaluation involves the following steps: (1) materials are included in adaptation and observation plots; (2) preliminary trials; (3) regional trials; (4) replication of regional trials; and (5) inscription of new var. The most outstanding advances to date are given for the different bean types. (Summary by EDITEC. Trans. by L.M.F.) G01

0572

19408 RIOS B.; M.J. 1983. Selección y evaluación de fríjol cargamanto voluble (Phaseolus vulgaris) en el oriente antioqueño. (Screening and evaluation of climbing Cargamanto bean in eastern Antioquia). Revista ICA 18(1):27-34. Span., Sum. Span., Engl., 6 Refs.

Phaseolus vulgaris. Selection. Cultivars. Yields. Resistance. Colletotrichum lindemuthianum. Plant breeding. Colombia.

Beans of var. Cargamanto (climbing) were collected and tested in eastern Antioquia, Colombia. Beans were selected on the basis of the healthiness (mainly regarding Colletotrichum lindemuthianum) and vigor (pod no. and size). Based on grain yield, the best bean var. was selected to be released to farmers as an improved var. Seventeen families of Cargamanto bean from 9 sites in the municipalities of Rionegro, San Vicente, Carmen de Viboral, and Sonson were used in a randomized complete block design with 2 replications, 2 checks, and a balanced mixture of these 19. Results showed that the av. yield for the selections varied from 1240 to 1679 kg/ha (selection 14 and 4, resp.), but variation among sites registered 944 and 1987 kg/ha for Carmen de Viboral and Rionegro, resp. Selection 4 had the highest av. yield over the 9 sites (statistically significant at 1% level); this selection was not only outstanding because of its yield (114% of the general av.) but it is also highly tolerant to anthracnose, a serious bean disease in this area. Selection 20, composed of a balanced mixture of all

selections, gave a high yield (105% of the general av.), indicating that the different genotypes have given a certain stability to this selection under the different environmental conditions tested. It is recommended that selection 4 (subjected twice to mass selection) be registered at the Ministry of Agriculture as an improved bean var. to be released for moderately cold areas in Colombia. (Author's summary) G01

0573

19096 SCHWARTZ, H.F.; PASTOR C., M.A.; SINGH, S.P. 1982. New sources of resistance to anthracnose and angular leaf spot of beans (Phaseolus vulgaris L.). Euphytica 31(3):741-754. Engl., Sum. Engl., 42 Refs.

Phaseolus vulgaris. Cultivars. Colletotrichum lindemuthianum. Isariopsis griseola. Resistance. Plant habit. Germplasm. Isolation. Inoculation. Colombia.

Over 13,000 CIAT bean accessions were evaluated for their reactions to the anthracnose (Colletotrichum lindemuthianum) and angular leaf spot (Isariopsis griseola) pathogens over a 3 yr period. Among these accessions, 156 were resistant to all races of the anthracnose pathogen collected from Popayán, Colombia. Thirty were resistant to numerous races obtained from other parts of the world, including Europe. Although many of these new resistant sources originated in Mexico and Central America, they are quite diverse for geographic origin, plant type, seed color, and seed size. In addition, more than 50 of the 156 lines were also resistant to isolates of I. griseola with diverse sources of origin throughout Colombia. (Author's summary) G01

0574

19065 SHII, C.T.; RABAKOARIHANTA, A.; MOK, M.C.; MOK, D.W.S. 1982. Embryo development in reciprocal crosses of Phaseolus vulgaris L. and P. coccineus Lam. Theoretical and Applied Genetics 62(1):59-64. Engl., Sum. Engl., 23 Refs., Illus.

Phaseolus vulgaris. P. coccineus. Crossbreeding. Embryo. Hybrids. Plant fertility. Genetics.

Reciprocal crosses of Phaseolus vulgaris cv. Great Northern and P. coccineus cv. Scarlet Runner were studied. Both shrunken and underdeveloped embryos were formed in crosses with P. coccineus as female. Plants of P. coccineus x P. vulgaris were obtained by embryo culture. Although P. vulgaris x P. coccineus resulted in normal seed development, the fertility of the hybrids was lower (27%) than that of the reciprocal hybrids (81%). Normal, shrunken, and underdeveloped F_2 embryos were formed on F_1 plants and the frequencies did not differ between reciprocal populations. Interactions between embryo and endosperm and/or maternal parent, rather than nucleocytoplasmic effects, are suggested to be important in determining the extent of embryo growth. Examination of the pollen fertility of F_2 plants and the development of F_2 and F_3 embryos suggested that formation of abnormal embryos and reduced male fertility are independent events. (Author's summary) G01

0575

19044 SULLIVAN, J.G.; BLISS, F.A. 1983. Recurrent mass selection for increased seed yield and seed protein percentage in the common bean (Phaseolus vulgaris L.) using a selection index. Journal of the American Society for Horticultural Science 108(1):42-46. Engl., Sum. Engl., 32 Refs., Illus.

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Phaseolus vulgaris. Selection. Cultivars. Protein content. Crossbreeding. Yields. Seed.

Recurrent mass selection based on a desired gain index was employed to increase simultaneously seed yield and seed protein % in the common bean. Seed protein was increased from 21.9 to 24.6% after 2 cycles of selection. Mean seed yields of selected populations were not significantly greater than the mean of the unselected parents, but high-yielding individual families were identified. Of particular interest was the family 2-4-1, with seed yields equal to the highest-yielding parent, and seed protein % higher than all parental lines in both years in which the expt. were conducted. Modifications in the selection procedure were proposed which should increase the efficiency of selection for seed yield. (Author's summary) G01

0576

19001 WALKEY, D.G.A.; TAYLOR, J.D. 1979. Resistance of United Kingdom cultivars of runner beans to bean common and yellow mosaic viruses and to halo-blight. Journal of the National Institute of Agricultural Botany 15:113-116. Engl., Sum. Engl., 21 Refs.

Phaseolus vulgaris. P. coccineus. Cultivars. Resistance. Bean common mosaic virus. Bean yellow mosaic virus. Pseudomonas phaseolicola. Selection. United Kingdom.

Runner bean (Phaseolus coccineus) cv. on the U.K. National List were assessed for resistance to BCMV and BYMV viruses and to halo blight (Pseudomonas phaseolicola). All cv. were resistant to the NL_3, NL_4, and NVRS strains of BCMV and the NVRS isolate of BYMV, but susceptible to halo blight races 1 and 2. Results suggest that P. coccineus could be an important source of virus resistance in P. vulgaris breeding programs and that existing halo blight resistance in P. vulgaris should be transferred to P. coccineus. (Author's summary) G01

See also 0405 0434 0437 0439 0455 0484 0493 0498 0522 0538

H00 NUTRITION

0577

19463 ANDRES, C. 1981. High-protein flour from white beans. Food Processing 42(5):64. Engl., Illus.

Phaseolus vulgaris. Bean flour. Protein content. Uses.

Two high protein flours from white beans are described, having protein contents of 25 and 40%, resp. The flours are deflavored and debittered, and intended for use in bakery products, snacks, milk replacers, and pasta foods. In bakery foods, the bean flour can replace up to 30% of wheat flour. The protein-rich flours are prepared by air-classification of cooked milled beans. (Summary by Food Science and Technology Abstracts) H00

0578

19066 GRANT, G.; MORE, L.J.; McKENZIE, N.H.; PUSZTAI, A. 1982. The effect of heating on the haemagglutinating activity and nutritional properties of bean (Phaseolus vulgaris) seeds. Journal of the Science of Food and Agriculture 33:1324-1326. Engl., Sum. Engl., 14 Refs., Illus.

Phaseolus vulgaris. Seed. Heat treatment. Phytohaemagglutinins.

The toxic lectins present in red, white, and black kidney beans are sensitive to heat treatment and the efficiency of that treatment is greatly improved by presoaking of the seeds. Heating of presoaked seeds at all temp. above 75°C caused a continuous reduction in both their hemagglutinating activity and toxicity. However, the only safe method of eliminating toxicity was to heat the fully hydrated seeds to 100°C for a min. of 10 min. (Author's summary) H00

H01 Foods and Nutritive Value

0579

16745 DAVIS, D.R.; COCKRELL, C.W. 1978. Factors affecting internal can pitting in canned snap beans. Arkansas Farm Research 27(6):7. Engl.

Phaseolus vulgaris. Snap beans. Canned beans. Storage. Temperature.

Snap bean cv. Early Gallatin was canned using commercial procedures in tin cans in order to determine the components responsible for can pitting and methods of preventing it. Sample cans were stored at room temp. or at 38°C and examined periodically over a 16-mo. storage period. The tin coating wt., can vacuum, and storage temp. all had a pronounced effect on pitting severity. Heavier tin-plate cans (1/2 lb) had significantly less pitting than those with a lighter tin plate (1/4 lb) at all storage periods and at both temp. Twenty percent of the cans stored at room temp. were perforated after 16 mo. There were no significant differences in pitting severity between high and low vacuum treatments when cans were stored at 38°C, but at room temp. at 10 mo. storage the difference in severity of pitting was highly significant for low-vacuum samples. This difference was not apparent at 16 mo. The incidence of can pitting increased with storage time at both temp. (Summary by EDITEC. Trans. by L.M.F.) H01

0580

19067 GUALBERTO, D.G.; BICUDO, M.H.; COELHO, D.T.; MAFFIA, L.M.; TEIXEIRA, S.M. 1982. Avaliacao nutricional de misturas de feijao (Phaseolus vulgaris L.) e soja (Glycine max L.) procesaados por extrusao. (Nutritional assessment of extruded bean and soybean mixtures). Revista Ceres 29(163):233-241. Port., Sum. Port., Engl., 11 Refs.

Phaseolus vulgaris. Proteins. Nutritive value. Laboratory animals. Methionine.

Nutritional quality of protein mixtures from texturized soybeans and precooked red beans at different levels of combinations (80:20, 60:40, 40:60, and 20:80), compared with texturized soybean and precooked red beans taken separately, was evaluated in a biological assay using male albino rats, 21 days old. The effects of the addition of 0.2% met. were also studied. The criterion selected for evaluation was the NPR. A completely randomized exptl. design was used. The products were also sensory evaluated. The addition of increasing amounts of soybean to bean gradually increased the level of protein in the mixture. Among the nonsupplemented mixtures, a better protein quality was obtained with 20% of the protein from red beans and 80% from soybeans, which corresponded to 37 and 63 g of bean and soybean, resp. Supplementation with met. improved the quality of the mixtures. The mixture of 60% precooked red beans and 40% texturized

194

soybean supplemented with 0.2% met. was found to be the best combination since it had good acceptability and high protein quality. (Author's summary) H01

0581

18569 LEVEILLE, G.A.; MORLEY, S.S.; HARPSTEAD, D.D. 1978. Beans—a food resource. In Robertson, L.S.; Frazier, R.D., eds. Dry bean production-principles and practices. East Lansing, Michigan State University. Cooperative Extension Service. Agricultural Experiment Station. Extension Bulletin E-1251. pp.31-44. Engl., 18 Refs., Illus.

Phaseolus vulgaris. Nutritive value. Analysis. Digestibility. Protein content. Vitamin content. Fat content. Mineral content. Carbohydrate content. USA.

The nutritional value of bean is analyzed and the methods of nutritional evaluation used to determine protein, lipid, carbohydrate, vitamin, and mineral contents are discussed. Antinutritional factors in bean are also discussed as well as the characteristics that affect consumer acceptance of the grain. Nutritional considerations that should be taken into account in bean breeding programs are given. These include a wider range of met. levels, lower levels of antinutritional factors, and greater digestibility and utilization of the product by the human body. (Summary by EDITEC. Trans. by L.M.F.) H01

0582

19431 MARQUEZ, U.M.L.; LAJOLO, F.M. 1981. Composition and digestibility of albumin, globulins, and glutelins from Phaseolus vulgaris. Journal of Agricultural and Food Chemistry 29(5):1068-1074. Engl., Sum. Engl., 39 Refs., Illus.

Phaseolus vulgaris. Cultivars. Digestibility. Protein content. Inhibitors. Trypsin. Proteins.

Fifteen Brazilian var. of Phaseolus vulgaris were examined for digestibility in vitro, trypsin inhibitors, and protein content. Four var. with extreme digestibility values were given to rats and showed similar digestibilities. The protein from var. Carioca, fractionated for detailed studies, had albumin 31.5 (richest in sulphur amino acids and trypsin inhibitors), globulin G_1 38.5, globulin G_2 13.8, and glutelin 22.4%. The in vitro digestibilities of the unheated globulins and glutelins were low but were improved by heating. The albumins were well digested in the raw state but after heating digestibility decreased; the effect was pH-dependent. The residue left after digestion of autoclaved albumin contained peptides with mol. wt. 14,000 and 20,000. A trypsin inhibitor in the albumin fraction was relatively heat-stable. The extent of digestion of the 4 fractions was tested by using trypsin, pancreatin, or pepsin-pancreatin. (Author's summary) H01

0583

19057 MYER, R.O.; FROSETH, J.A.; COON, C.N. 1982. Protein utilization and toxic effects of raw beans (Phaseolus vulgaris) for young pigs. Journal of Animal Science 55(5):1087-1098. Engl., Sum. Engl., 52 Refs.

Phaseolus vulgaris. Animal nutrition. Diets. Digestibility. Amino acids. Nutritive value. Tannin content. Trypsin.

One balance trial and 2 pair-feeding expt. were made to determine the effects of raw small red beans on young pigs. In the balance trial, the substitution of 5 and 15% raw beans for SBM and maize starch in the semipurified diet depressed apparent digestibilities of CP, total S, and all individual amino acids measured. Urinary excretion of N and sulfate was increased and N retention was decreased. Pigs given a semipurified diet with 15% raw beans in one pair-feeding trial gained less and had slightly larger livers and slightly smaller spleens than did pigs given the control diet without raw beans. There was no difference in pancreas size as a % of bodywt.; pancreatic trypsin, chymotrypsin, and amylase activities were lower in pigs given raw beans. Pigs given raw beans also had higher serum urea and lower albumin concn. and higher alkaline phosphatase activities and plasma Zn concn. Pigs given raw beans had a higher total leukocyte count, primarily because of an increase in neutrophils; eosinophil no. were depressed. Similar results were obtained in the other pair-feeding trial with pigs given a diet of maize and SBM without or with 15% raw beans; leukocyte no. and differential counts were affected only slightly by the feeding of raw beans. Size of pancreas of pigs given raw beans was decreased. The feeding of raw red beans decreased protein digestibility and appeared to interfere with systemic protein utilization. (Author's summary) H01

0584

19014 SGARBIERI, V.C.; CLARKE, E.M.W.; PUSZTAI, A. 1982. Proteolytic breakdown of kidney bean (Phaseolus vulgaris) storage proteins: nutritional implications. Journal of the Science of Food and Agriculture 33:881-891. Engl., Sum. Engl., 22 Refs., Illus.

Phaseolus vulgaris. Proteins. Digestibility. Laboratory animals.

Glycoprotein II (phaseolin), the major storage protein of the seeds of white kidney bean cv. Processor was largely resistant to hydrolysis by pure gut endopeptidases. However, the protein was extensively digested in vitro and nearly 90% of it became soluble in 5% trichloroacetic acid by treatment 1st with extracts of rat stomach followed by intestinal contents or alternatively 1st with pepsin, followed by pancreatin. Heat denaturation (100°C for 10 min) had no appreciable effect on the digestion. A similarly high extent (between 80-90%) and rate of digestion of pure Glycoprotein II was observed in vivo. However, intubation of pure Glycoprotein II into the stomach of previously fasted rats increased the production of insoluble intestinal secretions containing relatively large amounts of N. As this N passed into the caecum, it reduced both the apparent digestibility of Glycoprotein II and the net gain of N for the animal. Moreover, in the presence of a mixture of raw bean proteins in the stomach of rats the time taken to empty its content into the intestine was increased appreciably. Additionally, the toxic effects of the lectins in these mixtures, particularly on continuous feeding, were observed. The results of detailed in vivo and in vitro digestion studies in male rats using undenatured Glycoprotein II, alone or in combination with lectin, are reported. (Author's summary) H01

0585

19053 VARGAS, E.; BRESSANI, R.; ELIAS, L.G.; BRAHAM, J.E. 1982. Complementación y suplementación de mezclas vegetales a base de arroz y fríjol. (Complementation and supplementation of rice- and bean-based vegetable mixtures). Archivos Latinoamericanos de Nutrición 32(3):579-600. Span., Sum. Span., Engl., 20 Refs., Illus.

Phaseolus vulgaris. Laboratory animals. Proteins. Nutritive value.

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A series of expt. with lab. animals was carried out to determine the best complementation of rice and bean proteins; to measure possible protein differences of some bean var., both in terms of quality and quantity; and to quantify the effect of animal protein (meat or milk) and calorie (oil) supplementation on the nutritive value of rice- and bean-based mixtures. Three black bean var. (Suchitán, Turrialba, and S-19-N) and one of white polished rice were evaluated by partially substituting, by stages, the proteins of one grain for that of the other. Diets for young rats were prepared with these mixtures, evaluating the complementary effect of each bean var. combined with rice by the NPR. Results indicated that rice and bean proteins were complementary when rice supplied 90-40% of the protein in the diet and beans, 10-60%. It was also found that bean var. S-19-N contains more good quality protein than the other 2 var. studied. The relative protein value of the 60:40 rice:bean mixture, on a protein basis (optimum mixture), was 87% that of casein when var. S-19-N was used. The 60:40 mixture and a 35:65 rice:bean mixture, on a protein basis, were supplemented with milk or meat protein, replacing the vegetable protein at levels of 0, 5, 10, and 15%. The caloric density of the mixture was also increased 0, 7, 14, and 21% over a basal value of 360 kcal/100 g. The NPR was used as a measure of protein quality of diets for 21 to 23-day-old rats. Results revealed that meat and bean constitute supplements of equal quality for mixtures prepared on a rice and bean basis. For the 60:40 mixture there was no positive effect of protein supplementation. The 35:65 mixture improved with protein supplementation, reaching a protein value equivalent to that of the 60:40 mixture with the 15% supplementation level. Both mixtures were slightly favored by the 7% energy supplementation. Even though feed consumption, and protein and energy contents in animals receiving the 60:40 mixture were higher than 100% compared with those fed casein, the NPR, wt. gain, and feed conversion were only 88, 87, and 82% those of casein. Consumption, cost, and cultivated area required to maintain N equilibrium of an adult population fed beans and rice, with or without the milk supplement, were calculated. (Author's summary) H01

I00 MICROBIOLOGY

I01 *Rhizobium* spp., Nitrogen Fixation and Nodulation

0586

19089 CRAWFORD, S.L.; BERRYHILL, D.L. 1983. Survival of *Rhizobium phaseoli* in coal-based legume inoculants applied to seeds. Applied and Environmental Microbiology 45(2):703-705. Engl., Sum. Engl., 10 Refs.

Phaseolus vulgaris. *Rhizobium phaseoli*. Inoculation.

The survival of *Rhizobium phaseoli* in coal-based inoculants applied to seeds was studied. Eight coals (from different states in the USA) used as carriers in legume inoculants promoted the survival of *R. phaseoli* on pinto bean seeds. Although peat was more protective, most coal-based inoculants provided more than 10^4 viable rhizobia/seed after 4 wk. (Author's summary) I01

0587

18786 KREMER, R.J.; PETERSON, H.L. 1982. Effect of inoculant carrier on survival of *Rhizobium* on inoculated seed. Soil Science 134(2):117-125. Engl., Sum. Engl., 24 Refs., Illus.

Phaseolus vulgaris. Drought. Temperature. Strains. *Rhizobium leguminosarum*. *R. phaseoli*. Inoculation. Nodulation. Growth.

Studies were performed to examine the effects of temp.-moisture stress on rhizobia inoculated on legume seeds (which included bean cv. Commodore seeds in all expt.) in peat-base and oil-base inoculants. Plate count and most-probable-no. analyses were used to determine the survival of rhizobia on seeds planted in dry sand at specific sampling times. Plants were grown from inoculated seeds after exposure to 16 days of temp.-moisture stress to assess nodulation and plant growth. For bean seeds that were inoculated with 10^7 cells of Rhizobium phaseoli 931A, 3.0×10^6 cells/seed (plate counts) were recovered from seeds inoculated with the oil-base carrier, compared with 8.0×10^2/seed with peat-base inoculant. Oil-base inoculants promoted higher survival of rhizobia on seed than did peat-base inoculants. Plants inoculated with oil-base inoculants had higher nodule no. and wt. than plants inoculated with peat-base inoculants. Shoot dry wt. and total N content were likewise increased with oil-base inoculants. Oil-base inoculants may provide more protection than peat-base inoculants when rhizobia are inoculated on seeds and exposed to conditions of drought and high temp. (Author's summary) 101

0588

19098 LOWENDORF, H.S.; ALEXANDER, M. 1983. Identification of Rhizobium phaseoli strains that are tolerant or sensitive to soil acidity. Applied and Environmental Microbiology 45(3):737-742. Engl., Sum. Engl., 21 Refs., Illus.

Phaseolus vulgaris. Rhizobium phaseoli. Strains. Resistance. pH.

A study was conducted to determine whether the survival of Rhizobium phaseoli in acid soils could be predicted on the basis of the tolerance of the organism to acidity in culture. Of 16 strains tested, all grew in culture at pH 4.6, but only those that grew at pH 3.8 survived in soils having pH values of 4.1-4.6. Strains that tolerated the lowest pH values in culture were tolerant of the highest Al concn. In one acid soil, an acid-tolerant strain was unable to survive in no. greater than 100/g, but the poor survival was not related to the level of extractable Al or Mn in the soil. Reproduction of an acid-tolerant strain of R. phaseoli was enhanced in the rhizosphere of Phaseolus vulgaris in both acid and limed soils, but stimulation of an acid-sensitive strain by the plant occurred only in the limed soil. These results indicate that cultural tests can be used to predict the ability of R. phaseoli to survive in acid soil. (Author's summary) 101

0589

19090 ROBERT, F.M.; SCHMIDT, E.L. 1983. Population changes and persistence of Rhizobium phaseoli in soil and rhizospheres. Applied and Environmental Microbiology 45(2):550-556. Engl., Sum. Engl., 23 Refs., Illus.

Phaseolus vulgaris. Rhizobium phaseoli. Snap beans. Cultivars. Fallowing. Inoculation. Rhizosphere.

The impact of legume cultivation on the establishment and persistence of an inoculant strain of Rhizobium phaseoli and its ability to compete with a resident population of R. phaseoli for nodule occupancy was examined utilizing strain-specific fluorescent antibodies. The soil (Hubbard loamy sand) was inoculated homogeneously with 5×10^5 cells/g of soil and confined in plastic cylinders kept in field plots. Inoculated and uninoculated cylinders were either left fallow or planted to 2 seeds of legumes. Two hosts, navy bean cv. Seafarer and snap bean cv. Picker, as well as a nonhost, soybean cv. Wilkin, were used. Inoculant Viking 1 was

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highly stimulated in all 3 rhizospheres sampled at 6 (flowering), 10 (pod fill), and 17 (decay) wk. and in the following spring, whereas counts in fallow soil decreased rapidly. Although the overwintering population remained highest in the vicinity of decaying host roots, Viking 1 persisted, even in fallow soil, to produce abundant nodulation of host plants the following spring. Viking 1 was an excellent competitor for nodulation sites on the roots of the hosts; it thoroughly surpassed the resident population of R. phaseoli, occupying virtually 100% of the nodules under inoculated conditions in all expt. (Author's summary) 101

0590

19076 SPARROW JUNIOR, S.D.; HAM, G.E. 1983. Nodulation, N_2 fixation, and seed yield of navy beans as influenced by inoculant rate and inoculant carrier. Agronomy Journal 75(1):20-24. Engl., Sum. Engl., 24 Refs., Illus.

Phaseolus vulgaris. Nodulation. Nitrogen fixation. Yields. Rhizobium phaseoli. Inoculation.

Peat is the most commonly used carrier of Rhizobium sp. (rhizobia) in inoculants. The lack of suitable local peat in many areas of the world leads to interest in other materials as carriers of rhizobia. Studies were conducted (1) to compare potential carriers of R. phaseoli for their ability, under field conditions, to supply viable rhizobia to promote nodulation, N_2 fixation, and increased seed yield of navy beans, and (2) to determine the optimum rate of inoculation with R. phaseoli to promote nodulation, N_2 fixation, and increased seed yield of navy beans in 2 soils in Minnesota, USA, a loamy sand and a silt loam. In 1978, 5 inoculation rates (ranging from 1 to 10^8 cells/cm of row) of liquid suspensions of R. phaseoli inoculants were applied at planting. In 1979, R. phaseoli in 6 inoculant carriers (peat, charcoal, vermiculite, corn cobs, peanut hulls, and liquid medium) was used to inoculate navy beans at rates of 2.5×10^4 and 5×10^6 cells/cm of row. Nodule no. and wt., acetylene reduction rates, seed yield, and seed N % were determined. In 1978, in most parameters measured, inoculation rates of 10^5-10^6 cells/cm were required for a statistically significant increase over the lowest inoculation rate. In 1979 there was no effect of inoculation on a soil with a relatively high population of soil R. phaseoli (10^4 cells/g soil) and relatively high mineral N content (30 ppm). On a soil with an indigenous population of less than 10 cells/g soil and mineral N content of 8 ppm, peat and charcoal inoculants resulted in the highest seed yield, nodule no. and wt., and acetylene reduction rates. Peanut hulls and corn cobs gave the poorest responses. These results indicate that peat, charcoal, and vermiculite can be successfully used as carriers of R. phaseoli but peanut hulls and corn cobs are unsatisfactory. (Author's summary) 101

0591

19054 SUNDSTROM, F.J.; NEAL, J.L.; MORSE, R.D.; BENDER, D.A. 1983. The effect of delayed inoculation on nitrogen fixation by Phaseolus vulgaris L. grown in minesoil. Communications in Soil Science and Plant Analysis 14(1):15-27. Engl., Sum. Engl., 22 Refs., Illus.

Phaseolus vulgaris. Inoculation. Nitrogen fixation. Snap beans. Fertilizers. N. Rhizobium phaseoli.

The influence of delayed inoculation on $N_2(C_2H_2)$-fixation by snap bean cv. Stokes Improved Tendergreen grown in minesoil is described. Fertilizer treatments included were 0, 25, 50, and 100 kg N/ha applied at 21 days or at seeding. A peat culture of Rhizobium phaseoli was inoculated at 21 days

or at seeding. Nitrogenase activity was determined by reduction of C_2H_2 to C_2H_4 at 7, 21, 35, and 49 days. Nitrogenase activity was related to N fertilizer rate and treatment sequence. Addition of 25 kg N/ha significantly stimulated $N_2(C_2H_2)$-fixation while greater rates of N fertilizer decreased the rate of $N_2(C_2H_2)$-fixation. Results suggest that addition of 25 kg N/ha at time of seeding, followed by inoculation with R. phaseoli after legume growth has been established (21 days) results in an initial greater amount of $N_2(C_2H_2)$-fixation. (Author's summary) I01

See also 0422 0474

J00 ECONOMICS AND DEVELOPMENT

0592

18567 ANDERSEN, A.L.; ROBERTSON, L.S. 1978. The Michigan dry edible bean industry—history. In Robertson, L.S.; Frazier, R.D., eds. Dry bean production—principles and practices. East Lansing, Michigan State University. Cooperative Extension Service. Agricultural Experiment Station. Extension Bulletin E-1251. pp.1-15. Engl., 32 Refs., Illus.

Phaseolus vulgaris. History. Seed production. Processing. Uses. Agricultural projects. USA.

The development of the bean industry in Michigan (USA) is reviewed. Aspects of seed production, storage, marketing, processing, and utilization along with associated research, educational, and promotional programs are included. The bases of this development pre and post World War II are given. Developments in the bean industry due to research and extension programs of the Michigan State U. are summarized. The individuals behind these developments are mentioned and the activities discussed are divided into specific time periods (1892-1906, 1907-22, 1923-38, 1939-47, 1948-59, 1960-present). (Summary by EDITEC. Trans. by L.M.F.) J00

0593

19482 CALDERON C., W. 1982. Investigación de mercado de fríjol zona del Valle del Cauca - Colombia. (Market survey of beans in the area of Valle del Cauca, Colombia). Centro Colombiano de Estudios Profesionales. Escuela de Administración y Finanzas. 34p. Span., Sum. Span., 21 Refs., Illus.

Phaseolus vulgaris. Marketing. Prices. Production. Storage. Colombia.

Factors affecting bean consumption in Valle del Cauca, Colombia, are analyzed. The survey covers the period from 1978 to 1980 and protein deficiency was found principally in low-income groups. Cultural and educational factors and prices are decisive in the regular consumption of beans. The continuous raise of product prices is due to product handling by middlemen. Marketing problems and bean storage are discussed. (Author's summary. Trans. by L.M.F.) J00

0594

18709 KAGEYAMA, A.A.; ROMAO, D.A.; WAGNER NETO, J.A.; SILVA, J.G. DA; WANDERLEY, M. DE N.B. 1982. Diferenciación campesina y cambio tecnológico: el caso de los productores de fríjol en Sao Paulo. (Farmer differentiation and technological change: the case of bean growers in Sao Paulo). Campinas-SP, Brasil, Universidade Estadual de Campinas. v.1, 348p.; v.2, 306p. Span., 17 Refs., Illus.

200

Phaseolus vulgaris. Technology evaluation. Cultivation. Economics. Development. Production. Costs. Prices. Income. Marketing. Brazil.

On the basis of an extensive historical analysis of the policies and technological changes in the macro agricultural production in Brazil and micro production in Sao Paulo (municipalities of Barao de Antonina, Itabara, Itapeva, Itaperanga, Itavare, and Riversul), a cross section survey methodology was applied to study the technological change in bean production as of the 1970's and its effects on farmer differentiation in the region. At a macro level, the change resulted from the governmental response to a deficiency in grain supply in Brazil. This bean producing region was promoted by facilitating credit, min. price levels, farm insurance, research, and technical assistance. At a micro level, the production scale increased by expanding the area planted to bean. Production using animal traction was shifted to mechanized production. Most of the bean produced is currently destined for commercialization and the use of wage-earning labor increased as well as bean productivity. (Summary by EDITEC. Trans. by L.M.F.) J00

0595

19009 KUGIZAKI, Y. 1982. Anâlise economica dos sistemas de producao de milho e feijao no Espírito Santo. (Economic analysis of maize and bean production systems in Espírito Santo). Cariacica-ES, Brasil, Empresa Capixaba de Pesquisa Agropecuária. Comunicado Técnico no.5. 14p. Port., 9 Refs., Illus.

Phaseolus vulgaris. Technology evaluation. Intercropping. Zea mays. Costs. Storage. Yields. Seed. Fertilizers. Land preparation. Pest control. Brazil.

An economic analysis was made of maize and bean production systems (pure stands and associated cropping) in the state of Espírito Santo, Brazil. Costs were estimated using technical coefficients for each one of the inputs (seeds and fertilizers) and cultural practices required (pest control, land preparation, transportation, and storage). Two types of technology are described, one for farmers and one for researchers, as well as 2 types of production systems in monoculture. Yields of beans in monoculture using the recommended technique were estimated at 1200 and 700 kg/ha for the 2 systems. Regarding bean/maize intercropping, comparisons could not be made due to the lack of information on the technologies used by the farmers. In both bean and maize cultivation, the 1st production system is less efficient than the 2nd since it uses an excessive amount of modern agricultural inputs making it more expensive. The use of these inputs should be reviewed in research on these 2 crops. (Summary by EDITEC. Trans. by L.M.F.) J00

0596

18730 PACHICO, D. 1982. La estructura del mercado mundial del poroto: implicaciones para los países de América Latina y la República Argentina. (The structure of the world bean market: implications for Latin American countries and Argentina). Avance Agroindustrial 3(9): 13-21,23. Span., Illus.

Phaseolus vulgaris. Trade. Production. Costs. Latin America. Argentina.

Important features of world legume trade are discussed, emphasizing bean. World production and trade during the 1960's and 70's are analyzed and the bean trade standards in major regions of the world are described. Bean markets in West European countries and import demand in Latin America, the Near East, and SubSaharan Africa are analyzed. Implications of the world

situation of bean trade in Argentina are also discussed. The increase in demand for beans is slight in world markets. To compete for world markets bean production has to be highly efficient and costs should be minimized. A continued investment in market surveys is required. (Summary by EDITEC. Trans. by L.M.F.) J00

0597

18059 SCHLUTER, V. 1982. Perspective: bean consumption in East & West Europe. Michigan Dry Bean Digest 6(4):7,28. Engl.

Phaseolus vulgaris. Marketing. Production. Prices. Trade. Europe.

Bean market tendencies in the EEC and Eastern Europe as of 1980 are analyzed on the basis of price levels, interest rates, and exportable surplus of bean producing countries. The EEC imported 260,000 MT of beans in 1980; the Netherlands, Italy, France, Belgium/ Luxemburg, West Germany, Denmark, UK and Ireland imported 54, 35, 42, 16, 17, 0.15, and 94.6 thousand tons, resp. Excluding UK and Ireland, EEC countries imported 164, 206, and 186 thousand tons in 1980, 1979, and 1978, resp. Main suppliers have remained stable: Argentina 39% of the market, USA 29%, Ethiopia 10.4%, Canada 3.9%, Chile 1.7%, and Turkey 3.4%. Nontraditional producers of bean have the possibility to sell into the continental EEC market if an attractive price differential is offered and if they fulfill min. requirements for quality. (Summary by EDITEC. Trans. by L.M.F.) J00

0598

18568 WRIGHT, K.T. 1978. Production trends: world, U.S. and Michigan. In Robertson, L.S.; Frazier, R.D., eds. Dry bean production—principles and practices. East Lansing, Michigan State University. Cooperative Extension Service. Agricultural Experiment Station. Extension Bulletin E-1251. pp.16-30. Engl., Illus.

Phaseolus vulgaris. Production. USA.

Trends in acreage, yield, and production of beans in the world, leading bean producing countries (including the USA), leading bean producing states in the USA (including Michigan), and leading counties in Michigan are analyzed. Generally, the data are presented for 5-yr periods from 1950, with annual data from 1970 to 1975-76. World production of beans during 1970-74 was 71% above that of 1950-54, Brazil and Mexico being mainly responsible for the increase. Production in the USA during 1970-74 was somewhat less than during 1960-64, but about 10% above 1950-54. Brazil, Mexico, USA, Yugoslavia, and Turkey are leading bean producing countries, producing 3/4 of the world production. In the USA navy bean accounts for about 1/3 of the total production, pinto bean about 1/4, and great northern 10%. Michigan produced 40% of the total national production in 1960-64, averaging 35% in 1970-74 and 26% in 1975. (Summary by EDITEC. Trans. by L.M.F.) J00

See also 0479

L00 GRAIN STORAGE

0599

18707 TEIXEIRA, L.B. 1980. Secador solar: alternativa para secagem de alimentos. (Solar dryer: an alternative for drying food). Manaus-AM, Brasil, Empresa Brasileira de Pesquisa Agropecuária. Unidade de Execucao

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de Pesquisa de Ambito Estadual de Manaus. Comunicado Técnico no.8. 5p. Port., Illus.

Phaseolus vulgaris. Seed. Drying. Water content. Brazil.

Technical specifications and illustrations of a solar dryer that can be built by farmers in humid tropical climate zones, such as the state of Amazonas, Brazil, are given. The dryer uses solar radiation and natural ventilation. The dryer is apt for beans, among other crops. In bean, maize, and rice trials it was found that grain MC can be reduced from 20-25% to 11-14% over a period of 48-72 h, obtaining a product that is adequate for storage and commercialization. (Summary by EDITEC. Trans. by L.M.F.) L00

L01 Stored Grain Pests

0600

18754 THIERY, D. 1982. Influence de la teneur en eau et de la dureté du tégument des graines de Phaseolus vulgaris sur la fréquence de pénétration des larves néonates d'Acanthoscelides obtectus. (Influence of water content and hardness of the testa of Phaseolus vulgaris seeds on the penetration frequency of neonate larvae of Acanthoscelides obtectus). Entomologia Experimentalis et Applicata 32(2):141-145. Fr., Sum. Fr., Engl., 17 Refs., Illus.

Phaseolus vulgaris. Seed. Acanthoscelides obtectus. Water content. Seed characters. Seed coat.

Neonate larvae of the bruchid Acanthoscelides obtectus have to pierce the testa of seeds of Phaseolus vulgaris in order to develop in the cotyledons. The testa is an important mechanical and chemical barrier to larval penetration. The hardness of the testa was shown to be important in resisting larval penetration by varying its water content and thus its hardness. Seed age was also found to influence larval penetration, regardless of the water content of the testa. (Author's summary) L01

See also 0533

LIST OF ABBREVIATIONS

A	Angstrom(s)
ABA	Abscisic acid
ac	Acre(s)
Afr.	Afrikaans
a.i.	Active ingredient
alt.	Altitude
CAMD	Cassava African mosaic disease
CAMV	Cassava African mosaic virus
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)
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
i.e.	That is
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) (only in combination with no.)
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)

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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	Pexoxyacetic 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
RGRs	Relative growth rate
RH	Relative humidity
RNA	Ribonucleic acid
Rom.	Romanian
Russ.	Russian
S	Svedberg unit of sedimentation coeff. (10^{-13} S)
s	Second
$S_{20,w}$	Sedimentation coefficient corrected to water at 20°C
SBM	Soybean meal
SCN	Thiocyanate
SCP	Single cell protein
SDS	Sodium dodecyl sulfate
Sk.	Slovak
sp.	Specie
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)
α	alpha
β	beta
γ	gamma
δ	delta
ϵ	epsilon
λ	lambda
π	pi
ψ	psi
/	Per
μ	Micro
%	percent(age)
>	More than, greater than
<	Less than
$\leq$	Equal to or less than
$\geq$	Equal to or greater than
$\pm$	Plus or minus
ϕ	Diameter
$\ll$	Much less than
$\gg$	Much greater than

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SANDSTED, R.F.
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SANTOS, A.F. DOS
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SANTOS, J.U. DOS
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SHATTA, H.A.
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SHEN, Z-Y.
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SOTO, J.J.
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TAMAYO M., P.J.
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TAYLOR, J.D.
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TEASDALE, J.R.
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THURSTUN, M.D.
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0277 0282 0290 0291 0292 0480
DISEASES AND PATHOGENS
0437
GERMPLASM
0437
INJURIOUS INSECTS
0266 0403
MARKETING
0068 0267
PRODUCTION
0068
SEED PRODUCTION
0298

LAND PREPARATION
0086 0089 0286 0470 0595

LATIN AMERICA
DISEASES AND PATHOGENS
0488
MARKETING
0596
PRODUCTION
0596

LEAF AREA
0035 0055 0131 0206 0209 0245 0257
0260 0333 0446

LEAVES
0002 0003 0007 0009 0011 0012 0014
0015 0017 0018 0019 0020 0027 0032
0035 0039 0043 0054 0055 0057 0206
0209 0215 0217 0218 0225 0227 0260
0271 0274 0325 0327 0328 0329 0407
0410 0413 0414 0416 0417 0418 0427
0434 0435 0443 0449 0528 0564
DISEASES AND PATHOGENS
0126 0131 0226 0306 0316 0503 0506
0520
INJURIOUS INSECTS
0333
MINERALS AND NUTRIENTS
0022 0047 0077 0078 0245 0415 0446
0452 0529

LEPIDOPTERA
0163 0333 0339 0342 0343
INSECT CONTROL
0150 0266 0332

LIGHT
0013 0205 0207 0416
GROWTH
0206 0223
PHOTOPERIOD
0520

LYSINE
0181

MACROPHOMINA PHASEOLI
0085
DISEASE CONTROL
0305
CHEMICAL CONTROL
0318
INOCULATION
0501
SYMPTOMATOLOGY
0305

MAGNESIUM
0428 0446 0458
PLANT ASSIMILATION
0419

MALAWI
0239 0245 0289 0460

MANGANESE
0026 0030 0050 0052 0056 0069 0210
0216 0250 0421 0423

MANURES
0071 0073 0257 0437 0453 0459

MARKETING
0063 0066 0068 0194 0195 0267 0360
0388 0390 0393 0394 0397 0398 0399
0593 0594 0596 0597

MATURATION
0017 0020 0038 0164 0433 0436 0439
0538

MECHANICAL DAMAGE
0485

MECHANIZATION
0086 0430 0483

MELOIDOGYNE INCOGNITA
0323
RESISTANCE
0143 0524

METABOLISM
0026 0210 0216 0218 0222 0223 0271
0415 0429

METHIONINE
0181 0357 0377 0580

MEXICO
0062 0098 0102 0152 0185 0193 0257
0359 0459 0478 0533 0544 0546 0547
DISEASES AND PATHOGENS
0116 0170 0518 0545
GERMPLASM
0545
INJURIOUS INSECTS
0170 0518

MICRONUTRIENTS
0030 0069 0211 0243 0423 0425 0458

MINERAL CONTENT
0050 0052 0056 0080 0213 0216 0220
0236 0250 0326 0379 0384 0420 0421
0422 0424 0440 0453 0581
LEAVES
0022 0047 0057 0077 0078 0209 0435
0446 0452 0529
SEED
0022 0241
STEMS
0022 0478

MINERAL DEFICIENCIES
0024 0028 0030 0209 0212 0219 0240
0241 0423 0447

MINERALS AND NUTRIENTS
0181 0213 0220

235

ALUMINIUM
0254
BORON
0050 0052 0458
CALCIUM
0029 0099 0253 0419 0420 0446
COPPER
0050 0052 0425 0458
IRON
0026 0028 0056 0216 0219 0240 0447
0459
MAGNESIUM
0419 0446 0458
MANGANESE
0026 0050 0052 0056 0210 0216 0250
0421 0423
MOLYBDENUM
0022 0211 0458
NITROGEN
0024 0026 0047 0070 0071 0074 0076
0077 0078 0095 0097 0185 0188 0219
0234 0245 0250 0251 0258 0270 0272
0334 0415 0423 0440 0442 0446 0454
0456 0458 0459 0476 0478 0483 0591
PHOSPHORUS
0024 0025 0026 0070 0071 0074 0077
0078 0089 0095 0097 0099 0188 0211
0250 0251 0252 0254 0258 0270 0272
0423 0440 0446 0452 0454 0457 0458
0459 0476 0479 0483
POTASSIUM
0024 0071 0074 0078 0250 0258 0419
0423 0446 0458
SULFUR
0034 0241 0242 0250 0252 0423 0446
0447 0529
ZINC
0050 0052 0250 0423 0425 0458 0459

MITOCHONDRIA
0043

MOLYBDENUM
0022 0069 0211 0458

MORPHOGENESIS
0011 0227 0407

MULCHING
0089 0468 0468 0500 0535

MUTATION
0171 0347

MYCOSES
0006 0104 0107 0108 0114 0115 0119
0123 0124 0125 0127 0128 0130 0170
0172 0174 0179 0265 0273 0300 0301
0302 0303 0304 0305 0309 0311 0312
0317 0318 0344 0350 0358 0366 0475
0495 0496 0497 0498 0500 0504 0505
0508 0509 0511 0512 0515 0555 0556
0557 0568 0572
EPIDEMIOLOGY
0120 0307 0502 0503 0513 0514
INOCULATION
0109 0110 0111 0112 0113 0116 0117
0121 0122 0310 0314 0501 0506 0507
0510 0563 0573
ISOLATION
0116 0126 0313 0315 0494 0499 0501
0573
LEAVES
0126 0226 0316 0503 0506
SEED
0299 0355 0437
SEEDLINGS
0085
ROOTS
0110
TEMPERATURE
0118 0262 0503

NEMATODES
0142 0143 0144 0150 0323 0524
NEMATODE CONTROL
0525

NICARAGUA
0088 0089 0097 0287 0300

NITROGEN
0026 0047 0049 0096 0234 0304 0415
0478
FERTILIZER
0070 0071 0074 0076 0077 0078 0095
0097 0185 0188 0193 0245 0250 0251
0257 0258 0270 0272 0277 0423 0440
0442 0446 0453 0454 0456 0458 0459
0476 0483 0591
MINERAL DEFICIENCIES
0024 0212 0219 0423
NUTRIENT ABSORPTION
0023 0212 0422
PLANT ASSIMILATION
0023 0076 0212 0422
PROTEIN CONTENT
0453

NITROGEN FIXATION
0070 0076 0096 0175 0183 0184 0186
0187 0189 0190 0346 0383 0384 0387
0422 0474 0590 0591

NITROGEN-FIXING BACTERIA
0252

NODULATION
0183 0184 0187 0189 0193 0323 0346
0382 0385 0386 0387 0587 0590
HERBICIDES
0383
MINERALES AND NUTRIENTS
0022
NITROGEN
0070 0076 0185 0384
PHOSPHORUS
0070

NUCLEIC ACID
0411
DNA
0055 0139 0368 0521
RNA
0055 0133 0224 0228 0324 0368 0426
0516

NUTRIENT ABSORPTION
0022 0023 0025 0028 0029 0212 0213
0220 0241 0242 0260 0420 0422 0452

NUTRIENT SOLUTION
0011 0024 0025 0026 0029 0030 0042
0050 0052 0056 0187 0210 0219 0240
0409 0413 0418 0421 0435

NUTRIENT TRANSPORT
0409 0410 0420 0457

NUTRITIONAL REQUIREMENTS
0069 0070 0071 0073 0074 0077 0078
0089 0095 0097 0099 0185 0188 0193
0241 0242 0243 0245 0250 0251 0252
0257 0258 0260 0261 0265 0270 0272
0277 0423 0437 0440 0442 0446 0447
0452 0453 0454 0456 0457 0458 0459
0476 0479 0483 0513 0591

NUTRITIVE VALUE
0180 0375 0377 0380 0453 0580 0581
0583 0585

ORNITHINE
0037

OSMOTIC POTENTIAL
0440

OSMOTIC PRESSURE
0444

OZONE
AIR POLLUTION
0145 0146 0148 0528
HOST-PLANT RESISTANCE
0329 0331 0558 0564
PLANT INJURIES
0057 0145 0146 0148 0326 0328 0329
0331 0527 0564

PALATABILITY
0380

PERU
0258 0524 0525 0531
INJURIOUS INSECTS
0530
INJURIOUS MITES
0530

PH
0029 0070 0075 0080 0111 0214 0219
0240 0330 0588
AGRICULTURAL LIME
0250

PHASEOLLINS
0013 0349
ANALYSIS
0432

PHASEOLUS ACUTIFOLIUS
0168

PHASEOLUS COCCINEUS
0168 0356 0385 0567 0574 0576

PHASEOLUS LUNATUS
0166 0168 0562

PHENOLIC CONTENT
0010 0053 0110 0583
SEED
0233 0237

PHOSPHORUS
0070 0071 0074 0077 0078 0089 0095
0097 0099 0188 0211 0250 0251 0252
0254 0257 0258 0270 0272 0277 0428
0437 0440 0446 0454 0457 0458 0459
0476 0479 0483
MINERAL DEFICIENCIES
0024 0029 0423
NUTRIENT ABSORPTION
0025 0029 0260 0452
PLANT ASSIMILATION
0025 0028 0260 0452

PHOTOPERIOD
0025 0151 0352 0417 0439 0520
GROWTH
0427

PHOTOSYNTHESIS
0014 0018 0031 0186 0207 0209 0210
0223 0225 0253 0324 0325 0408 0415
0451

PHYTOALEXINS
0013 0110 0310 0316 0349 0432 0492

PHYTOHEMAGGLUTININS
0371 0578

PLANT ANATOMY
0001 0002 0004 0005 0006 0021 0137
0202 0203 0206 0406 0407 0421 0449
0553

PLANT ASSIMILATION
0022 0023 0025 0027 0028 0029 0076
0212 0213 0214 0215 0216 0220 0242
0260 0411 0417 0419 0420 0422 0424
0425 0452 0528

PLANT BREEDING
0167 0302 0344 0361 0553 0567
BACKCROSSING
0175 0348 0356 0498 0549
CROSSBREEDING
0169 0178 0347 0348 0350 0356 0498
0549
HYBRIDIZING
0166 0168 0169 0356 0385 0570
MUTATION
0171 0347
SELECTION
0350 0357 0560 0570 0572

PLANT DEVELOPMENT
0011 0017 0020 0026 0031 0035 0036
0038 0041 0042 0050 0052 0076 0156
0164 0185 0187 0206 0208 0210 0216
0222 0223 0225 0227 0248 0249 0274
0318 0323 0326 0331 0407 0427 0428
0433 0436 0439 0444 0446 0449 0451
0455 0458 0474 0482 0538 0587

PLANT FERTILITY
0016 0567 0574

PLANT - GROWTH SUBSTANCES
0011 0032 0035 0036 0039 0040 0041
0050 0052 0059 0205 0208 0221 0224
0225 0229 0271 0411 0412 0426 0429
0527

PLANT HABIT
0023 0033 0084 0091 0092 0100 0166
0173 0176 0178 0232 0275 0293 0294
0363 0365 0405 0407 0411 0419 0420
0439 0461 0477 0573 0573

231

PLANT INJURIES
0057 0125 0137 0156 0159 0226 0328
0329 0333 0338 0340 0511 0522 0527
0536 0538 0564
AIR POLLUTION
0145 0146 0147 0148
HERBICIDES
0462 0471 0473
TEMPERATURE
0145 0306 0526
TOXICITY
0326 0334
WATER STRESS
0331

PLANT NUTRITION
0415 0423

PLANT PHYSIOLOGICAL DISORDERS
0026 0050 0052 0145 0146 0147 0148
0324 0325 0326 0329 0330 0331 0526
0527 0528 0529 0564

PLANT PHYSIOLOGICAL PROCESSES
0008 0009 0012 0015 0021 0222 0224
0228 0241 0326 0327 0413 0414 0416
0427 0444 0529
ABSCISSION
0017 0020 0221 0253 0429
NUTRIENT TRANSPORT
0409 0410 0420 0452
PHOTOSYNTHESIS
0014 0018 0031 0186 0207 0209 0223
0225 0253 0324 0325 0408 0415 0451
PLANT ASSIMILATION
0022 0023 0025 0027 0029 0076 0213
0214 0215 0218 0220 0242 0260 0411
0417 0419 0420 0422 0424 0425 0452
0528
PLANT RESPIRATION
0031 0223 0324 0328

PLANT PIGMENTS
0009 0012 0015 0018 0035 0038 0055
0131 0209 0210 0216 0308 0418 0427
0435 0449

PLANT REPRODUCTION
0050 0169 0567 0570

PLANT RESPIRATION
0031 0223 0324 0328

PLANT TISSUES
0002 0011 0019 0041 0406 0421
DISEASES AND PATHOGENS
0006 0053 0496
ENZYMES
0017 0021 0051 0496

PLANT TOXINS
0312

PLANTING
0069 0085 0092 0103 0246 0270 0279
0280 0283 0290 0311 0367 0469 0476
0484 0544 0566
AGRICULTURAL EQUIPMENT
0475 0483
SPACING
0001 0084 0097 0123 0265 0277 0292
0459 0480 0483 0508

PODDING
0034 0037 0038 0072 0248

PODS
0014 0152 0253 0261 0278

POLLEN
0016 0347

POLLINATION
0169 0567

POLYPHAGOTARSONEMUS LATUS
0339

POTASSIUM
0057 0071 0074 0078 0217 0250 0257
0258 0261 0428 0446 0458
MINERAL DEFICIENCIES
0024 0209 0423
PLANT ASSIMILATION
0419

PREDATORS
0160 0163 0335

PRICES
0195 0388 0389 0391 0393 0593 0594
0597

PROCESSING
0200 0201 0370 0374 0430 0541 0592

PRODUCTION
0063 0065 0068 0194 0195 0388 0389
0390 0391 0393 0394 0593 0594 0596
0597 0598

PROTEIN CONTENT
0035 0080 0210 0236 0379 0434 0435
0453 0577 0581 0582 0583
SEED
0357 0430 0436 0575

PROTEINS
0049 0055 0226 0324 0426 0585
AMINO ACIDS
0060 0181 0377 0580
ANALYSIS
0045 0048 0058 0061 0133 0228 0229
0232 0368 0432
DIGESTIBILITY
0375 0377 0582 0584

PSEUDOMONAS PHASEOLICOLA
0308 0490
DISEASE CONTROL
0303 0305 0307
DISEASE TRANSMISSION
0307
EPIDEMIOLOGY
0307
ETIOLOGY
0303 0307
INOCULATION
0491
RESISTANCE
0350 0437 0545 0576
SYMPTOMATOLOGY
0302 0303 0305 0307 0491

PSEUDOMONAS SYRINGAE
0306
INOCULATION
0489 0491
SYMPTOMATOLOGY
0489 0491

PUERTO RICO
DISEASES AND PATHOGENS
0114 0119

PYTHIUM ULTIMUM
0124 0504
INOCULATION
0109

RADIATION
0224

RHIZOBIUM
0070 0346 0383 0385
INOCULATION
0071 0076 0184 0185 0187 0188 0189
0191 0192 0193 0265 0323 0384 0386
0387 0422 0587 0589 0590 0591
STRAINS
0184 0188 0192 0382 0384 0386 0387
0587 0588

RHIZOBIUM LEGUMINOSARUM
INOCULATION
0587
NODULATION
0587
STRAINS
0587

RHIZOBIUM PHASEOLI
INOCULATION
0184 0185 0187 0189 0191 0192 0386
0387 0422 0586 0587 0589 0590 0591
NODULATION
0184 0185 0187 0189 0346 0382 0383
0385 0386 0387 0587 0590
STRAINS
0184 0192 0382 0386 0387 0587 0588

RHIZOCTONIA SOLANI
0006 0126 0317 0496 0504 0512
DISEASE CONTROL
0123 0307 0311
CHEMICAL CONTROL
0128 0495 0500
INTEGRATED CONTROL
0170
DISEASE TRANSMISSION
0500
ETIOLOGY
0303 0499 0511
INOCULATION
0111 0121 0501
RESISTANCE
0170 0366
SYMPTOMATOLOGY
0104 0303 0511

RHIZOSPHERE
0589

RNA
0055 0131 0224 0228 0324 0368 0426
0516

ROOTING
0073 0222 0406 0426

ROOTS
0001 0011 0022 0043 0025 0056 0110
0183 0203 0206 0212 0214 0222 0224
0328 0406 0409 0478

ROTATIONAL CROPS
0288

RWANDA
MARKETING
0063
PRODUCTION
0063
SEED PRODUCTION
0063

SALINITY
0217 0413 0418
GROWTH
0444
PLANT DEVELOPMENT
0444
TEMPERATURE
0444

SCLEROTIUM ROLFSII
0300
DISEASE CONTROL
0303 0497
ETIOLOGY
0303
INOCULATION
0501
RESISTANCE
0497
SYMPTOMATOLOGY
0303

SEED
0044 0045 0046 0081 0171 0230 0238
0278 0297 0354 0355 0365 0368 0431
0485 0548 0578 0578 0599
AMINO ACIDS
0357 0430
DISEASES AND PATHOGENS
0105 0106 0437 0487
GENETICS
0229 0551 0574
GERMINATION
0040 0101 0142 0234 0299 0448 0487
INJURIOUS INSECTS
0161 0538 0540 0600
MARKETING
0397
PROTEIN CONTENT
0357 0430 0436 0575
STORAGE
0233 0234 0237 0402 0595
YIELDS
0100 0241 0357 0551 0575 0595

SEED CHARACTERS
0046 0081 0103 0230 0233 0234 0237
0273 0299 0351 0355 0365 0485 0487
0600
SEEED COLOR
0100 0548 0551

SEED COAT
0182 0381 0600

239

INHERITANCE
0548 0551

SEED COLOR
0100 0538 0548 0551

SEED PRODUCTION
0063 0065 0066 0086 0099 0100 0101
0124 0298 0394 0458 0486 0487 0592

SEED TREATMENT
0111 0142 0265 0381 0404

SEEDS
0004 0037 0059 0168 0182 0381 0428

SELECTION
0122 0146 0164 0174 0270 0276 0342
0343 0345 0349 0354 0362 0363 0364
0437 0524 0538 0543 0546 0547 0550
0555 0556 0558 0563 0565 0566 0568
0571 0575 0576
PLANT BREEDING
0350 0357 0560 0570 0572

SHOOTS
0034 0036

SNAP BEANS
0014 0028 0029 0125 0126 0148 0163
0178 0189 0215 0229 0230 0253 0261
0268 0273 0283 0298 0305 0306 0310
0314 0318 0323 0330 0339 0342 0343
0348 0349 0354 0355 0362 0366 0367
0370 0373 0373 0380 0403 0426 0431
0436 0472 0473 0494 0515 0551 0579
0589 0591

SODIUM
0217

SOIL ANALYSIS
0070

SOIL CONSERVATION PRACTICES
0255 0286 0438

SOIL FERTILITY
0070 0457 0478

SOIL REQUIREMENTS
0070 0246 0256 0259 0438 0457 0466

SOIL TEMPERATURE
0259 0262

SOIL WATER
OSMOTIC PRESSURE
0444

SOILS
0424

SOLAR RADIATION
0003 0259

SOLUBLE CARBOHYDRATES
0222 0376

SPACING
0001 0081 0265 0275 0359 0437 0483
YIELDS
0084 0091 0097 0098 0123 0253 0272
0277 0285 0292 0294 0296 0442 0459
0464 0474 0480 0508

STARCH CONTENT
0435

STATISCAL ANALYSIS
0008 0074 0079 0088 0094 0200 0201
0389 0400 0479

STEMS
0005
MINERALS AND NUTRIENTS
0022 0478
NUTRIENT ABSORPTION
0022

STOMATA
0007 0325 0329 0413 0414 0444 0449

STORAGE
0063 0068 0197 0234 0237 0378 0381
0388 0390 0402 0593 0595
TEMPERATURE
0233 0579

STORED GRAIN PESTS
0152 0161 0162 0197 0198 0199 0273
0364 0403 0404 0533

SUCROSE
0215 0218 0236 0238

SUGARS
0057 0060 0061 0212 0236 0238 0428

SULFUR
0034 0241 0242 0250 0252 0423 0446
0447 0529

SYMBIOSIS
0186 0190 0191
NODULATION
0184 0187 0189 0193 0346 0382 0383
0386 0387 0590
MINERALS AND NUTRIENTS
0022 0070 0185 0384
PHOSPHORUS
0070

TANZANIA
0191 0252 0354 0371 0438
DISEASES AND PATHOGENS
0273 0314 0563
GERMPLASM
0355
MARKETING
0066 0399
SEED PRODUCTION
0066

TECHNOLOGICAL PACKAGE
0088 0097 0196 0239 0282

TECHNOLOGY EVALUATION
0088 0279 0293 0395 0396 0552 0569
0571 0594 0595

TEMPERATURE
0019 0049 0080 0118 0183 0189 0201
0201 0233 0259 0262 0352 0417 0430
0443 0448 0503 0520 0579

GROWTH
0427 0446 0449 0587
PLANT INJURIES
0145 0306 0526
YIELDS
0177 0439 0441 0444 0546 0547 0551

THYSANOPTERA
0151 0159 0339

TIMING
0069 0092 0123 0265 0276 0280 0367
0427 0436 0469 0484 0544 0566

TISSUE CULTURE
0011 0035 0041 0228 0406 0428

TOBACCO MOSAIC VIRUS
INOCULATION
0138 0520
RESISTANCE
0138 0520

TOXICITY
0112 0326 0334 0433
HERBICIDES
0281 0324 0463
MINERALS AND NUTRIENTS
0026 0050 0052 0210 0216 0254 0419
0421

TRADE
0065 0068 0195 0388 0390 0394 0397
0398 0399 0596 0597

TRANSLOCATION
0014 0029 0409 0410

TRANSPIRATION
0204 0325 0327 0444

TRYPTOPHANE
0181 0235

UGANDA
0191 0275 0351
DISEASES AND PATHOGENS
0065 0276 0301 0302
MARKETING
0393
PRODUCTION
0065 0393
SEED PRODUCTION
0065

UREA
FERTILIZERS
0251

UROMYCES PHASEOLI
0115 0300
DISEASE CONTROL
0273 0303 0305 0307 0309 0310
CHEMICAL CONTROL
0505
DISEASE TRANSMISSION
0307
EPIDEMIOLOGY
0307 0503
ETIOLOGY
0273 0301 0303 0307 0309 0310
INOCULATION
0112 0310 0563
RESISTANCE
0174 0179 0301 0355 0358 0437 0555
0556 0557 0563 0568
SYMPTOMATOLOGY
0104 0273 0301 0302 0303 0304 0305
0307 0309

USA
0001 0048 0084 0145 0153 0168 0259
0278 0283 0288 0299 0402 0423 0433
0445 0466 0470 0581
DISEASES AND PATHOGENS
0105 0150 0307 0344 0504 0541
INJURIOUS INSECTS
0149 0150 0340
MARKETING
0388
PRODUCTION
0388 0598
SEED PRODUCTION
0592

VECTORS
0517 0518

VIROSES
0013 0053 0104 0129 0130 0131 0132
0133 0134 0135 0136 0137 0138 0139
0140 0141 0170 0226 0299 0302 0303
0304 0305 0307 0319 0320 0321 0322
0341 0344 0350 0437 0487 0516 0517
0518 0519 0520 0521 0522 0523 0542
0543 0554 0559 0576

VITAMIN CONTENT
0236 0581

VITAMIN DEFICIENCIES
0181

WATER ABSORPTION
0206

WATER CONTENT
0046 0049 0233 0234 0278 0326 0402
0430 0487 0599 0600

WATER REQUIREMENTS (PLANT)
0008 0075 0080 0239 0244 0259 0440
0444 0445 0450

WATER STRESS
0067 0073 0079 0248 0249 0331 0434
0451 0455

WEEDING
0082 0083 0084 0089 0258 0264 0269
0281 0283 0291 0324 0367 0437 0460
0462 0463 0465 0466 0467 0471 0472
0473

WEEDS
HERBICIDES
0269

WHETZELINIA SCLEROTIORUM
0262
DISEASE CONTROL
0303 0305 0307
CHEMICAL CONTROL
0502 0515
DISEASE TRANSMISSION
0307

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EPIDEMIOLOGY
0307 0502
ETIOLOGY
0301 0303 0307
RESISTANCE
0172 0301
SYMPTOMATOLOGY
0301 0303 0305 0307 0502

XANTHOMONAS PHASEOLI
0299 0300
DISEASE CONTROL
0303 0305 0307
DISEASE TRANSMISSION
0307
EPIDEMIOLOGY
0307
ETIOLOGY
0301 0303 0307
INOCULATION
0106 0491 0492 0493
RESISTANCE
0166 0174 0301 0492 0493 0545 0550
SYMPTOMATOLOGY
0106 0301 0303 0304 0305 0307 0491
0493

XANTHOMONAS PHASEOLI VAR FUSCANS
DISEASE CONTROL
0307
DISEASE TRANSMISSION
0307
EPIDEMIOLOGY
0307
ETIOLOGY
0307
INOCULATION
0491
SYMPTOMATOLOGY
0307 0491

YIELD COMPONENTS
0124 0245 0257 0405 0456 0565

ZABROTES SUBFASCIATUS
0152 0404
CHEMICAL CONTROL
0198
RESISTANCE
0364

ZEA MAYS
INTERCROPPING
0090 0091 0093 0096 0097 0098 0246
0269 0285 0290 0291 0292 0293 0294
0296 0345 0363 0400 0437 0442 0475
0476 0477 0478 0479 0480 0482 0483
0542 0595

ZINC
0030 0050 0052 0069 0250 0423 0425
0458 0459

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