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.

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

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

COMPONENTS OF AN ABSTRACT

Sequential number in the journal (for use of indexes)

Authors

Year of publication

Accession number (for photocopy requests)

16751 ALVAREZ C., L.; VANEGAS G., G.; VICTORIA K., J.I. 0284 1979.
Transmisión por semilla de bacterias fitopatógenas del frijol (*Phaseolus vulgaris* L.) en Colombia. *(Seed transmission of bacterial phytopathogens in beans in Colombia).* Acta Agronómica 29(1/4), 11-20., Span., Sum. Span., Engl., 11 Refs.

Original title

English title

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Language of summary

Additional notes

Phaseolus vulgaris. Xanthomonas phaseoli. **Seeds. Cultivars. Disease transmission. Seed transmission. Statistical analysis. Laboratory experiments. Colombia.**

Descriptors

Three different methods were used to determine the % of bean seed infection by *Xanthomonas phaseoli.* Evaluations were made on 21 samples with an av. seed infection of 19.9, 5.4, and 24.4% as determined by visual analysis of abnormal symptoms on seed coats, the most probable number technique (MPN), and induction of symptoms on bean seedlings, resp. Results obtained with visual analysis presented a highly significant correlation coefficient (0.82) with symptoms produced by *X. phaseoli* on bean seedlings. However, the results obtained by the MPN technique showed a high variation coefficient and low correlation coefficient with the other 2 methods. Best results were obtained by sowing bean seed samples on sterile sandy soil and later incubating 8 day-old seedlings under 100% RH at 26°C for 48 h. *(Author's summary)* E02

Abstract

Abstractor and/or translator

Subject categories

HOW TO USE THE INDEXES

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

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

Author Index

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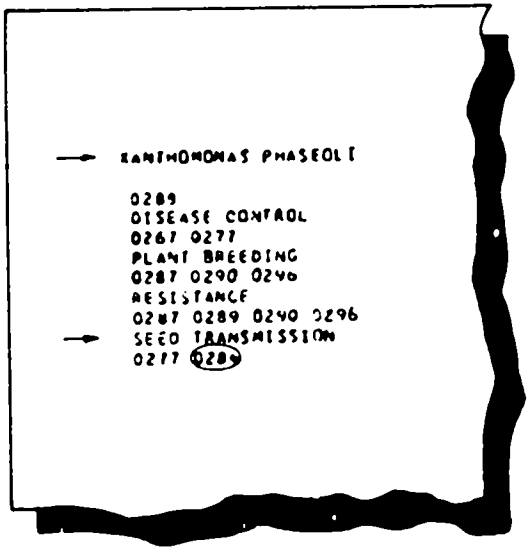

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6. UNESCO coupons, available at UNESCO offices all over the world

B00 PLANT ANATOMY, MORPHOLOGY AND CYTOLOGY

0001

17842 STOFFELLA, P.J.; SANDSTED, R.F.; ZOBEL, R.W.; HYMES, W.L. 1981. **Root morphological characteristics of kidney beans as influenced by within-row spacing.** HortScience 16(4):543-545. Engl., Sum. Engl., 9 Refs.

Phaseolus vulgaris. **Roots. Planting. Spacing. Plant anatomy. USA.**

Root morphological characteristics of plants of kidney bean cv. Redkote and Redkloud were measured during 2 growth stages at 5, 10, 15, and 20 cm within-row spacings under field conditions at the Cornell Agronomy Research Farm, Aurora, NY (USA). Significantly higher total root wt., shoot wt., basal root wt., and stem and hypocotyl Ø of individual plants occurred as within-row spacing increased. Uprooting resistance, taproot wt., and taproot Ø increased as within-row spacing increased up to 15 cm followed by a nonsignificant increase at 20 cm. No differences in adventitious root wt. or shoot:root ratios occurred among within-row spacing treatments. Redkote root parameters were significantly higher than those of Redkloud, with the exception of adventitious root wt. and uprooting resistance. Seed yields were highest for 15 cm spacing although not significantly more than at 5 cm spacing. All parameters with the exception of basal root no. were significantly lower during anthesis when compared with full pod fill growth stage. *(Author's summary)* B00

0002

17812 SWIECKI, T.J.; ENDRESS, A.G.; TAYLOR, O.C. 1982. **Histological effects of aqueous acids and gaseous hydrogen chloride on bean leaves.** American Journal of Botany 69(1):141-149. Engl., Sum. Engl., 32 Refs., Illus.

Phaseolus vulgaris. **Leaves. Air pollution. Plant tissues.**

Primary leaves of pinto beans, 9 or 12 days from sowing, were exposed to aqueous acids, chloride salts, or hydrogen chloride gas. Leaves were examined for the presence and severity of resultant visible injury and sampled for light and scanning electron microscopy. Exposure to 0.06 N HCl, HNO_3, H_2SO_4, or 14.5-19.0 mg/m³ gaseous HCl for 20 min evoked similar foliar injury including glazing and necrosis of the laminas. This injury appeared to result initially from plasmolysis and collapse of the epidermis and subsequently of the underlying mesophyll. Cellular injury was accompanied by various cytoplasmic alterations. Microscopic symptoms observed in leaves exposed to gaseous HCl or aqueous acids included vesicles and particulates within the larger vacuoles. Similar symptoms were present in leaves exposed to polyethylene glycol 6000. Differential effects included formation of necrotic pits and preferential injury to paravascular tissues in leaves treated with aqueous acids and crystalline chloroplast inclusions in gaseous HCl-treated and water-stressed leaves. The visible and microscopic appearances of leaves exposed to aqueous acids or gaseous HCl were compared and related to injury stemming from acid precipitation and a possible mechanism of action for gaseous HCl phytotoxicity. *(Author's summary)* B00

0003

17401 RAJENDRUDU, G.; DAS, V.S.R. 1981. **Solar tracking and light interception by leaves of some dicot species.** Current Science 50(14):618-620. Engl., Sum. Engl., 5 Refs., Illus.

Phaseolus vulgaris. **Leaves. Solar radiation.**

Leaves of *Dolichos lablab* and *Phaseolus vulgaris* showed diurnal paraheliotropic movements when the leaves remained parallel to the direct sunlight throughout the daytime, those of some other dicotyledonous species showed diaheliotropic movements to keep the leaf perpendicular to the incident sunlight and wheat leaves showed fixed vertical orientation irrespective of the change in the angle of incident sunlight throughout the daytime. *(Summary by Field Crop Abstracts)* B00

0004

17860 MANEN, J.F.; PUSZTAI, A. 1982. **Immunocytochemical localisation of lectins in cells of *Phaseolus vulgaris* L. seeds.** Planta 155(4):329-334. Engl., Sum. Engl., 18 Refs., Illus.

Phaseolus vulgaris. **Seeds. Analysis. Cell structure. Antibodies. Electron microscopy.**

Antibodies against pure E_4- and L_4-lectins from the seeds of *Phaseolus vulgaris*, raised in rabbits, were made monospecific by immunoaffinity chromatography on E_4- or L_4-lectin Sepharose 4B columns. Localization of lectins in bean seeds was investigated by indirect immunofluorescence and by electron microscopy on sections stained with colloidal gold particles coated with monospecific anti-E_4- and anti-L_4-IgG. In parenchyma cells from the cotyledons both E- and L-type lectins were found inside the protein bodies. Apparently the matrix of all protein bodies contained both types of lectins. On the other hand in vascular and in axis cells the 2 types of lectins were localized in the cytoplasm, outside the protein bodies. Thus these findings suggest different roles for the lectins: in cotyledons this may be a specific form of N storage, while in vascular and axis cells lectins may have a more direct metabolic part to play. *(Author's summary)* B00

0005

17869 KAWASE, M. 1981. **Effect of ethylene on aerenchyma development.** American Journal of Botany 68(5):651-658. Engl., Sum. Engl., 15 Refs., Illus.

Phaseolus vulgaris. **Stems. Ethylene. Cytology. Cell structure. Cell walls. Cell division.**

When applied to a part of stem or basal part of stem and root system, 1 ppm ethylene induced lysigenous aerenchyma development in the stem cortex of *Helianthus annuus*, *Lycopersicon esculentum*, and *Phaseolus vulgaris*. Local application of ethylene to a part of stem significantly increased the activity of cellulase in that part of stem in the above 3 species. In kidney beans, ethylene did not change the size or shape of epidermal cells. Intercellular space was rather large even in the control cortex. Ethylene treatment radially enlarged cells and caused cell desintegration in cortex resulting in large intercellular spaces. Advanced plasmolysis is observed in some cells located around the large intercellular spaces of ethylene-treated plants. Some cell wall fragments of the desintegrated cortical cells were seen in the intercellular spaces, suggesting the lysigenous origin of the aerenchyma development. The effects of soil application of 1 ppm ethylene were similar to those of the ethylene-ballon treatment. The cellulase activities in treated stem sections of intact kidney beans significantly increased in response to the local application of 1 ppm ethylene for 4 days. The deficiency of O in waterlogged plants seems to trigger the anaerobic stimulation of ethylene production, which in turn increases the cellulase activity leading to aerenchyma development. *(Author's summary)* B00

0006

18084 STOCKWELL, V.; HANCHEY, P. 1982. **Cytohistochemical techniques for calcium localization and their application to diseased plants.** Plant Physiology 70 (1):244-251. Engl., Sum. Engl., 22 Refs., Illus.

Phaseolus vulgaris. **Plant tissues.** *Rhizoctonia solani.* **Cell walls. Cytology. Analysis.**

After treatment with potassium pyroantimonate during fixation, hypocotyl tissue of *Phaseolus vulgaris* with lesions due to *Rhizoctonia solani* and uninoculated control tissue contained granular deposits in the cell walls. Granules also occurred on the plasma membranes of cells adjacent to lesions and in organelles of damaged cells. Cell walls from healthy 24-day-old plants had a greater granule density than those from 8-day-old plants. The results suggest different mechanisms for lesion delimitation and age-induced resistance. *(Summary by Review of Plant Pathology)* B00

See also 0011 0137

C00 PLANT PHYSIOLOGY

0007

17838 WEBSTER, B.D.; ROSS, R.M.; EVANS, T. 1982. **Nectar and the nectary of *Phaseolus vulgaris* L.** Journal of the American Society for Horticultural Science 107(3):497-503. Engl., Sum. Engl., 47 Refs., Illus.

***Phaseolus vulgaris*. Stomata. Flowers. Composition. Nectar.**

The discoid nectary of *Phaseolus vulgaris* cv. Red Kidney, produces nectar comprised of sugars, amino acids, protein, lipids, reducing acids, phenols, and alkaloids. Nectar is secreted through open stomata located near the inner and outer rims of the shallowly lobed nectary. Closed stomata are present on external and internal flanks of the nectary. Nectar production by this autogamous cv. is anomalous, since such production usually exists to attract pollinators to ensure transfer of germ cells. Honey bees (*Apis mellifera*) and bumblebees (*Bombus vosnesenskii*) which regularly visit the plants for nectar are provided with a highly nutritious resource, apparently at the expense of the plant. Diversion of energy for nectar production thus appears to be an unrewarded expense to this cv. *(Author's summary)* C00

0008

17870 MOJARRO D., F.; PALACIOS V., E. 1979. **Ajuste de las funciones de Jensen-Haise, Horton y Norero para la estimación de la evapotranspiración. *(Agreement of the Jensen-Haise, Horton, and Norero functions for the estimation of evapotranspiration).*** Agrociencia (México) 38:77-87. Span., Sum. Span., Engl., 14 Refs., Illus.

***Phaseolus vulgaris*. Evapotranspiration. Statistical analysis. Water requirements. Plant physiological processes.**

Phaseolus vulgaris cv. Michoacán 12-A-3 was grown in a weighing lysimeter and max. evapotranspiration was measured. These data were compared with those estimated using the Jensen-Haise and Norero formulae. The crop factor Kc was also calculated utilizing the same data as well as Pan A evaporation data for the evaluation of estimated values obtained from Horton's formula. Kc was similar for all the formulae used. *(Summary by Field Crop Abstracts)* C00

0009

18018 JOUY, M. 1982. **Spectra of photoinduced absorbance changes in the irradiated etiolated *Phaseolus vulgaris* leaves after rapid dark spectral shift.** Photosynthetica 16(2):176-179. Engl., Sum. Engl., 11 Refs., Illus.

***Phaseolus vulgaris*. Leaves. Irradiation. Plant pigments. Plant physiological processes. Chlorophyll.**

The $C_{695-693}$ chlorophyllide-protein complex in leaves of bean cv. Commodore is characterized by a much lower fluorescence yield at room temp. than at liquid N temp. This is caused by the performing of some photobiochemical work in the leaf proved by the red radiation-induced absorbance changes which only occur when the leaf contains the $C_{695-693}$ chlorophyllide. Several changes are reversible in the dark. The irreversible absorbance changes are principally caused by the photoreduction of newly synthesized protochlorophyllide. The dark reversible changes are probably provoked by oxidoreductions in electron carrier chains and by the carotenoid electrochromic change. Similar phenomena occur also in the normal green leaf. *(Author's summary)* C00

0010

17873 FUHRER, J. 1982. **Early effects of excess cadmium uptake in *Phaseolus vulgaris*.** Plant, Cell and Environment 5(4):263-270. Engl., Sum. Engl., 43 Refs., Illus.

***Phaseolus vulgaris*. Cd. Enzymes. Ethylene. Phenolic content. Cell walls.**

Seedlings of *Phaseolus vulgaris* were exposed to solutions containing Cd^{2+} in the range 0-1 mol/m³. Ethylene formation started following 3 h of exposure to 0.01, 0.1, and 1 mol/m³ Cd^{2+}, peaked at 18 h and returned to a relatively low rate after 24 h. Cd-induced ethylene formation depended on the formation of 1-aminocyclopropane-1-carboxylic acid (ACC). Aminoethoxyvinylglycine (AVG, 0.1 mol/m³) inhibited ACC accumulation and ethylene production during exposure to 0.2 mol/m³ Cd^{2+}. Activity of soluble and ionically-bound peroxidase increased after 18 h of exposure to Cd^{2+} concn. 0.001 mol/m³ due to an increase in activity of cathodic isoperoxidases. Stimulation of soluble and ionically-bound peroxidase by 0.2 mol/m³ Cd^{2+} was reduced in the presence of 0.1 mol/m³ AVG. Accumulation of soluble and insoluble (lignin-like) phenolics was found in plants exposed to Cd^{2+}($\geq$ 0.01 mol/m³) in the presence or absence of AVG. Deposition of insoluble (autofluorescing) material occurred in cell walls around vessels and was associated with reduced expansion and water content of leaves. *(Author's summary)* C00

0011

17862 TONIN, G.S., CARVALHO, M.T.V. DE; SHARP, W.R.; CROCOMO, O.J. 1981. **Amino acids in the callus growth and root morphogenesis of bean (*Phaseolus vulgaris*) leaves cultured in vitro.** Turrialba 31(3):245-252. Engl., Sum. Port., Engl., 22 Refs., Illus.

***Phaseolus vulgaris*. Leaves. Plant tissues. Nutrient solution. Indoleacetic acid. Cytokinins. Arginine. Cysteine. Glycine. Morphogenesis. Histidine. Growth. Roots. Culture media. Tissue culture.**

Explants were obtained from the primary leaves of 2 wk.-old plants of bean cv. Carioca grown in Hoagland and Arnon complete nutrient solution with various amino acids in the presence or absence of growth regulators. Arginine, aspartic acid, and cysteine alone or in groups of 2 or 3 increased growth and root morphogenesis. Glutamic acid, glycine, and histidine inhibited growth and morphogenesis. At a low concn., glutamic acid stimulated growth and morphogenesis but inhibited it at a high concn. Optimum callus growth was obtained in a medium containing IAA, NAA, 2,4-D, and kinetin in the presence of glutamic acid, glycine, and histidine. *(Summary by Field Crop Abstracts)* C00 B00

0012

18017 JOUY, M. 1982. **Photoactivity of the $C_{695-693}$ chlorophyllide-protein complex in the irradiated etiolated leaf of *Phaseolus vulgaris*.** Photosynthetica 16 (2):180-183. Engl., Sum. Engl., 9 Refs., Illus.

Phaseolus vulgaris. **Leaves. Irradiation. Chlorophyll. Plant pigments. Plant physiological processes.**

The fluorescence yield of the newly formed chlorophyllide in leaves of bean cv. Commodore decreases a short while after the protochlorophyllide photoreduction. The yield decay occurs at the same time as the rapid dark spectral shift ($C_{688 \to 693} \to C_{695 \to 683}$) which follows the photoreduction. Indeed, the fluorescence emission of the $C_{695 \to 683}$ chlorophyllide-protein complex is quenched at room temp. while the fluorescence yield is much higher at liquid N temp. The radiant energy absorbed by $C_{695 \to 683}$ is used to perform some photobiochemical work. photoinduced absorbance changes (most of them dark reversible) were observed in leaves containing $C_{695 \to 683}$. Irradiation of illuminated etiolated leaves may induce reactions occurring also in normal green leaves. *(Author's summary)* C00

0013

17898 ROWELL, P.M., BAILEY, J.A. 1982. **Influence of light and excision of organs on accumulation of phytoalexins in virus-infected hypocotyls of bean** *(Phaseolus vulgaris)* Physiological Plant Pathology 21(1): 75-84. Engl., Sum. Engl., 24 Refs., Illus.

Phaseolus vulgaris. **Hypocotyls. Viroses. Light. Phytoalexins. Phaseollin.**

The phytoalexins, phaseollin, phaseollidin, phaseollinisoflavan, and kievitone, were isolated from bean hypocotyls bearing necrotic lesions induced by the tobacco necrosis virus. Phaseollin was the predominant phytoalexin and was localized within the necrotic tissues. Highest yields of phaseollin (> 450 µg/g fresh wt.) were obtained from dark-grown infected bean seedlings brought into light. The production of each phytoalexin was reduced when cotyledons were removed. Growth and incubation in total darkness completely prevented the production of any phaseollinisoflavan. The total amount of virus produced was not greatly affected by these treatments. It is suggested that the amounts of phytoalexin which accumulate depend on the different biochemical and physiological activities of the living tissues with which adjacent necrotic tissues interact. *(Author's summary)* C00

0014

17897 OLUFAJO, O.O., DANIELS, R.W., SCARISBRICK, D.H. 1982. **The effect of pod removal on the translocation of ^{14}C photosynthate from leaves in** *Phaseolus vulgaris* **L. cv Lochness.** Journal of Horticultural Science 57(3): 333-338. Engl., Sum. Engl., 7 Refs., Illus.

Phaseolus vulgaris. **Snap beans. Leaves. CO_2. Pods. Translocation. C. Photosynthesis.**

Trifoliate leaves of the dwarf French bean cv. Lochness were exposed under field conditions to ^{14}C during reproductive development. Labelled photosynthate was mainly retained within each nodal unit, the branch pods acting as the main sinks. Sink removal 48 h before exposing the leaves to ^{14}C enhanced translocation to pods above and below the fed node. *(Author's summary)* C00

0015

18016 JOLY, M. 1982. **Effect of age of etiolated leaves of** *Phaseolus vulgaris* **on the 695 nm fluorescence kinetics during first irradiation.** Photosynthetica 16(2): 234-238. Engl., Sum. Engl., 7 Refs., Illus.

Phaseolus vulgaris. **Leaves. Irradiation. Chlorophyll. Plant physiological processes.**

The 695 nm fluorescence kinetics of etiolated bean cv. Commodore leaves irradiated for the 1st time depended on leaf age. A chlorophyllide fluorescence yield decay was observed in 5-7 days and older leaves, but these, moreover, showed a chlorophyllide fluorescence yield increase limited in time, which occurred after approx. 10 s irradiation. This increase

phase is called fluctuation A, interpreted as caused by a saturation of the active centers, which determines a transitory decay of the efficiency of leaf photoactivity. The study of the fluctuation A may inform about the active centers in the irradiated etiolated leaf. *(Author's summary)* C00

0016

18044 CAZARES E., B. 1979. **Longevidad del polen de frijol (*Phaseolus* spp.).** *(Pollen longevity in beans).* Tesis Mag. Sc. Chapingo. México, Colegio de Postgraduados. 115p. Span., Sum. Span., 48 Refs., Illus.

Phaseolus vulgaris. **Pollen. Cultivars. Plant fertility.**

The possibility of developing a method by which *Phaseolus vulgaris* and *P. coccineus* pollen can be kept viable to be used when needed was studied. A method to determine and prolong pollen viability was 1st developed. Pollen of var. Canario 107 and Negro 150 and from the collection Morelos 336 of *P. vulgaris* and pollen from the collections Mexico 1013 and Mexico 1001 of *P. coccineus* were used. Pollen viability was determined using as criterion its in vitro germination; therefore it was adapted to a culture medium where it would obtain a higher germination %. Conditions for pollen conservation were analyzed by investigating the effect of temp. and degree of hydration on pollen viability. Results obtained show that max. pollen germination of both species is reached under the conditions offered by Kwack's liquid culture medium (1965) with 20% saccharose and pH 6.2-6.6. Max. germination was obtained at 20°C, 60-90 min after planting. Max. germination % of pollen obtained were 64.76, 42.89, 36.19, 31.93, and 23.5% for var. Canario 107 and Negro 150 and the collections Morelos 336, Mexico 1001, and Mexico 1013, resp. Pollen was found to have higher viability when stored at 5°C in glass flasks or covered vials. Germination of pollen up to 20 days of storage under the previous conditions were 14.74, 2.69, 2.98, 2.13, and 0% for the var. Canario 107 and Negro 150 and the collections Mexico 1001, Mexico 1013, and Morelos 336, resp. Up to 10 days storage, this last collection had a germination of 2.43%. *(Author's summary. Trans. by L.M.F.)* C00

0017

18070 KENIS, J.D., TRIPPI, V.S. 1982. **Actividad de peroxidasas y su relación con el envejecimiento y la abscisión en *Phaseolus vulgaris* L.** *(Peroxidase activity and its relationship with senescence and abscission in Phaseolus vulgaris).* Phyton (Argentina) 42(1) 17-24. Span., Sum. Span., Engl., 40 Refs., Illus.

Phaseolus vulgaris. **Enzymes. Leaves. Abscission. Plant tissue. Maturation.**

Peroxidase activity in the abscission zone of attached and detached bean leaves was related to senescence and abscission. In attached leaves, peroxidases did not change until senescence and abscission were advanced. In explants aged in vitro, treatments that accelerated abscission increased peroxidases. Thos treatments were: sucrose, fructose, glycerol, and glucose in explants taken from young leaves, and far-red light in explants from mature leaves. In explants obtained from older leaves, in which abscission is not controlled by light quality, activity remains high under red or far-red light, at least during the 1st 24 h of treatment. Changes induced by sugars or glycerol could be blocked by cycloheximide, suggesting that they are dependent upon the synthesis of new protein. Peroxidase processes are involved in a late phase of senescence. Their role and that of some hydrolitic enzymes in damaging cell membranes is discussed. *(Author's summary)* C00

0018

18303 INOUE, Y., KOBAYASHI, T., OGAWA, T., SHIBATA, K. 1981. **A short lived intermediate in the photoconversion of protochlorophyllide to chlorophyllide *a*.** Plant and Cell Physiology 22(2) 197-204. Engl., Sum. Engl., 7 Refs., Illus.

Phaseolus vulgaris. **Leaves. Photosynthesis. Chlorophyll.**

The transient absorption change for the photoreduction of protochlorophyllide (PChlide) was studied with a solution of extracted PChlide holochrome and with etiolated kidney bean leaves. The following results were obtained: (1) A short-lived intermediate with an absorption max. at 690 nm was found before formation of chlorophyllide *a* (Chlide). (2) The intermediate appeared instantly at the onset of the actinic laser, and it decayed very fast with a rate constant of 3.4 x 10^5/s. (3) This decay constant for the intermediate agreed well with the rate constants for Chlide formation, 3.1 x 10^6/s for the extract and 4.6 x 10^6/s for the etiolated kidney bean leaves. *(Author's summary)* C00

0019

18302 FIELD, R.J. 1981. **A relationship between membrane permeability and ethylene production at high temperature in leaf tissue of *Phaseolus vulgaris* L.** Annals of Botany 48(1) 33-39. Engl., Sum. Engl., 11 Refs., Illus.

Phaseolus vulgaris. **Plant tissues. Temperature. Ethylene production. Leaves.**

Leaf discs cut from primary leaves of bean cv. Masterpiece were incubated at temp. higher than the growth temp. of 25°C. Both basal and wound ethylene production increased up to temp. of 35-37.5°C, thereafter declining rapidly. There was no detectable ethylene production at temp. > 42.5°C. Exposure of leaf discs to high temp. for 60 min resulted in a large production of wound ethylene when they were returned to 25°C. The magnitude of ethylene production was related to the initial incubation temp. as was the length of the lag period before max. production was achieved. The results are discussed in relation to the requirement for continued membrane integrity for ethylene production. *(Author's summary)* C00

0020

18069 KENIS, J.D., TRIPPI, V.S. 1982. **Envejecimiento y abscisión en *Phaseolus vulgaris* L. Actividad de fosfatasas ácidas en relación con la edad y su regulación por calidad de la luz, azúcares y cicloheximida.** *(Senescence and abscission in Phaseolus vulgaris. Activity of acid phosphatases in relation to age and its regulation by light quality, sugars, and cycloheximide).* Phyton (Argentina) 42(1):9-16. Span., Sum. Engl., Span., 30 Refs., Illus.

Phaseolus vulgaris. **Leaves. Enzymes. Abscission. Maturation.**

The activity of acid phosphatases was studied in the abscission zones of young, mature, and old bean leaves, during in vivo and in vitro senescence and abscission. Activity was low in the attached young leaves, strongly increased in the mature ones and decreased as the leaves got older and abscission accelerated. In vitro, changes with aging depended on the age of the leaves from which explants were taken. In explants from young leaves, acid phosphatases and abscission were closely related; sucrose, fructose, and glucose induced abscission and also increased activity but their effects were completely blocked by cycloheximide. In explants from mature and old leaves conditions that accelerated senescence and abscission decreased the activity of acid phosphatases. The possible role of acid phosphatases in early senescence is discussed. *(Author's summary)* C00

0021

18304 BOLWELL, G.P., NORTHCOTE, D.H. 1981. **Control of hemicellulose and pectin synthesis during differentiation of vascular tissue in bean (*Phaseolus vulgaris*) callus and in bean hypocotyl.** Planta 152(3):225-233. Engl., Sum. Engl., 40 Refs., Illus.

Phaseolus vulgaris. **Hypocotyls. Cellulose. Plant tissues. Enzymes. Plant physiological processes.**

Membrane fractions from bean hypocotyl or callus incorporate arabinose from UDP-β-L-arabinose into arabinan and xylose from UDP-α-D-xylose into xylan. The control of

these syntheses has been studied during xylogenesis in stele and in xylogenesis induced in callus tissue. Induction of arabinan synthetase activity occurs during division and extension growth while that of xylan synthetase occurs subsequently during the period of secondary thickening of the cell wall. The xylan synthetase induction is correlated with the induction of phenylalanine ammonia-lyase and with lignin synthesis. *(Author's summary)* C00

See also 0186

C01 Plant Nutrition

0022

17892 FRANCO, A.A.; MUNNS, D.N. 1981. **Response of *Phaseolus vulgaris* L. to molybdenum under acid conditions.** Soil Science Society of America Journal 45(6): 1144-1148. Engl., Sum. Engl., 23 Refs., Illus.

***Phaseolus vulgaris*. Laboratory experiments. Growth-chamber experiments. Mo. Cultivars. Nutrient absorption. Mineral content. Leaves. Roots. Stems. Seed. Nodulation.**

Greenhouse and growth chamber expt. in soil and solution culture were conducted to determine whether soil acidity prevents Mo response in bean by interfering with Mo uptake or translocation to nodules, to establish relationships between Mo concn. in nodules and in other plant parts, and to assess cv. differences in Mo uptake. In the 6 cv. tested, plant Mo levels were influenced little by pH between 4.8-5.8. In cv. Venezuela 350, neither pH (4.8-6.3) nor temp. (21-31°C) affected Mo level or its distribution. Nodule Mo levels generally varied less than shoot Mo in response to variable external supply. Stem Mo level was more closely correlated with nodule Mo level than leaf or root level. Root Mo level was closely related to external Mo level. Leaves appeared to act as sinks for Mo disposal at high Mo levels. Mo levels were 10 times higher in seeds produced at Davis, California (USA) than at Goiana, Brazil on an Entisol and an Oxisol, resp. *(Author's summary)* C01

0023

18034 BRETELER, H.; NISSEN, P. 1982. **Effect of exogenous and endogenous nitrate concentration on nitrate utilization by dwarf bean.** Plant Physiology 70(3): 754-759. Engl., Sum. Engl., 43 Refs., Illus.

***Phaseolus vulgaris*. Dwarf beans. Roots. Nutrient absorption. N.**

The effect of the exogenous and endogenous NO_3^- concn. on net uptake, influx, and efflux of NO_3^- and on nitrate reductase activity (NRA) in roots was studied in *Phaseolus vulgaris* cv. Witte Krombek. After exposure to NO_3^-, an apparent induction period of about 6 h occurred regardless of the exogenous NO_3^- level. A double reciprocal plot of the net uptake rate of induced plants vs. exogenous NO_3^- concn. yielded 4 distinct phases, each with simple Michaelis-Menten kinetics, and separated by sharp breaks at about 45, 80, and 480 µmol/dm³. Influx was estimated as the accumulation of ^{15}N after 1 h exposure to $^{15}NO_3^-$. The isotherms for influx and net uptake were similar and corresponded to those for alkali cations and Cl^-. Efflux of NO_3^- was a constant proportion of net uptake during initial NO_3^- supply and increased with exogenous NO_3^- concn. No efflux occurred to a NO_3^--free medium. The net uptake rate was negatively correlated with the NO_3^- content of roots. Nitrate efflux, but not influx, was influenced by endogenous NO_3^-. Variations between expt., in NO_3^- status, affected the values of K_m and V_{max} in the various concn. phases. The concn. at which phase transitions occurred, however, were constant both for influx and net uptake. The findings corroborate the contention that separate sites are responsible for uptake and transitions between phases. Beyond 100 µmol/dm³, root NRA was not affected

by exogenous NO_3^- indicating that NO_3^- uptake was not coupled to root NRA, at least not at high concn. *(Author's summary)* C01

0024

17854 MARCONDES, D.A.S.; NASCIMENTO FILHO, V.F.; SERRA, G.E.; SARTORI, J.O. 1980. **Testes rápidos em tecidos vegetais de feijoeiro (*Phaseolus vulgaris* L. cv. Goiano precoce), para avaliçao de deficiencias minerais -N, P e K.** *(Rapid tests for evaluation of mineral deficiencies -NPK- in plant tissue of bean cultivar Goiano precoce).* Ecossistema 5(1):62-65. Port., Sum. Port., Engl., 3 Refs.

***Phaseolus vulgaris*. Laboratory experiments. Nutrient solution. N. P. K. Mineral deficiencies. Brazil.**

Rapid tests were carried out on plant tissues of bean cv. Goiano Precoce to evaluate mineral deficiencies (NPK). Bean plants were grown in nutrient solution with several levels of N, P, and K under greenhouse conditions at the Centro de Energía Nuclear na Agricultura, Piracicaba, SP, Brazil. N was evaluated by the diphenylamine method, P by ammonium molybdate, and K by sodium cobaltinitrate. Evaluations 90 days after trials were set up showed good results, indicating the possibility of using these methods to assess NPK deficiencies. *(Author's summary)* C01

0025

18024 EMMERT, F.H. 1981. **Diurnal cycles in centripetal passage, residual uptake, and xylem sap concentration of radiophosphorus in roots.** Journal of Plant Nutrition 4(2):195-203. Engl., Sum. Engl., 16 Refs., Illus.

***Phaseolus vulgaris*. Nutrient solution. Photoperiod. Nutrient absorption. P. Composition. Roots.**

In solution culture expt. using 13-day-old *Phaseolus vulgaris* cv. Red Wade plants grown in 16/8 h light/dark periods, centripetal passage from the external medium across the root into the xylem and residual accumulation in the root of ^{32}P was highest in the light and lowest in the dark periods. Xylem stream ^{32}P content followed the transpiration pattern and was lower in the light than in the dark periods and was always lower than in the external solution. This content was more affected by dilution in water than by passage of P into the xylem. Similarity of P passage into and through roots suggested that both might be governed by the same mechanism. *(Summary by Field Crop Abstracts)* C01

0026

17890 BARCELO, J.; POSCHENRIEDER, CH. 1981. **Efectos tóxicos del manganeso sobre el crecimiento y metabolismo de *Phaseolus vulgaris*. I. Crecimiento y síntomas de toxicidad.** *(Toxic effects of manganese on the growth and metabolism of Phaseolus vulgaris. I. Growth and symptoms of toxicity).* Anales de Edafología y Agrobiología 40(5/6):915-926. Span., Sum. Span., Engl., 23 Refs., Illus.

***Phaseolus vulgaris*. Snap beans. Nutrient solution. Mn. Fe. N. Growth. Metabolism. Plant physiological disorders. Toxicity.**

The toxic effect of different concn. of Mn on the development of plants of snap bean cv. Contender was studied in 3 different series of exp.. using nutrient solution with different levels of Fe and Mn. At equal concn. of Mn, plants with higher Fe levels had less symptoms of Mn toxicity. Different growth parameters were studied and external symptoms are described, thus allowing an early visual diagnosis of Mn phytotoxicity in snap beans. *(Author's summary)* C01

0027

18014 SCHMUTZ, D.; BRUNOLD, C. 1982. **Regulation of sulfate assimilation in plants. 13. Assimilatory sulfate reduction during ontogenesis of primary leaves of** *Phaseolus vulgaris* L. Plant Physiology 70(2):524-527. Engl., Sum. Engl., 25 Refs., Illus.

Phaseolus vulgaris. **Enzymes. Leaves. Plant assimilation. Cysteine.**

The correlation between the extractable activities of 3 key enzymes of assimilatory sulfate reduction and the in vivo incorporation of $^{35}SO_4^{2-}$ into amino acids, proteins, and sulfolipids was investigated from greening to senescence in primary leaves of bean cv. Saxa. The total extractable activity of ATP sulfurylase and of adenosine 5'-phosphosulfate sulfotransferase reached a max. in the leaves of approx. 7- and 11-day-old seedlings, resp. During senescence, there was a decrease in both enzyme activities. After approx. 17 days, no appreciable activities remained. In contrast, total *O*-acetyl-L-serine sulfhydrylase activity decreased to only approx. 50% of the max. value during the same period. The in vivo incorporation of $^{35}SO_4^{2-}$ into amino acid and protein fractions showed a time-course similar to that of the total extractable adenosine 5'-phosphosulfate sulfotransferase activity. Both cysteine and sulfate markedly decreased during senescence. The total extractable activity of ribulosebisphosphate carboxylase was max. in the primary leaves of 13-day-old seedlings, and approx. 40% of this value was still detectable after 17 days. Taken together with results from the literature, these results show that assimilatory sulfate reduction in primary leaves of *Phaseolus vulgaris* stops before CO_2 and nitrate assimilation. *(Author's summary)* C01

0028

18099 EL-GHARABLY, G.A.; EL-RAZEK, M.A. 1982. **Responses of snapbeans to applications of P and Fe in calcareous soil.** Journal of Plant Nutrition 5(4/7): 721-728. Engl., Sum. Engl., 23 Refs., Illus.

Phaseolus vulgaris. **Laboratory experiments. Snap beans. P. Fe. Mineral deficiencies. Nutrient absorption. Growth.**

A greenhouse pot expt. was conducted with various levels and combinations of P and Fe being applied to a sandy calcareous soil in which snap beans were grown as a test crop for growth response and nutrient uptake. P, Fe, Ca, Mg, Mn, and Zn were determined on the 21- and 35-day old snap beans and DM yield was recorded separately for tops and roots. Symptoms of Fe deficiency developed on plants in those pots where no Fe was applied. With the application of 20 ppm Fe, the symptoms were prevented. Max. plant growth was obtained when 150 ppm P was added. The mineral content of snap bean plants was affected by increased levels of applied P and Fe. Significant interactions were found between P and Fe treatments for most of the characteristics measured. High Fe decreased Zn and Mn in plants and high P decreased them further. *(Author's summary)* C01

0029

18093 TYLER, L.D.; McBRIDE, M.B. 1982. **Influence of Ca, pH and humic acid on Cd uptake.** Plant and Soil 64(2):259-262. Engl., Sum. Engl., 17 Refs.

Phaseolus vulgaris. **Nutrient absorption. Cd. Ca. pH. Snap beans. Nutrient solution. Translocation.**

Solution culture expt. were conducted to examine the effect of naturally occurring components of soil solutions such as Ca-ion, H-ion, and organic acids on the Cd uptake of maize and snap beans. An increase in the Ca-ion concn. of solution cultures depressed the translocation of Cd from roots to tops of snap beans and maize but had no apparent effect on the absorption of Cd by roots. Suppression of Cd translocation by Ca was less marked for the maize than for the beans. Addition of humic acid to the solution decreased the Cd activity in solution and the subsequent absorption of Cd by maize roots, indicating that Cd-ion activity in solution directly affects Cd uptake. *(Author's summary)* C01

0030

18095 WALLACE, A. 1982. **Additive, protective, and synergistic effects on plants with excess trace elements.** Soil Science 133(5):319-323. Engl., Sum. Engl., 30 Refs.

Phaseolus vulgaris. **Dwarf beans. Nutrient solution. Cd. Cu. Zn. Mn. Co. Ni. Yields. Mineral deficiencies.**

Bush bean plants were grown 15 days in solution culture to test whether or not multiple trace elements that result in little or no apparent stress when applied alone,would result in more or less stress when applied together. Prior experience had indicated these possibilities, and the matter is of considerable concern in establishing threshold levels for excesses of some trace elements in the environment. Levels of Cd (5×10^{-7} M), Cu (10^{-5} *M*), Zn (5×10^{-5} *M*), Mn (10^{-4} *M*), Co (10^{-4} *M*), and Ni (10^{-4} *M*) were pplied singly or in combination of Cd, Cu, and Zn, and Mn, Co, and Ni; and all six combined. Little or no stress was expected for some of the single elements; the yield depression in dry wt. of trifoliate leaves was 0, 2, 43, 32, 0, and 4% for Cd, Cu, Zn, Mn, Co, and Ni, resp. For Cd, Cu, and Zn together the depression was 46% ; for Mn, Co, and Ni, 23% , and for all 6, 85%. Additive, protective, and synergistic effects were involved, although induced Fe deficiency complicated the results for all 6 elements combined. The results indicate that even if the concn. of at least some elements is too low to have any visual effects, they can have important consequences if other trace element stresses are simultaneously present. *(Author's summary)* C01

C02 Plant Development

0031

15846 ROVALO, M.; CORONADO, A. 1981. **Estudios fisiológicos con partenina y eugarzadona en frijol (*Phaseolus vulgaris* L.).** *(Physiological studies with parthenine and eugarzadone in beans).* Agronomía (México) 197:18-23. Span., 5 Refs., Illus.

Phaseolus vulgaris. **Inhibitors. Plant height. Growth. Plant respiration. Photosynthesis.**

Lab. trials were conducted using 4 lactonic inhibitors, namely parthenine (obtained from *Parthenium hysterophorus*), eugarzadone (isolated from *Teucrium cubense*), chlorided parthenine, and epoxiparthenine, to determine their effect on plant height, respiration, and light reactions of photosynthesis. Seedlings irrigated with eugarzadone solution showed max. inhibition; those irrigated with parthenine showed less inhibition. Root fresh and dry wt. was severely affected by eugarzadone. Eugarzadone crystals had an inhibitory effect of 60% (compared with the control) on respiratory activities of seeds and leaf discs. Inhibitors were easily degraded in the soil since plants were seen to recuperate. *(Summary by F.G. Trans. by L.M.F.)* C02

0032

17824 MONNIER, M. 1982. **Culture of mature ecotyledonous embryos of *Phaseolus vulgaris* and the nutritional role of cotyledons.** American Journal of Botany 69(6):896-903. Engl., Sum. Engl., 20 Refs., Illus.

Phaseolus vulgaris. **Embryo. Cotyledons. Culture media. Growth. Plant-growth substances.**

Embryos of *Phaseolus vulgaris* were excised from seeds and cultured with cotyledons removed to determine the actions of various cultural conditions upon embryo development. Four media were tested, but ecotyledonized embryos did not grow as rapidly on any of them as did embryos with intact cotyledons on agar-water media. Comparisons of growth of ecotyledonized embryos with embryos bearing fractions of cotyledons indicated ecotyledonized embryos cultured on nutrient media grew about as well as embryos bearing cotyledons from which 97% of the vol. had been removed surgically. The final wt. of ecotyledonized embryos was greater when detached cotyledons were placed near them and was even greater when extracts of detached and incubated cotyledons were employed in the nutrient medium. Benzyladenine, kinetin, GA, IAA, presence of sucrose, and light or dark culture failed to enhance the ability of incubated cotyledons to stimulate growth of embryos. *(Author's summary)* C02

0033

17886 VIEIRA, C. 1981. **Effect of artificial defoliation on the yield of two indeterminate bean (*Phaseolus vulgaris* L.) cultivars.** Turrialba 31(4):383-385. Engl., Sum. Port., Engl., 5 Refs.

Phaseolus vulgaris. **Cultivars. Indeterminate cultivars. Defoliation. Developmental stages. Yields. Brazil.**

Two indeterminate bean cv., S-182-N and Carioca, were each defoliated 20, 30, 40, 50, and 60 days after seedling emergence in plots in Viçosa, MG, Brazil. Defoliation degree was 0, 33, or 66% . A 66% defoliation was very detrimental to yield when made during the flowering and pod formation stages. Cv. Carioca was more tolerant to defoliation than cv. S-182-N. *(Author's summary)* C02

0034

17397 RECALDE-MANRIQUE, L.; DIAZ-MIGUEL, M. 1981. **Evolution of ethylene by sulphur dust addition.** Physiologia Plantarum 53(4):462-467. Engl., Sum. Engl., 38 Refs., Illus.

Phaseolus vulgaris. **Seedlings. S. Ethylene. Growth. Shoots. Flowering. Podding.**

Phaseolus vulgaris cv. Contender plants were dusted with S 25 days after germination. The amount of ethylene evolution was measured in shoots (with attached leaves) and roots from plants at several stages of development. The growth of shoots and roots was also measured and the flowering period observed. The ethylene evolution was associated with precise morphogenic stages. The amounts of ethylene produced from S-treated plants, compared with that evolved from control plants, showed 2 stages of stimulation in shoots, 1 preceding full flowering and 1 preceding fruit-set. Inhibition of ethylene evolution due to S dust occurred in roots before initiation of floral primordia and before full flowering. S dust seemed to increase the no. of leaves/plant, but only in the vegetative stage. Likewise, the earliness of flowering was enhanced. The effects of elemental S dust treatments on ethylene evolution may be attributed to a slow oxidation of elemental S in air producing SO_2 ; this SO_2 greatly enhances ethylene evolution from leaf tissues. *(Author's summary)* C02

0035

17881 VAN STADEN, J.; CARMI, A. 1982. **The effects of decapitation on the distribution of cytokinins and growth of *Phaseolus vulgaris* plants.** Physiologia Plantarum 55(1):39-44. Engl., Sum. Engl., 22 Refs., Illus.

Phaseolus vulgaris. **Growth. Defoliation. Leaf area. Chlorophyll. Cytokinins. Protein content. Analysis.**

Growth of primary leaves of *Phaseolus vulgaris* cv. Bulgarian was enhanced greatly by decapitation of the rest of the shoot. This increased growth was manifested by an increase in leaf area, leaf wt., and in a higher synthesis of chlorophyll and soluble proteins. Within the roots and stems decapitation resulted in a detectable increase in endogenous cytokinins within 2 days after the surgical treatment. In the primary leaves increased cytokinin levels were only detected after 16 days. At this time most of the recorded activity co-chromatographed with the cytokinin glucosides. When plants which were decapitated were left under normal growing conditions for 16 days and then transferred to continuous darkness for 8 days the senescence of the primary leaves of the decapitated plants, in which the cytokinins had increased, was delayed significantly when compared with that of the primary leaves of the intact plants. *(Author's summary)* C02 C03

0036

17867 KARTHA, K.K.; PAHL, K.; LEUNG, N.L.; MROGINSKI, L.A. 1981. **Plant regeneration from meristems of grain legumes: soybean, cowpea, peanut, chickpea, and bean.** Canadian Journal of Botany 59(9):1671-1679. Engl., Sum. Engl., 15 Refs., Illus.

Phaseolus vulgaris. **Apical meristems. Growth. Plant-growth substances. Culture media. Shoots. Indoleacetic acid. Tissue culture.**

The regeneration potential of shoot apical meristems of (a) soybean, (b) cowpea, (c) groundnut, (d) chickpea, and (e) *Phaseolus vulgaris* was studied on agar-solidified Murashige and Skoog (MS) medium supplemented with benzyladenine (BA) and/or NAA. Plantlets of (a) could be regenerated only when 0.05-0.1 μM BA + 1 μM NAA was applied. Meristems of (b) did not require exogenous hormones for 100% plant regeneration to occur. Very low levels of BA (0.1-0.005 μM) with 0.05 μM NAA also induced a high frequency of regeneration. Meristems of (e) differentiated into plantlets on hormone-free medium or with only NAA and multiple bud regeneration (15-30 buds/meristem) was induced with 10 μM BA. Elongated shoots of (e) differentiated roots on 50% MS medium + 1 μM IAA. Although most combinations of BA or BA + NAA induced shoot regeneration in (c) and (d), whole plant regeneration occurred more frequently (75%) in (c) only when 0.1 μM BA + 10 μM NAA was applied. Multiple axillary branching occurred from the main shoots regenerated from (d) meristems, but rooting occurred only when these shoots were recultured on medium with 1 μM IBA. *(Author's summary)* C02

0037

17880 PALAVAN, N.; GALSTON, A.W. 1982. **Polyamine biosynthesis and titer during various developmental stages of *Phaseolus vulgaris*.** Physiologia Plantarum 55(4).438-444. Engl., Sum. Engl., 26 Refs., Illus.

Phaseolus vulgaris. **Enzymes. Arginine. Ornithine. Anthesis. Podding. Growth. Analysis.**

The activities of arginine decarboxylase (ADC) and ornithine decarboxylase (ODC) as well as polyamine content were examined in *Phaseolus vulgaris* cv. Taylor's Horticultural before and during anthesis, during fruit development, and throughout vegetative growth. The specific activities of polyamine biosynthetic enzymes were highest in all rapidly growing tissues (root apices, hypocotyls, young internodes, young leaves, flower buds, young pods, and pericarps). They were lowest in mature, nongrowing tissues. Similarly, the content of the major polyamines (putrescine, spermidine, spermine) is highest in rapidly growing tissues, and lowest in mature tissue. These correlations reinforce the growing connection between polyamines and rates of cell division and metabolic activity during both vegetative and reproductive development. *(Author's summary)* C02 C03

0038

18001 LOVETT D.J.; EATON, G.W. 1982. **Demographic aspects of flower and fruit production in bean plants, *Phaseolus vulgaris* L.** American Journal of Botany 69(7) 1156-1164. Engl., Sum. Engl., 24 Refs., Illus.

Phaseolus vulgaris. **Dwarf beans. Flowering. Seed vigor. Flowers. Maturation. Plant reproduction. Podding. Ovules. Yields.**

The relative contributions to total pod yield of cohorts of flowers of known age were assessed. Plant growth of bush bean selection W.S.U. 9BP713 was monitored and births of individual flowers were recorded and their fates followed. For every cohort of flowers an array of yield measures was calculated, including the mean and total cohort dry wt. of fruits, and the no. of viable and aborted seeds and completely undeveloped ovules. When mature, pods were removed from half of the plants. Plants whose mature pods were removed produced significantly greater no. of flowers, ovules, and viable seeds and a greater total wt. of pods than did untreated plants. However, the proportion of ovules giving rise to viable and aborted seeds and undeveloped ovules was the same in plants of both groups. Approx. 50% of ovules of marketable pods, in all plants, yielded viable seeds. The 12 cohorts of flowers contributed markedly different amounts to plant yield. Early and later

cohorts contributed much less than did middle cohorts in terms of marketable pod dry wt. and no. of fully developed seeds, aborted seeds, and undeveloped ovules. Peak productivity was therefore obtained from the middle phase of flowering in these annual bean plants. The lower pod yield of later cohorts is interpreted as a result of competition for limited resources between maturing pods and new flowers. Possible causes for the various fates of flowers and ovules were considered; the use of flowers as plant modules suitable for demographic examination was discussed. *(Author's summary)* C02

0039

18028 TAMAS, I.A. ENGELS, C.J. 1981. **Role of indoleacetic acid and abscisic acid in the correlative control by fruits of axillary bud development and leaf senescence.** Plant Physiology 68(2):476-481. Engl., Sum. Engl., 38 Refs., Illus.

Phaseolus vulgaris. **Indoleacetic acid. Buds. Plant-growth substances. Leaves.**

When fully filled pods of bean plants were deseeded, the rate of axillary bud growth and the chlorophyll content of leaves were increased. Application of 0.1% IAA in lanolin on the deseeded pods caused abscission of axillary buds, inhibited growth of the remaining buds, and decreased leaf chlorophyll content. The response of bud development to fruit-applied IAA was concn. dependent between 0.001-0.1% IAA (representing from 2-200 μg IAA/fruit), resulting in greater growth inhibition at higher IAA concn. When plants were defruited so that the no. of fruits/plant was adjusted to 0, 6, 12, or 18, a dosage effect of fruits on photosynthesis was observed. Removal of all fruits caused a rise in the CER. With increasing fruit dosage, plants showed leaf senescence of increasing intensity and a corresponding decline in CER. In contrast to the effect of fruit-applied IAA on leaves and buds, it delayed the senescence of treated fruits. When axillary buds were treated directly with aqueous solutions of IAA, no growth inhibition occurred. ABA applied on deseeded pods, up to a concn. of 0.1% ABA in lanolin, failed to inhibit axillary bud development or to cause leaf senescence. The results support the hypothesis that the correlative control of axillary bud development and leaf senescence by fruits involves the participation of both IAA and ABA. IAA, released by the seeds, may play the role of the correlative signal that moves from the fruit to the target organ, where it stimulates the synthesis or accumulation of ABA. ABA, in turn, may be responsible for the inhibition of axillary bud development and the enhancement of leaf senescence. *(Author's summary)* C02

0040

18075 HUTTON, M.J.; VAN STADEN, J. 1982. **Cytokinins in germinating seeds of *Phaseolus vulgaris* L. 2. Transport and metabolism of 8[^{14}C] *t*-zeatin applied to the radicle.** Annals of Botany 49(5):693-699. Engl., Sum. Engl., 21 Refs., Illus.

Phaseolus vulgaris. **Seed. Germination. Cytokinins.**

The application of 8-^{14}C-*t*-zeatin to the radicle tips of germinating bean cv. Contender seeds revealed that cytokinins are transported rapidly from the embryonic axis to the cotyledons and are utilized and metabolized extensively in these organs. Information obtained on the transportation between the different parts of the embryo was consistent with the view that the mobilization of food reserves from the cotyledons is controlled by cytokinins which originate in the embryonic axis. Tentative identification of the radioactive metabolites formed indicated that the applied zeatin was altered by side-chain cleavage and by substitution to the adenine ring. *(Author's summary)* C02

0041

18085 MOK, M.C.; MOK, D.W.S.; DIXON, S.C.; ARMSTRONG, D.J.; SHAW, G. 1982. **Cytokinin structure-activity relationships and the metabolism of N^6-(Δ^2-isopentenyl)adenosine-8-^{14}C in *Phaseolus* callus tissues.** Plant Physiology 70(1): 173-178. Engl., Sum. Engl., 21 Refs., Illus.

Phaseolus vulgaris. Cytokinins. Growth. Tissue culture. Plant tissues.

In cultures of *Phaseolus vulgaris* Great Northern, cytokinins with saturated N^6-isoprenoid side chains were more effective in promoting growth than the corresponding unsaturated analogues. In cultures of *P. lunatus* Kingston, cytokinins with unsaturated side chains were more effective or equally as effective as the saturated compounds. The major metabolite of [^{14}C]N^6-(δ^2-isopentenyl)adenosine was adenosine in Great Northern callus and the corresponding nucleotide in Kingston callus. The activity of cytokinins with saturated side chains was the same in both parental callus lines and in callus of the hybrid Great Northern x Kingston. The responses of hybrid callus to cytokinins with unsaturated side chains were intermediate between those of the parental callus tissues, as were the characteristics of [^{14}C]N^6-(δ^2-isopentenyl)adenosine metabolism. *(Summary by Field Crop Abstracts)* C02

0042

18082 BATCHELDER, A.R. 1981. **Chlortetracycline and oxytetracycline effects on plant growth and development in liquid cultures.** Journal of Environmental Quality 10(4):515-518. Engl., Sum. Engl., 15 Refs., Illus.

Phaseolus vulgaris. Nutrient solution. Inhibitors. Growth.

Cattle manure often contains relatively large amounts of antibiotics used as cattle feed supplements. Spreading that manure over cropland might cause plant growth problems. Two greenhouse studies were conducted to evaluate the effects of 2 antibiotics, chlortetracycline and oxytetracycline on pinto bean plants var. University of Idaho 114 grown in aerated nutrient media. Root growth and development were markedly decreased by both antibiotics as their concn. were increased from 0 to 160 ppm in solution. Top dry wt. were reduced 71-87% by the antibiotic concn., and root dry wt. were decreased 66-94%. Plant mortality increased as the antibiotic concn. were increased and all plants died at the 160 ppm treatment level. Chlortetracycline degraded faster in nutrient solution than oxytetracycline did, but the effects on pinto bean plants were more detrimental even at lower concn. Results showed that relatively low antibiotic concn. can markedly affect pinto bean plant growth and development in nutrient solution. *(Author's summary)* C02

See also 0050 0052 0072 0073 0101 0185 0187

C03 Chemical Composition, Methodology and Analyses

0043

18020 OLIVER, D.J. 1981. **Formate oxidation and oxygen reduction by leaf mitochondria.** Plant Physiology 68(3):703-705. Engl., Sum. Engl., 17 Refs.

Phaseolus vulgaris. **Leaves. Mitochondria. ATP. Enzymes. Analysis.**

In the mitochondria of tobacco, lentils, soybeans, peas, bush beans (grown in garden plots) and other crops, NADH was oxidized by the electron transport sequence and was coupled to ATP synthesis. The amount of formate dehydrogenase and the capacity for formate-dependent O_2 uptake varied greatly among species. For beans, 3 mitochondrial preparations were made and prepared. Formate dehydrogenase activity was 1.3. *(Summary by Field Crop Abstracts)* C03

0044

18032 DESHPANDE, S.S.; SATHE, S.K.; CORNFORTH, D.; SALUNKHE, D.K. 1982. **Effects of dehulling on functional properties of dry bean (*Phaseolus vulgaris* L.) flours.** Cereal Chemistry 59(5):396-401. Engl., Sum. Engl., 39 Refs., Illus.

Phaseolus vulgaris. **Bean flour. Cultivars. Analysis.**

Effects of dehulling on certain functional properties of flours of 10 different dry bean cv. were investigated. Dehulling improved the water and oil absorption capacities of bean flours by 3-39% and 10-44%, resp. Foaming and emulsion capacities of bean flours increased as a result of dehulling. Foams and emulsions of dehulled bean flours were, however, less stable than those of whole bean flours. Foaming properties of bean flours were dependent on pH and concn. Seed coat removal improved gelling properties of most cv. investigated. Among the cv. studied, Small White beans showed excellent water absorption, gelling, and emulsion properties. Black Beauty and Cranberry flours gave the max. increase in whipping vol., whereas foams prepared from Dark Red Kidney beans were the most stable. Seed coat appears to play an important role in foam and emulsion stability of bean flours. *(Author's summary)* C03

0045

18023 ALLI, I.; BAKER, B.E. 1981. **Constitution of leguminous seeds. Scanning electron microscopy of proteins prepared from *Phaseolus* beans.** Journal of the Science of Food and Agriculture 32(11):1069-1073. Engl., Sum. Engl., 10 Refs., Illus.

Phaseolus vulgaris. **Proteins. Analysis. Electron microscopy. Seed.**

Proteins were isolated from citric acid and NaOH extracts of navy beans, white kidney beans, and baby lima beans (*Phaseolus lunatus*). Examination of the proteins under the

scanning electron microscope revealed that several types of particulate microstructures were present in the proteins obtained by citric acid extraction of the beans followed by precipitation by cooling. Examination of the proteins obtained by extraction with NaOH solution and isoelectric precipitation revealed the presence of only 1 type of nonparticulate microstructure. *(Author's summary)* C03

0046

17826 ALVARENGA, L.C. DE; FORTES, M.; PINHEIRO FILHO, J.B.; HARA, T. 1980. **Distribuição de umidade no interior de grãos de feijão-preto após secagem.** *(Moisture distribution within black bean grains after drying).* Revista Brasileira de Armazenamento 5(1) 19-29. Port., Sum. Port., Engl., 9 Refs., Illus.

Phaseolus vulgaris. Seed characters. Water content. Brazil.

The period of tempering of black beans after drying was simulated. Internal moisture distribution curves of the grains are given for this period. These can be used to analyze and optimize drying processes such as air drying and intermittent drying. Regression curves were fit to exptl. data on conductance variance of grain layer with tempering time. A relationship between surface MC and electrical conductance was established. It is suggested that electrical conductance-based moisture meters are influenced by the grain surface MC and therefore should only be used when grain thermodynamic equilibrium is assured. *(Author's summary)* C03

0047

17851 TEIXEIRA, N.T., COBRA NETTO, A. 1980. **Teores de nitrogênio total e solúvel em folhas de feijoeiro (*Phaseolus vulgaris*, L.) cultivar Roxinho.** *(Total and soluble nitrogen contents in leaves of common bean cultivar Roxinho).* Ecossistema 5(1) 55-58. Port., Sum. Port., Engl., 7 Refs.

Phaseolus vulgaris. N. Composition. Leaves. Mineral content. Brazil.

This study verified the total and soluble N contents in beans grown in N-deficient and in complete nutrient solution culture. Plants were grown the 1st wk. in the complete nutrient solution culture and were then subjected to 2 treatments. In both treatments plants were harvested when 2-5 wk. old. Harvested material was separated into seed leaves and folioles and oven-dried at 70-80°C. Total and soluble N contents were then assessed. During the 1st harvest there were differences in growth among treatments, during the 2nd, symptoms typical of deficiency were observed in plants grown in the N-deficient solution. N-deficient plants had severe symptoms in the 2 last samplings. Total N content decreased with plant development in both treatments and in seed leaves and folioles. Total and soluble N contents indicate the nutritional state of the plant. *(Summary by F.G. Trans. by L.M.F.)* C03

0048

17847 BROWN, J.W.S., MA, Y., BLISS, F.A., HALL, T.C. 1981. **Genetic variation in the subunits of globulin-1 storage protein of French bean.** Theoretical and Applied Genetics 59(2) 83-88. Engl., Sum. Engl., 28 Refs., Illus.

Phaseolus vulgaris. Proteins. Analysis. Snap beans. Composition. Genetics. USA.

Charge and mol. wt. heterogeneity of globulin-1 (G1) polypeptides of French beans was revealed by SDS-polyacrylamide gel electrophoresis (SDS-PAGE). Different bean cv. were classified into 3 groups on the basis of their protein subunit composition: Tendergreen, Garulac, and Contender. Nine distinct major bands ($\alpha 51$, $\alpha 49$, $\alpha 48.5$, $\beta 48^T$, $\beta 48^S$, $\beta 47$, $\gamma 45.5$, $\gamma 45^S$, and $\gamma 45^C$) and 2 minor bands ($\gamma 46^T$ and $\gamma 46^S$) were found to account for the 3 profiles seen on 1-dimensional SDS-PAGE. Two-dimensional analysis revealed these 11 protein bands to be composed of a min. of 14 distinct protein subunits. Tendergreen and

Sanilac types differ in their G1 polypeptide composition. The protein patterns of the Centennial types are intermediate, containing many protein subunits found in the patterns of the Tendergreen and Sanilac types, suggesting a genetic and evolutionary relationship. *(Author's summary)* C03

0049

17804 PILOSOF, A.M.; BARTHOLOMAI, G.B.; CHIRIFE, J. 1981. Kinetics of nitrogen solubility loss in heated flour and protein isolates from bean, *Phaseolus vulgaris*. Journal of Food Science 47(1):4-7. Engl., Sum. Engl., 18 Refs., Illus.

Phaseolus vulgaris. Bean flour. Proteins. Temperature. Water content. N.

Effect of temp., time, and MC on the loss of N solubility of heated bean flour and protein isolates was studied. Solubility loss followed 1st-order reaction kinetics in almost all cases studied. The rate of solubility loss was greatly increased with increasing MC both for flour and protein isolates; protein isolate was far more sensitive to heat treatment than flour. Activation energies for the 1st-order reaction constants were calculated and ranged between 20-30 kcal/mole. *(Author's summary)* C03

0050

17895 AVILA-RINCON, M.J.; ROMERO, L.; ALVAREZ TINAUT, M.C. 1981. Effect of boron and GA_3 treatments on growth and B, Cu, Mn and Zn contents in dwarf bean plants. 2. Reproductive stage of development. Anales de Edafología y Agrobiología 40(7/8) 1315-1322. Engl., Sum. Span., Engl., 23 Refs., Illus.

Phaseolus vulgaris. Nutrient solution. B. Gibberellins. Growth. Mineral content. Cu. Mn. Zn. Plant physiological disorders. Analysis. Plant reproduction. Snap beans. Dwarf beans. Toxicity.

Yield (dry wt. and no. of flowers and fruits), and B, Cu, Mn, and Zn contents were measured in plants of dwarf snap bean cv. Contender grown in hydroponic solution with different levels of B ranging from deficient (0.1 ppm) to moderately toxic (5.0 ppm). Stem apexes of B-deficient and normal plants were treated with GA_3 (5 ng/plant). Plants were harvested in the reproductive stage of development, when some fruits were totally formed but new flowers were still appearing. Levels of B or GA_3 application did not result in significant differences in yield, Mn content or distribution. B content in plant parts was closely correlated to the B concn. in the solution. A direct negative effect of toxic and deficient B levels on Zn transport to leaves was observed during the reproductive stage. Toxic treatments of B resulted in an extra mobilization of Cu from leaves. This mobilization is attributed to the pigment biosynthesis required for flower formation. *(Author's summary)* C03 C02

0051

18009 ALFONSO, A.; SURLI, J.A. 1981. Isoperoxidasas presentes en plantas y cultivos de tejidos de *Phaseolus vulgaris* L. *(Isoperoxidases in plants and tissue cultures of Phaseolus vulgaris)*. Ciencias de la Agricultura 10:67-72. Span., Sum. Span., Engl., 10 Refs., Illus.

Phaseolus vulgaris. Plant tissues. Analysis. Enzymes. Cultivars.

The patterns of isoperoxidases were determined in callus obtained from roots, hypocotyls, and leaves of bean cv. Velasco and Cuba C-25-9. Comparisons were made between their patterns and those of the same tissues of plants in vivo. The different parts of the plant cultured in vitro showed an isoperoxidase pattern relatively similar from the qualitative point of view, although quantitative differences exist. When this pattern was compared with those of the plants in vivo notable differences were seen in both cases. *(Author's summary)* C03

0052

17894 AVILA-RINCON, M.J.; GOMEZ-RODRIGUEZ, M.V.; ALVAREZ-TINAUT M.C. 1981. **Effect of B and GA_3 treatments on growth and B, Cu, Mn, and Zn distribution in dwarf bean (*Phaseolus vulgaris*, L.) plants. 1. Vegetative stage of development.** Anales de Edafologia y Agrobiologia 40(7/8): 1303-1313. Engl., Sum. Engl., Span., 30 Refs., Illus.

Phaseolus vulgaris **Nutrient solution. B. Gibberellins. Growth. Mineral content. Cu. Mn. Zn. Snap beans. Dwarf beans. Analysis. Plant physiological disorders. Toxicity.**

Growth (dry wt. and stem elongation) and B, Cu, Mn, and Zn contents were measured in plants of dwarf bean cv. Contender grown in hidroponic solution with B concn. ranging from deficient (0.1 ppm) to moderately toxic (5.0 ppm). Stem apexes of B-deficient and normal plants were treated with GA_3 (5 ng/plant). Plants were harvested when flower buds began to form. The effect of B on stem elongation was positive, the slightly toxic B level enhancing stem elongation above the control, even when these plants showed symptoms of toxicity. However, the highest B level resulted in other detrimental effects such as the detected decrease in plant absorption of Zn and Cu, which neutralized the positive effect. The effect of B on stem elongation could be related to gibberellin metabolism or action in plants, since the shortening of stems of B-deficient plants could be reverted by GA_3 application. Toxic B levels (provided not to be too severe) seemed to have the same effect as GA_3 application on stem elongation. However, stem elongation responses to GA_3 application did not involve changes in B content or distribution. A direct synergistic interaction existed between B and Mn at the level of root uptake. Mn concn. and content in roots were correlated to B content and concn. in roots and in the solution. Roots seem to regulate Mn transport to the stem. Mn content in stems was approx. the same for all the treatments. *(Author's summary)* C03 C02

0053

18008 PEREZ, N.; VALDES, E.; SURLI, J.A. 1981. **Cuerpos fenólicos en plantas de *Phaseolus vulgaris* L. infectadas con el virus del mosaico común del fríjol (BCMV).** [*Phenolic bodies in Phaseolus vulgaris plants infected with the bean common mosaic virus (BCMV)*] Ciencias de la Agricultura 10:61-66. Span., Sum. Span., Engl. 12 Refs.

Phaseolus vulgaris **Cultivars. Plant tissues. Phenolic content. Bean common mosaic virus.**

The presence of phenolic bodies was determined in leaf, petiole, hypocotyl, stem, and root tissues of healthy *Phaseolus vulgaris* plants as well as in plants infected with BCMV. Tissues of resistant var. Bolita 42 had more phenolic bodies than tissues of susceptible var. Caruaro for both healthy and infected plants. Infected plants always had a higher concn. of phenolic bodies than healthy ones, mainly in the leaves where these compounds are grouped around the central nerve and its ramifications. *(Author's summary)* C03 E04

0054

17858 HOUGEN, C.L.; MELLER, E.; GASSMAN, M.L. 1982. **Magnesium protoporphyrin monoester destruction by extracts of etiolated red kidney bean leaves.** Plant Science Letters 24(3): 289-294. Engl., Sum. Engl., 16 Refs., Illus.

Phaseolus vulgaris **Leaves. Enzymes. Analysis.**

Cell-free extracts prepared from the leaves of etiolated Red Kidney bean seedlings contain an enzyme which degrades Mg protoporphyrin monoester (Mg Proto ester). The activity is O_2-dependent, heat-labile, and has a pH optimum at 7.5. The enzyme has been partially purified by gel filtration on Sephadex G-25. This enzyme may play a role in porphyrin turnover. *(Author's summary)* C03

0055

18021 MAKRIDES, S.C.; GOLDTHWAITE, J. 1981. **Biochemical changes during bean leaf growth, maturity, and senescence. Content of DNA, polyribosomes, ribosomal RNA, protein, and chlorophyll.** Journal of Experimental Botany 32 (129):725-735. Engl., Sum. Engl., 40 Refs., Illus.

Phaseolus vulgaris. **Leaves. DNA. Leaf area. RNA. Protein. Chlorophyll. Composition.**

Changes in the DNA, polyribosome, rRNA, protein, and chlorophyll content of primary leaves of *Phaseolus vulgaris* var. Dwarf Horticultural Bush were studied during their lifespan. Leaf expansion was rapid up to day 8-9 then slowed until day 14 when leaf area and vol. reached their max. Total DNA in leaf tissue, excluding the veins, increased rapidly to day 8 then gradually until it reached 145 µg on day 12-13. Thereafter it stayed constant or increased slightly at a value of 212 µg/leaf (including major veins). Polyribosome content reached a max. at day 9-10, decreased rapidly to day 15 then decreased gradually. Monoribosome content was 50-70% of the total polyribosomes and showed a similar trend. Small polysomes (2-5 units) composed 30-35% of the total and remained constant. Total rRNA showed a similar trend to total polyribosomes, reaching peaks on days 8 (cytoplasmic RNA) and 12 (organelle RNA) then decreasing up to day 19. Protein increased rapidly from day 6 to day 10 then declined moderately until day 32 then more rapidly until a max. of 80% was degraded. Chlorophyll content increased steeply from days 6 to 10, reached a peak at day 16 then declined slowly until day 27 then rapidly thereafter. *(Summary by Field Crop Abstracts)* C03

0056

17889 POSCHENRIEDER, CH.; BARCELO, J. 1981. **Efectos tóxicos del manganeso sobre el crecimiento y metabolismo de *Phaseolus vulgaris*. 2. Interacciones Fe/Mn.** *(Toxic effects of manganese on the growth and metabolism of Phaseolus vulgaris. 2. Fe/Mn interactions).* Anales de Edafología y Agrobiología 40(5/6):927-934. Span., Sum. Engl., Span., 24 Refs., Illus.

Phaseolus vulgaris. **Snap beans. Nutrient solution. Mn. Analysis. Canopy. Roots. Mineral content. Fe.**

Mn and Fe contents of 4 groups of plants of snap bean cv. Contender, grown in nutrient solution containing equal amounts of Fe but different Mn concn., were determined at different stages of growth. Critical levels of Mn producing toxicity symptoms in beans are approx. 1000 ppm for the canopy and 3000 ppm for the roots. This corresponds to a Mn/Fe relationship above 10 which is higher than the optimum growth relationship 0.3/1 for beans. *(Author's summary)* C03

0057

17868 McKERSIE, B.D.; HUCL, P.; BEVERSDORF, W.D. 1982. **Solute leakage from susceptible and tolerant cultivars of *Phaseolus vulgaris* following ozone exposure.** Canadian Journal of Botany 60(1):73-78. Engl., Sum. Engl., Fr., 12 Refs., Illus.

Phaseolus vulgaris. **Cultivars. Leaves. Ozone. Mineral content. Ca. K. Sugars. Amino acids. Plant injuries.**

Leakage of total electrolytes, K, Ca, sugars, and amino acids from primary leaf discs of *Phaseolus vulgaris* cv. Seafarer (O_3 susceptible) and cv. Goldcrop (O_3 tolerant) was monitored following exposure to 40 ppm O_3 for 4 h. Significant differences in cv. response were not detected until 24 h after exposure, when leakage from Seafarer leaves was 220% for total electrolytes, 230% for Ca, 260% for K and sugars, and 400% for amino acids relative to controls, whereas the leakage from Goldcrop leaves remained at control levels. The water-soluble sugar and free amino acid content of a leaf homogenate also increased at the 24-h

sampling time. These accumulations may result from a reduced rate of phloem translocation. Rates of leakage and leaf-solute contents returned to control levels by 48 and 72 h after exposure. Kinetic analysis of solute efflux from leaf discs sampled from both cv. immediately after O_3 exposure indicated that these leaves contained an increased quantity of solutes which could be rapidly leached within 0.5 h. The subsequent linear rate of leakage between 0.5-4 h did not increase except in leaf discs sampled from Seafarer 24 h after exposure. The results are discussed in relation to the mechanism of O_3 injury in Seafarer and the basis of O_3 tolerance in Goldcrop. *(Author's summary)* C03

0058

18035 SATHE, S.K.; SALUNKHE, D.K. 1981. **A research note: solubilization of California Small White bean (*Phaseolus vulgaris* L.) proteins.** Journal of Food Science 46(3):952-953. Engl., Sum. Engl., 11 Refs., Illus.

Phaseolus vulgaris. **Proteins. Composition. Analysis.**

An intent to solubilize California Small White bean proteins showed that these contained 25.90% CP on dry wt. basis. Albumins accounted for 11.30% of the total CP. Alkali (1N NaOH) extractable proteins had an isoelectric pH of approx. 4.0. About 88% of the total CP were recovered employing acid/alkali extraction. Polyacrylamide gel electrophoretic analyses indicated that the acid soluble proteins were comprised of at least 5 components whereas the alkali soluble proteins consisted of at least two components. *(Author's summary)* C03

0059

18074 HUTTON, M.J.; VAN STADEN, J.; DAVEY, J.E. 1982. **Cytokinins in germinating seeds of *Phaseolus vulgaris* L. 1. Changes in endogenous levels within the cotyledons.** Annals of Botany 49(5):685-691. Engl., Sum. Engl., 23 Refs., Illus.

Phaseolus vulgaris. **Cotyledons. Cytokinins. Germination. Analysis. Embryo.**

Ethanolic extracts from the cotyledons of mature dry bean cv. Contender seed yielded cytokinin-like activity which cochromatographed with zeatin and ribosylzeatin. Under conditions which stimulated germination and cotyledon expansion, the level of these cytokinins decreased rapidly in both intact embryos and excised cotyledons. In the excised cotyledons the decrease was continuous, resulting in very low levels of cytokinin being detected after 4 days of incubation. With embryonic axis present, however, the initial decrease was arrested and reversed after 3 days. This suggests that the cotyledons do not synthesize cytokinins but that these hormones are imported from the embryonic axis, particularly once radicle growth is well under way. *(Author's summary)* C03

0060

18311 HOLST, G.J. VAN; KLIS, F.M.; WILDT, P.J.M. DE; HAZENBERG, C.A. M.; BUIJS, J.; STEGWEE, D. 1981. **Arabinogalactan protein from a crude cell organelle fraction of *Phaseolus vulgaris* L.** Plant Physiology 68(4):910-913. Engl., Sum. Engl., 24 Refs., Illus.

Phaseolus vulgaris. **Proteins. Hypocotyls. Amino acids. Sugars. Composition.**

Sonication of a crude cell organelle fraction from hypocotyls tissue of dark-grown bean seedlings, and from suspension-cultured cells released a hydroxyproline-containing protein. The purification of this protein is described. It was found to be an arabinogalactan protein composed of 90% carbohydrate and 10% protein. The major sugars are galactose, arabinose, and uronic acids, and the major amino acids are hydroxyproline, serine, and alanine. Its mol. wt. was estimated at 1.4×10^5 d and the isoelectric point at pH 2.3. The molecule is soluble in 5% trichloroacetic acid and can be precipitated with β-galactosyl Yariv antigen. Pulse-chase expt. indicated that it was a secretory protein. The biosynthesis of arabinogalactan proteins is discussed. *(Author's summary)* C03

0061

18312 HOLST, G.J. VAN; KLIS, F.M. 1981. Hydroxyproline glycosides in secretory arabinogalactan-protein of *Phaseolus vulgaris* L. Plant Physiology 68(4): 979-980. Engl., Sum. Engl., 15 Refs.

Phaseolus vulgaris. Proteins. Analysis. Sugars.

The carbohydrate moiety of secretory arabinogalactan protein in bean cv. Prélude seedlings is attached to the peptide backbone through hydroxyproline, serine, and threonine. Hydroxyproline-linked side chains, consisting of arabinose, galactose, glucose, and rhamnose, comprise the major part of the sugar residues. These hydroxyproline glycosides differ from those in non-extractable cell wall protein but show similarities with those in wall protein of the alga *Chlamydomonas*. *(Author's summary)* C03

See also 0035 0037 0078 0080 0110

D00 AGRONOMY

0062

14904 MIGLIORANZA, E.; KIKUTI, P.; SIMOES, J.W. 1979. Feijão. *(Beans). In* ——. Culturas agrícolas em empresas florestais: dados técnicos básicos. Piracicaba-SP, Brasil, Instituto de Pesquisas e Estudos Florestais. Circular Técnica no. 56. pp. 23-28. Port.

Phaseolus vulgaris. Cultivation. Brazil.

Technical recommendations for bean cultivation in Brazil are included dealing with the following aspects: climate and soil; cv.; fertilization; liming; planting time and density; land preparation; weed, pest, and disease control; amount of seed required; and yield. *(Summary by F.G. Trans. by L.M.F.)* D00

D01 Soil, Water, Climate and Fertilization

0063

15885 NYABYENDA, P.; SEKANABANGA, C.; NYANGURUNDI, L. 1981. **Bean production in Rwanda.** *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.98-121. Engl., Sum. Engl., 29 Refs., Illus.

Phaseolus vulgaris. **Production. Cultivation. Cultivars. Cultivation systems. Marketing. Storage. Seed production. Rwanda.**

Different aspects of bean production in Rwanda are described: bean types (local and introduced var., selections), production areas and systems, production, marketing, storage, utilization, and factors limiting production. Rwanda's bean program (1976-81) is also discussed, it contemplates an increase of 47.5% in bean production (from 135,600 to 200,000 t), an increase of 6% in cultivated area (from 164,300 to 174,000 ha), and an increase in yield (from 800 to 1150 kg/ha). These increases would be achieved by crop rotation, training in improved cultural practices through extension work, use of trellises, extending the use of climbing beans and new selected var. to high alt. regions and the use of bush var. in dry, low, and intermediate alt. regions, using adequate storage methods, and by putting into practices research results from the Institut des Sciences Agronómiques du Rwanda (ISAR) and by training personnel. Aspects highlighted are the problem of the middlemen, the low profitability that bean growing represents for the farmers, and the role that the Grenier National du Rwanda (GRENARWA), the SILO project, and the Office des Produits Vivrieres et Animaux (OPROVIA) play in the improvement of deficient marketing, transportation, and storage services. Regarding seed production and distribution, 5 centers (100 ha in total) multiply the seed provided by ISAR, which is then distributed among the municipal agricultural demonstration fields by the Seed Selection Project (SSS). The main goals of the research program for the 1980-84 period are included *(Summary by I.B. Trans. by L.M.F.)* D01 J00

0064

15884 EDJE, O.T.; MUGHOGHO, L.K., RAO, Y.P., MSUKU, W.A.B. 1981. **Bean production in Malawi.** *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.54-97. Engl., Sum. Engl., 39 Refs., Illus.

Phaseolus vulgaris. **Cultivation. Climatic requirements. Cultivation systems. Research. Malawi.**

Aspects on the importance, types, introduction, distribution, and the results of research on the production of beans, the major food crop, in Malawi are discussed. Beans grown are mixtures (70% climbing beans) and are grouped according to their use in dry beans, snap

beans, and canning beans (the latter produced under irrigation). Soil and climatic conditions are given for the crop and the production systems used (mixed cropping, ridge intercropping, relay cropping, double cropping, time of planting, plant population, fertilizers, weed control, irrigation, harvesting, and threshing) are described in detail. There is no data collected on the area planted to beans or on the total production. The internal market is dominated by the Agricultural Development and Marketing Corporation (ADMARC) which is responsible for the purchase of the surplus sold by farmers. The central region of the country produces over 70% of the bean crop. Local names of different bean dishes are also included. Major constraints include irregular rainfall, diseases (a total of 23 of which anthracnose is the most important), pests, lack of suitable var., research and extension workers, and the need of adequate seed production and distribution. The objectives of the bean improvement program are given along with information on the collection of bean germplasm and future plans. *(Summary by I.B. Trans. by L.M.F.)* D01 J00

0065

15887 RUBAIHAYO, P.R.; MULINDWA, D.; SENGOOBA, T.; KAMUGIRA, F. 1981. **Bean production in Uganda.** *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.155-186. Engl., Sum. Engl., 47 Refs., Illus.

Phaseolus vulgaris. **Cultivation. Diseases and pathogens. Pests. Seed production. Production. Trade. Economics. Uganda.**

Several aspects of bean production in Uganda, an agricultural country that cultivates a wide range of land races and improved cv., are analyzed: importance of beans, types, introduction, soil and climatic conditions, cropping systems, production (estimated to be 252,500 t in 1977 in an area planted of 338,300 ha with a calculated yield of 746 kg/ha), trade, and utilization. Factors limiting production include problems in the production and distribution of seed (it is estimated that 500 t of seed would be required to meet the annual demand), pests and diseases, poor agronomical and cultural practices. A description is given of the bean program in Uganda which currently has 3 projects: French bean breeding, white haricot bean breeding (for canning purposes), and bean pathology. Expt. using mutagenic agents have been conducted by Makerere U. to improve seed and protein yield of selected Banja 2 and Mexico 142 mutants. Achievements and future plans are summarized. *(Summary by I.B. Trans. by L.M.F.)* D01 J00

0066

15886 KAREL, A.K., NDUNGURU, B.J.; PRICE, M.; SEMUGURUKA, S.H.; SINGH, B.B. 1981. **Bean production in Tanzania.** *In* Regional Workshop Potential for Field Beans in Eastern Africa, Lilongwe, Malawi, 1980. Proceedings. Cali, Colombia, Centro Internacional de Agricultura Tropical. Series 03EB-1. pp.122-154. Engl., Sum Engl., 37 Refs., Illus.

Phaseolus vulgaris. **Cultivation. Climatic requirements. Marketing. Seed production. Research. Tanzania.**

The following aspects of bean production in Tanzania are discussed: its importance, types of beans, their introduction (var. for canning purposes and for exportation) and distribution, soil and climatic conditions, cropping systems, production, trade, storage, and utilization. Factors limiting production, which is predominantly rainfed, are described in detail: use of genetic mixtures, pests, and diseases as well as socioeconomic and institutional constraints. The National Milling Corporation (NMC) is in charge of channeling excess production and regulating marketing. Tanzania has a well organized seed production and distribution system. Advances in research and the release of var. Tengeru No. 8 and 16, T3 and Kabanima (the last 2 for local use) since the bean improvement program was started in Tanzania are highlighted. *(Summary by I.B. Trans. by L.M.F.)* D01 J00

0067

17857 STARKEY, T.E.; DAVIS, D.D.; PELL, E.J.; MERRILL, W. 1981. **Influence of peroxyacetyl nitrate (PAN) on water stress in bean plants.** HortScience 16 (4):547-548. Engl., Sum. Engl., 11 Refs.

Phaseolus vulgaris. **Cultivars. Water stress. Air pollution. Symptomatology.**

Bean plants of cv. Provider and Stringless Black Valentine were exposed to 395 $\mu g/m^3$ (0.08 ppm) PAN for 0.5 h and subjected to drought stress following exposure. PAN influenced the plant water potential of PAN-sensitive cv. Provider, resulting in visible wilting and reduced soil MC. There was no effect of PAN on the water relations of the PAN-tolerant cv. Stringless Black Valentine. *(Author's summary)* D01

0068

15882 NJUNGUNAH, S.K.; NDEGWA, A.M.M.; RHEENEN, H.A. VAN; MUKUNY'., D.M. 1981. **Bean production in Kenya.** *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. 35-53. Engl., Sum. Engl., 66 Refs., Illus.

Phaseolus vulgaris. **Cultivation. Climatic requirements. Cultivation systems. Production. Trade. Marketing. Storage. Uses. Kenya.**

The following aspects of bean production in Kenya are discussed: the importance of beans, types, their introduction and distribution, soil and climatic conditions, cropping systems (a review of previous information), production, trade, storage, and utilization, factors limiting production (diseases, pests, and labor). Research concentrates on agronomy, breeding, and pathology, and is conducted at the Dry Land Research Station, Katumani; Embu Agricultural Research Station, Embu; Nyanza Agricultural Research Station, Kisii; and the Western Agricultural Research Station, Kakamega, being coordinated at the Thika National Horticultural Research Station. Three var. have been released: GLP-2, GLP-24, and GLP-1004. The results obtained are given along with a summary of future plans. *(Summary by I.B. Trans. by L.M.F.)* D01 J00

0069

18012 NAKAGAWA, J.; NAKAGAWA, J.; MACHADO, J.R.; BRINHOLI, O.; MARCONDES, D.A.S. 1981. **Comportamento de algumas cultivares de feijão (*Phaseolus vulgaris* L.) na presença e ausência de micronutrientes. Experimento 1.** *(Performance of several bean cultivars in the presence and absence of micronutrients. Experiment 1).* Cientifica 9(1):67-71. Port., Sum. Port., Engl., 19 Refs.

Phaseolus vulgaris. **Cultivars. Fertilizers. B. Cu. Fe. Mn. Mo. Zn. Micronutrients. Yields. Planting. Timing. Brazil.**

The performance of 6 dry bean cv. :Bico de Ouro, Carioca, Goiano Precoce, Pirata, Regente Feijó, and Rosinha G-2) in the presence and absence of micronutrients was studied in 2 field expt. carried out on a yellow red Latosol, sandy phase, municipality of São Manuel, SP, Brazil. One expt. took place during the rainy season and the other during the dry season. A micronutrient fertilizer known as fritted trace elements FTE BR-12 (11.5% ZnO, 7.0% B_2O_3, 1.0% CuO, 5.4% Fe_2O_3, 5.5% MnO_2, and 0.2% MoO_3) was applied at a rate of 49 kg/ha. All plots received th. same NPK fertilization. The micronutrients applied in this form and at this rate did not affect the production of these cv. However, differences in yield were observed in relation to planting season. Cv. Regente Feijó had the highest bean production during the dry season while cv. Goiano Precoce and Pirata gave highest yields during the rainy season. *(Author's summary)* D01

0070

17435 JANSSEN, B.H.; LIE, T.A. 1980. **Report of a consultancy mission on soil fertility and *Rhizobium* microbiology.** Thika, Kenya, Grain Legume Project. National Horticultural Research Station. 33p. Engl., 12 Refs., Illus.

Phaseolus vulgaris. **Soil fertility. Microbiology. *Rhizobium.* Fertilizers. N. Soil analysis. P. pH. Nitrogen fixation. Nodulation. Kenya.**

From Jan. 8-Feb. 22, 1980, a Dutch consultancy mission visited Kenya to advise the Grain Legume Project in this country on aspects related to soil fertility and *Rhizobium* microbiology. Field observations made during the visit are given and this information is analyzed. Specific recommendations are also given. Regarding fertilization in areas where no response to P has been found, it is recommended to apply 36 kg N, especially in the region of Katumani where N content is low. Moreover, fertilization should be based on soil analysis data. In western Kenya fertilizer applications should again be based on soil analyses; the possibility that the no response in beans is due to climatic factors and its relationship with disease incidence should be studied. If soil analysis data are available, other important parameters in soil-bean relationships should be taken into account for fertilization; pH, organic N, and P-Mehlich. Recommendations for further trials on the efficiency of nodulation and N fixation with indigenous *Rhizobium* strains and its relationship with adequate fertilization are given. Tentative fertilization recommendations are included. Appendixes are included on N fixation by beans in Kenya, and soil fertility and response to fertilizers. *(Summary by EDITEC. Trans. by L.M.F.)* D01 101

0071

17891 MUÑOZ A R.; MOLINA M., L. 1982. **Fertilización del fríjol arbustivo (*Phaseolus vulgaris* L.) en clima frío y medio de Antioquia.** *(Fertilization of dwarf bean in cold and temperate climates in Antioquia).* Suelos Ecuatoriales 12(1):233-244. Span., Sum. Span., 7 Refs., Illus.

Phaseolus vulgaris. **Dwarf beans. Cultivars. Fertilizers. P. N. K. Dung. Climatic requirements. Yields. Agricultural lime. Inoculation. *Rhizobium.* Colombia.**

Fertilization trials carried out in Antioquia, Colombia, with dwarf bean var. Diacol Catío, ICA-Toné, and the promissory lines Línea 20270 and Línea 10487, showed highly significant responses to the application of P and FYM and to a lesser extent to N and K. In moderately cold climates (acid soils with high OM content, low in available P, and low Ca, Mg, and K exchange capacities), high productions of 1.3-2.0 t beans/ha were obtained with rates of 0-50, 75-150, 0-50, 1000-2000, and 1000 kg N, P, K, FYM, and dolomitic limestone/ha, resp., applied to the bottom of the furrow at planting. In temperate climates (soils with low to intermediate OM contents and similar to the former in other chemical characteristics) grain yields similar to those of moderately cold climates were reached with 30-60, 90, 30, and 500-1000 kg N, P, K, and FYM/ha, resp. Leaf application of urea 2% at 2-wk. intervals, starting at 15 days after germination up to maturity, produced a highly significant increase in yields without N application or with 30 kg N/ha applied to the soil. The apparently contradictory results in liming and in seed inoculation with *Rhizobium* indicate the need for further studies. The tested materials, with few exceptions, showed a varietal response to fertilization. Var. ICA-Toné was outstanding for the temperate climate zone, and Diacol Catío and Línea 20270 for the moderately cold climate zone. *(Author's summary. Trans. by L.M.F.)* D01

0072

18057 MUIRHEAD, W.A., WHITE, R.J.G. 1981. **The influence of soil water potential on the flowering pattern, pod set and yield of snap beans (*Phaseolus vulgaris* L.).** Irrigation Science 3(1):45-56. Engl., Sum. Engl., 19 Refs., Illus.

Phaseolus vulgaris. **Flowering. Irrigation. Podding. Yields.**

The effect of the soil water potential on pod yield of snap beans grown with a series of irrigation frequencies was studied over 2 seasons. The treatments were to furrow-irrigate either weekly or fortnightly during the preflowering period and each treatment then received weekly or fornightly irrigations to harvest. These treatments were compared with trickle irrigation applied daily in the 1st, and every 2nd day in the 2nd season. Irrigation frequencies during preflowering did not influence pod yield; this was determined by irrigation treatments applied after flowering. The highest yield was similar in each season (16.7 t/ha) and was produced under trickle irrigation. Pod yield was reduced by 0.5 t/ha each day the soil water potential at 30 cm depth was less than -50 kPa. This relationship accounted for approx. 77% of the variation in pod yield. *(Author's summary)* D01 C02

0073

17346 GUIMARAES, C.M.; CASTRO, T. DE A.P.E. 1981. **Sistema radicular do feijoeiro e profundidade de aplicação do adubo.** *(Root system of beans and depth of application of manures).* Goiânia-GO, Brasil, Empresa Brasileira de Pesquisa Agropecuária. Centro Nacional de Pesquisa-Arroz, Feijão. Pesquisa em Andamento no. 31. 3p. Port., Illus.

Phaseolus vulgaris. **Rooting. Manures. Water stress. Brazil.**

Root growth of beans was studied under conditions in which manures were applied superficially or deeply. Superficial application of manure was done with a conventional planter and profound application with a special planter that applies manure at approx. 20 cm in depth to seeds in the usual way. Planting took place during the 1980 dry season; water stress occurring during its growth cycle. Samples of the root system were taken by trenching. A higher concn. of roots was observed among rows than among plants; higher root density occurred most of the time with superficial application, regardless of the method of application, time, and sampling site. *(Summary by EMBRAPA. Trans. by L.M.F.)* D01 C02

0074

17422 KRANZ, W.M.; MUZILLI, O.; POMPEU, A.S.; VAN RAIJ, B. 1976. **Respostas do feijoeiro ao nitrogênio, fósforo e potássio nos principais solos do Estado do Paraná.** *(Response of beans to nitrogen, phosphorus, and potassium in major soils of the state of Paraná).* *In* Congresso Brasileiro de Ciência do Solo, 15o., Campinas-SP, Brasil, 1975. Anais. Campinas, Sociedade Brasileira de Ciência do Solo. pp.235-238. Port., Sum. Port., 4 Refs.

Phaseolus vulgaris. **Fertilizers. N. P. K. Statistical analysis. Brazil.**

Studies of response curves to NPK in major bean producing areas of the state of Paraná (Cascavel, Imbituva, Ivaiporã, Londrina, and Ibaiti), Brazil, were carried out during 2 cropping cycles (rainy and dry seasons) to achieve, according to recommendations, subsidies for fertilization. No significant response to N application was observed; increases of only 12% were obtained at the rate of 120 kg N/ha. P always had a linear effect on production, with av. increases of 30-55% for the rainy season and 48-78% for the dry season, at the rate of 40 kg/ha. No significant differences were observed with K application for all of the studied areas and cropping cycles. *(Author's summary. Trans. by L.M.F.)* D01

0075

17872 EVANS, L.S.; LEWIN, K.F.; CUNNINGHAM, E.A.; PATTI, M.J. 1982. **Effects of simulated acidic rain on yields of field-grown crops.** New Phytologist 91 (3):429-441. Engl., Sum. Engl., 21 Refs., Illus.

Phaseolus vulgaris. **Seedlings. Rainfall. Yields. pH.**

Expt. were performed to determine the effects of simulated acidic rainfall on yields of radish, garden beet, kidney bean, and alfalfa grown under standard agronomic practices. The

exptl. design allowed the detection of statistically significant differences among means that differed from each other by less than 10%. The plants were exposed to small additions of simulated rain at pH levels of 5.7, 4.0, 3.1, and 2.7. The spray-to-wet simulated rain applications were similar in vol. to the median of all ambient rainfall showers. Some plants received no simulated rainfall and all were exposed to ambient rainfall at Brookhaven National Lab. (Upton, N.Y., USA), which had a mean weighted pH of 4.06 during the summer of 1980. With kidney bean, there were no significant differences among treatments of such parameters as no. of seeds/plant, mass of seed/plant, and no. of pods/plant. These studies suggest that no generalizations about crop sensitivity with regard to either plant portion harvested (roots, fruits, leaves) or taxonomic considerations can be made. *(Author's summary)* D01

0076

18055 FERNANDES, M.S.; NEVES, M.C.P.; SA, M.F.M. 1982. **Effects of supplemental nitrogen on nodulation, assimilation of nitrogen, growth and seed yield of *Phaseolus vulgaris* and *Vigna unguiculata*.** *In* Graham, P.H.; Harris, S.C., eds. Biological nitrogen fixation technology for tropical agriculture, Cali, Colombia, 1981. Papers presented. Cali, Centro Internacional de Agricultura Tropical. pp. 317-326. Engl., Sum. Engl., 6 Refs. Illus.

Phaseolus vulgaris. N. Fertilizers. Nodulation. Growth. Plant assimilation. Yields. Nitrogen fixation. *Rhizobium*. Inoculation.

Supplemental N equivalent to 60 kg N/ha was applied to inoculated plants of *Phaseolus vulgaris* cv. Rio Tibagi and *Vigna unguiculata* cv. Vita 34 at flowering, either as nitrate N or ammonium N + nitrapyrin to soil, or as urea applied foliarly in repeated dressings. Seeds were inoculated with *Rhizobium* (C-05 and F413 mixed for beans). Plants harvested at weekly intervals thereafter were assayed for nitrogenase and nitrate reductase activity, nodule development, and the ureide content of the xylem exudate. Bean plants had lower nodule dry wt. and were weaker in $N_2(C_2H_2)$ fixation than cowpea, but profiles of activity were similar for both species. The nitrate reductase activity of bean plants was about 3 times greater than that of cowpea. Applied N affected nitrate reductase activity in cowpea, but in beans the sharp increase in nitrate reductase activity soon after flowering occurred with or without supplemental N. In beans max. ureide content was found during flowering and decreased just after application of supplemental N. Yield of green bean pods was enhanced considerably with applied nitrate-N. Cowpeas outyielded beans in all treatments, but were less efficient in utilization of nitrate-N. *(Author's summary)* D01 I01

0077

18042 CORELLA V., J.F. 1982. **Respuesta del frijol común *(Phaseolus vulgaris* L.), a la fertilidad nitrogenada y fosfórica en un Typic Eutropept de Costa Rica.** *(Response of common bean to nitrogen and phosphorus fertility in a Typic Eutropept in Costa Rica).* Costa Rica, Ministerio de Agricultura y Ganadería. 8p. Span., 13 Refs., Illus.

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

Phaseolus vulgaris. Fertilizers. N. P. Yields. Mineral content. Leaves. Costa Rica.

In the Cantón de Upala, province of Alajuela, Costa Rica, an expt. was conducted in a Typic Eutropept soil in an area of tropical moist forest with transition to perhumid in order to study optimum NP application in beans. Soil was of intermediate fertility with a pH of 6.3, and normal P, K, Ca, Mg, and minor elements contents. Levels of N and P applied were 0, 30, 60, 90, and 120 kg/ha and 0, 30, 60, and 90 kg/ha, resp.; K was also applied at 40 kg/ha. A randomized complete block design, arranged in a 5 x 4 factorial, was used with 4 replications. Parameters tested were no. of pods/plant, beans/plot, leaf nutrient content, wt. of 100 grains, and yield. Yields increased with higher amounts of applied fertilizer.

When levels between 0-120 kg N were applied per ha, there was a 60% increase in yield; however, the highest increase with the lowest amount of fertilizer applied was reached with 30 kg N/ha for an increase of 350 kg beans/ha. Yield increases with up to 60 kg P/ha, then decreases. The highest net return/colon invested is reached when 30 kg P are applied per ha. Results of leaf analyses indicate that the nutrient contents are normal and no significant effect of the treatments on them was observed. The most adequate application level for beans is 30 kg N + 30 kg P/ha. *(Author's summary. Trans. by L.M.F.)* D01

0078

18041 CORELLA V., J.F. 1982. **Efecto de diferentes dosis de fertilizante (al suelo y foliar), sobre el rendimiento de fríjol (*Phaseolus vulgaris* L.), en un Typic Eutropept de Costa Rica.** [*Effect of different fertilization rates (applied to the soil and to leaves) on bean yields in a Typic Eutropept in Costa Rica*]. Costa Rica, Ministerio de Agricultura y Ganadería. 11p. Span., 12 Refs., Illus.

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

Phaseolus vulgaris. **Fertilizers. N. P. K. Yields. Leaves. Mineral content. Costa Rica.**

To study the effect of a 10-30-10 fertilization formula and the use of foliar nutrient on the yield of bean var. Jamapa, an expt. was conducted in the Cantón de Upala, province of Alajuela, Costa Rica, on a Typic Eutropept soil in tropical moist forest with transition to perhumid. Six levels of 10-30-10 from 0-230 kg/ha, all applied at planting, were assessed; 30 ml foliar nutrient/16-l pump were also applied at 4, 6, and 8 wk. N P:K relationship in the foliar nutrient was 8:8:6%; minor elements were also included. A randomized complete block design was used. Parameters assessed were the no. of pods/plant, no. of beans/pod, leaf nutrient content, yield, and wt. of 100 grains. The addition of foliar nutrient increased yields by 14%, this difference not being statistically significant. Higher yields were obtained with higher rates of 10-30-10 fertilizer, except at 230 kg/ha which decreased yields. The highest yield increase with the lowest amount of fertilizer was reached when 92 kg were applied per ha, outyielding the check in 400 kg beans/ha. At 138 kg/ha an increase in yield of 568 kg/ha was obtained; with 184 kg/ha bean yields increased to 768 kg/ha. The content of different nutrients in the leaves is normal. Leaf fertilization did not have a significant effect on the no. of pods/plant; however, increases in the rates of 10-30-10 fertilizer did affect the no. of pods/plant in a positive manner (1%). *(Author's summary. Trans. by L.M.F.)* D01 C03

0079

18310 SILVEIRA, P.M. DA; GUIMARAES, C.M.; STONE, L.F.; KLUTHCOUSKI, J. 1981. **Avaliação de cultivares de feijão para resistência à seca baseada em dias de estresse de água no solo.** *(Evaluation of bean cultivars for drought resistance on the basis of days of soil water stress).* Pesquisa Agropecuária Brasileira 16(5):693-699. Port., Sum. Port., Engl., 11 Refs.

Phaseolus vulgaris. **Cultivars. Host-plant resistance. Water stress. Yields. Drought. Statistical analysis.**

Preto- and mulatinho-type bean cv. were assessed for drought resistance on the basis of days of soil water stress. Yield trials were installed on 6 planting dates using 8 preto-type cv. (P-730, GO-3836, Iguaçu, Rio Tibagi, P-729, Rico 23, Tambó, and Cuva 168-N) and 6 mulatinho-type cv. (Mulatinho Paulista, Favinha, Vila Nova, IPA-7419, Mulatinho Vagem Roxa, and Mulatinho Irecê) in a randomized block design. Days of soil water stress were measured for all cv. of each planting through a water balance, using a computer model. Days of water stress were those in which the total extractable soil water was 25% below the storage capacity until 1 m depth level. Simple linear regression studies were made between production and no. of days of water stress in all 6 expt. during the flowering stage; the

productivity of each cv. was also compared with the general av. of the group. Grain yield decreased as no. of days of soil water stress increased in all preto- and mulatinho-type cv. In general, yield av. was higher in the mulatinho-type cv. than in the preto-type cv. under soil water stress. Among preto-type cv., P-730 was the most steady and Rio Tibagi had the highest production, with 24.15% more than the av. under 0, 5, 10, and 15° soil water stress. Among mulatinho-type cv., Favinha was the most steady and IPA-7419 had the highest production, with 13.61% more than the av. under the same degrees of soil water stress. The advantage of this method of evaluating drought resistance is that yields of cv. with different flowering stages can be compared directly; these may be subject to different degrees of water stress. *(Author's summary)* D01 G01

0080

18076 ENRIQUEZ, G.A., CHIRIBOGA, C. 1982. **Variabilidad del contenido de proteína en el grano de frijol común cultivado en diferentes condiciones del medio ambiente.** *(Variability of protein content of beans cultivated under different environmental conditions).* Revista Latinoamericana de Ciencias Agrícolas 16(1): 111-121. Span., Sum. Span., Engl., 10 Refs.

Phaseolus vulgaris **Cultivars. Protein content. Temperature. Rainfall. Mineral content. pH. Ecuador.**

Eight regional trials were conducted in the low valleys of the Ecuadorian highlands to study the agronomic characteristics and protein % of 8 bean var.: Algarrobo, Diacol Calima, Diacol Andino, Matambre, Amarillo, Diacol Numa, Panamito, and Línea 32. Data on alt., av. temp., rainfall, and soil NPK contents and pH were recorded for each locality. For each var. at each site the following parameters were studied: days to flowering and physiological maturity, no. of pods/plant, no. of grains/pod, wt. of 100 seeds, and yield. HI and total plant yield, except roots, were estimated. Protein % correlated with the characteristics of each site. The highest correlation was recorded with the temp. ($r = -0.928$); the 2nd factor was HI ($r = -0.906$). Multiple correlations were made between factors that best predict protein %, yield and HI were found to correlate best and should be considered in an equation for prediction. Protein % for one var. can be better predicted with an equation that considers temp., days to maturity, and HI. *(Author's summary)* D01 C03

See also 0089 0095 0099 0122 0177 0193

D02 Cultivation Practices: Planting, Weed Control and Harvesting

0081

17882 LOLLATO, M.A.; FARIA, R.T. DE; SILVA, W.R. DA 1982. **Efeitos de espaçamento e densidade de semeadura na qualidade da semente do feijoeiro.** *(Effect of row spacing and plant density on bean seed quality).* Pesquisa Agropecuária Brasileira 17(1):109-119. Port., Sum. Port., Engl., 25 Refs.

Phaseolus vulgaris. **Spacing. Cultivars. Seed characters. Brazil.**

Expt. were conducted in Irati, Ivaiporã, and Siqueira Campos, PR, Brazil, to evaluate the effects of row spacing and plant density on seed quality of bean cv. Carioca, Aroana, and Goiano Precoce, in the dry season of 1978, wet season of 1978/79, and dry season of 1979. Row spacings of 80, 60, 48, and 40 cm were studied for Carioca and Aroana and 60, 48, 40, and 30 cm for Goiano Precoce; plant densities were of 10, 15, and 20 plants/m. Row spacing affected individual seed wt., wider spacing resulting in heavier seed. In cv. Aroana lower plant density resulted in fewer seedlings infected by fungi and bacteria. The germination test, accelerated aging test, and seed depletion test did not show any effect of row spacing and plant density on the physiological quality of seeds. *(Author's summary)* D02 D04

0082

17434 HESS, C. 1977. **El Basagran aplicado a frijoles en México.** *(Bentazon applied to bean crops in Mexico).* Reportes Agrícolas BASF 3:10-13. Span., Illus.

Phaseolus vulgaris. **Weeding. Herbicides. Mexico.**

The excellent results obtained by the Instituto Nacional de Investigaciones Agrícolas and the General Direction of Plant Health in Mexico with the use of bentazon for weed control in beans are reported. Technical recommendations for its application are included. *(Summary by F.G. Trans by L.M.F.)* D02

0083

17829 ALONSO, J. 1980. **Control de malezas en soja y poroto.** *(Weed control in soybeans and beans).* Avance Agroindustrial 1(3):28-29. Span.

Phaseolus vulgaris. **Weeding. Herbicides. Argentina.**

The advantages of using chemical products for weed control are discussed. Product alternatives and application times (planting, preemergence, and postemergence) are given. The most common perennial and annual weeds found in beans in eastern Tucumán, Argentina, are listed. *(Summary by F.G. Trans. by L.M.F.)* D02

0084

17704 KOSTEWICZ, S.R., TYSON, R.V.; STALL, W.M. 1981. **Bush snap bean yields as influenced by row spacing and weed population.** Proceedings of the Florida State Horticultural Society 94:127-129. Engl., Sum. Engl., 8 Refs., Illus.

Phaseolus vulgaris. **Snap beans. Dwarf beans. Spacing. Planting. Weeding. Yields. USA.**

Bush snap bean cv. Sprite was planted in the fall of 1980 at 12, 18, 24, and 36-in. rows with 1.5-in.-row spacings on a St. John's fine sand near Gainesville, Florida (USA). Beans were either cultivated once or left uncultivated. Total and marketable pod yields increased as plant density increased. A single between-row cultivation 21 days after planting resulted in a doubling of yield, however, yields in general were low due to heavy in-row weed pressures. In the spring 1981 season, 12, 18, and 36-in rows and 1.5-in.-in-row spacings were used in combination with 4 weed control treatments (weed-free, DCPA broadcasted preemergence, DCPA 8-in banded preeemergence over the row, and weedy check) and 3 cultivation levels (0, 1, and 2). Highest yields of marketable and total pods were associated with closer spaced rows (high plant population) and lowest weed densities (weed-free growing area). Cultivation was effective in reducing weed levels and increased yields at wide row spacings, but decreased yield at 12-in. row spacing. *(Author's summary)* D02

0085

17887 GONZALEZ A., M., MARRERO G., H. 1981. **Influencia de la profundidad de siembra en la incidencia de *Macrophomina phaseolina* (Tassi) Goid., sobre plántulas de frijol.** *(Influence of planting depth on the incidence of Macrophomina phaseolina on bean seedlings)* Ciencias de la Agricultura 10:3-7. Span., Sum. Span., Engl., 6 Refs.

Phaseolus vulgaris. **Planting.** *Macrophomina phaseolina.* **Germination. Seedlings. Cuba.**

The influence of planting depth (2, 4, or 6 cm) on the disease incidence of ashy stem blight, caused by the fungus *Macrophomina phaseolina*, was studied under natural and controlled conditions in the province of Holguin, Cuba. A higher % of germination and a lower no. of affected plants were obtained at a planting depth of 2 cm. This depth is recommended for plantings on red ferralytic soils infested by *M. phaseolina*. *(Author's summary)* D02 E03

0086

16046 REPUBLICA DOMINICANA. SECRETARIA DE ESTADO DE AGRICULTURA. 1978. **Fitotecnia: producción de semilla de frijol con el uso de alta tecnologia.** *(Plant breeding: bean seed production using advanced technology). In* ——. Informe Anual 1978. La Herradura, Santiago de los Caballeros, Centro de Desarrollo Agropecuario, Zona Norte. pp.3-7. Span., Illus.

Phaseolus vulgaris. **Cultivation. Land preparation. Seed production. Mechanization. Dominican Republic.**

In Nov. 1977 a project was carried out by the Centro de Desarrollo Agropecuario, Zona Norte (CENDA - Dominican Republic) on red bean seed production using var. Pompadour Checa to purify bean material that would serve as a basis for the Seed Department of the Secretary of Agriculture to initiate a seed certification program. The expt. took place on 96.85 ha of the Banegas farm of the Instituto Agrario Dominicano which was divided into 20 lots. The following techniques were used: mechanized planting, density of 20,000 plants/0.063 ha, chemical weed control, fertilizers broadcasted or worked in with the harrow, upflow irrigation, aerial pest control, manual harvesting, and mechanized threshing. Total production was 110.7 t of high quality seed. Highest yielding lots corresponded to those with a good land preparation. *(Summary by F.G. Trans. by L.M.F.)* D02 D04

0087

16475 FRANCIS, C.A. 1981. **El cultivo del fríjol.** *(Bean cultivation).* Hacienda 76(3):33-34. Span.

***Phaseolus vulgaris.* Cultivation.**

Aspects of bean cultivation are briefly described: soil and climatic requirements, growth habit, improved var., planting, fertilization, weed, pest, and disease control, harvesting, and storage. *(Summary by F.G. Trans. by L.M.F.)* D02

0088

18036 ICAZA G., J. 1982. **Prueba preliminar de tecnología de fríjol en Jinotega, Nicaragua.** *(Preliminary testing of bean technology in Jinotega, Nicaragua).* Turrialba, Costa Rica, Centro Agronómico Tropical de Investigación y Enseñanza. Departamento de Producción Vegetal. 17p. Span., 8 Refs., Illus.

***Phaseolus vulgaris.* Technological package. Technology evaluation. Yields. Statistical analysis. Income. Costs. Nicaragua.**

Preliminary testing of a technological package for bean production in Jinotega, Nicaragua is analyzed and discussed. Traditional technology is compared with that recommended for the areas of Sisle and Los Robles in the following aspects: var. used, planting distance and density, labor, weed control, NPK fertilization, pest and disease control, and yield. Yields of 567 kg/ha were obtained by farmers vs. 805 kg/ha obtained with the recommended technology. Yield variation was explained by linear regression and Cobb-Douglas models. Costs of both technologies were compared along with gross margin/ha and per man-days and the risk included when the economical aspects of both were assessed. The recommended technology did not always have higher levels of gross margin/ha, therefore it is not considered completely satisfactory. *(Summary by F.G. Trans. by L.M.F.)* D02 J00

0089

18037 ICAZA G., J. 1982. **Influencia del cero laboreo en el cultivo del fríjol.** *(Influence of zero tillage on bean crops).* Turrialba, Costa Rica, Centro Agronómico Tropical de Investigación y Enseñanza. Departamento de Producción Vegetal. 12p. Span., 8 Refs., Illus.

***Phaseolus vulgaris.* Mulching. Land preparation. Weeding. Cultivars. Fertilizers. P. Yields. Nicaragua.**

In a farmer's field in a subtropical moist forest in Los Robles, Jinotega, Nicaragua, an expt. was conducted to compare the effect of mulching on bean yield using common agriculture practices (land plowing with oxen and hand weeding) and to evaluate the response of var. Gosliceño (traditional) and Honduras 46 (improved) to 3 levels of P fertilization (0-0-0, 17-64-3, and 17-124-3) and the possible interactions between these and the type of tillage. Types of tillage used were: (1) zero tillage, consisting in cutting down the existing vegetation and then planting; (2) traditional, cutting vegetation level to the ground followed by 2 plowings with oxen. A split-split plot design was used with 3 replications. The main plot corresponded to the type of tillage, the split plots to the var., and the split-split plots to the level of P. Data was recorded on plant population at harvest; chrysomelid attack at 20 days; disease incidence at 40 days; plant height at 70 days; and grain yield with 13% MC. Bean yield under traditional tillage conditions was very similar to that of zero tillage (608 and 584 kg/ha, resp.). Although the improved var. gave a 10% higher yield (625 kg/ha) than the local var. (568 kg/ha), this difference was not statistically significant. Response to P was significant at the 10% level, regardless of the type of tillage. An increase in yield (782 kg grain/ha) was observed with 62 kg P/ha compared with 470 kg/ha without P application. *(Summary by F.G. Trans. by L.M.F.)* D02 D01

See also 0091 0092 0097 0103 0123

D03 Cultivation Systems: Intercropping, Rotational Crops

0090

17732 TAY U., J.; LAGOS S., C.; PAREDES C., M. 1979. **Asociación de los cultivos de maíz (*Zea mays* L.) y frejol (*Phaseolus vulgaris* L.).** *(Intercropping maize and beans).* Simiente 49(1):40-43. Span., Sum. Span., 3 Refs.

Phaseolus vulgaris. Zea mays. **Intercropping. Chile.**

In field trials in 1977-78 conducted at the Quilamapu Exptl. Station, Chillán (Chile), maize cv. Sintético Precoz and bean cv. Arroz-3 were sown on Nov. 30 either separately or in (a) single or (b) double bean rows punctuated by single maize plants or (c) single maize plants surrounded by beans. Maize grain yields ranged from 7.59 t/ha when grown alone to 3.97 t at 20,000 maize + 200,000 bean plants/ha in (b), and bean seed yields from 2.48 t/ha when grown alone to 0.72 t at 60,000 maize + 100,000 bean plants/ha in (c). In a 2nd trial, maize and beans were grown as in (a) at 20,000-75,000 plants/ha and 100,000 - 250,000 plants/ha, resp. Maize grain yields decreased with maize plant density from 7.96 to 3.50 t/ha and bean seed yields increased with increase in bean density and decrease in maize density. *(Summary by Horticultural Abstracts)* D03

0091

17423 SEGOVIA S., R.; ARIAS F., J. 1981. **Estudio de poblaciones de maíz y de fríjol en el sistema maíz x fríjol voluble para clima medio conservando constantes las distancias de siembra.** *(Maize and bean plant populations in maize/climbing bean intercropping in temperate climate zones, maintaining constant planting distances).* Bogotá, Colombia, Instituto Colombiano Agropecuario. Programa de Cultivos Múltiples. 19p. Span., Illus.

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

The effect of different populations in the mixed cropping system maize var. Blandito Regional x climbing bean var. Cargamanto for small farmers was studied at the El Arsenal Exptl. Station, Colombia (1450 m.a.s.l., av. temp. 22°C, 1200 mm/yr, light clay soils with pH 5.8-6.2). A randomized block design was used, organized in a 3 x 3 factorial scheme with 3 replications and a check (maize in monoculture). Plots consisted of 4 rows with fixed planting distances, 1 x 0.9 m. Crops were planted simultaneously with 2, 3, or 4 maize plants/site and 1, 2, or 3 bean plants/site with all combinations. Increasing the plant population of one of the species increased its production and reduced the production of the other species (2 maize plants x 1 bean plant yielded 1.362 and 0.350 t/ha, resp.; 2 maize plants x 2 bean plants yielded 1.270 and 0.469 t/ha, resp.). The analysis of the total incomes of the different combinations indicated that it is economically convenient for the farmer to change maize in monoculture to maize x climbing bean multiple cropping; the latter is more efficient in land use since higher net profits were obtained in addition to the benefits that legume cultivation brings. *(Summary by EDITEC. Trans. by L.M.F.)* D03 D02

0092

17424 SEGOVIA S., R.; ARIAS F., J. 1981. **Efecto de sistemas y épocas de siembra de fríjol Calima en el sistema tabaco/fríjol. Proyecto: 1-A-81.** *(Effect of planting dates and cropping systems of bean var. Calima in tobacco/bean intercropping. Project. 1-A-81).* Bogotá, Colombia, Instituto Colombiano Agropecuario. Programa de Cultivos Múltiples. 17p Span.

Phaseolus vulgaris. **Intercropping.** *Nicotiana tabacum.* **Planting. Timing. Dwarf beans. Income. Yields. Colombia.**

The effect of the planting date and cropping system of bean var. Diacol-Calima in association with tobacco var. ICA-Guane was studied in order to determine a production alternative to tobacco in monoculture. The expt. was carried out at the El Arsenal Expt. Station (Colombia) using a randomized block design arranged in a 2 x 3 factorial scheme with 3 replications. Plots consisted of three 10-m rows with 0.5 m between transplanted tobacco and bean plants. Bean seed was drilled or hill-dropped (3/hill) 30, 60, 90, and 120 days after the tobacco was transplanted. Tobacco yields decreased compared with the check (tobacco in monoculture), but the total net income of several treatments was higher than that for the check. Intercropping tobacco/hill-dropped beans at 30 days was the most effective system. *(Summary by EDITEC. Trans. by L.M.F.)* D03 D02

0093

16711 CORREIA, J.S., FERRAZ, M.C.V.D.; QUINDERE, M.A.W. 1979. **Ocorrência de insetos e pragas nas culturas consorciadas de feijão x milho (*Phaseolus vulgaris* L. x *Zea mays* L.), no Estado da Bahia no período agrícola 1978/1979.** *(Disease and pest incidence in maize/bean intercropping in the state of Bahia during the 1978/1979 crop year).* Salvador-BA, Brasil, Empresa de Pesquisa Agropecuária da Bahia. Comunicado Técnico no. 029. 7p. Port., 4 Refs.

Phaseolus vulgaris. **Intercropping.** *Zea mays.* **Injurious insects. Brazil.**

Research work was carried out to determine the pests that occur in maize/bean intercropping systems in the main producing regions of the state of Bahia, Brazil. The municipalities of Nova Soure, Ribeira do Pombal, Tucano, and Euclides da Cunha (NE region) and Central, Irecê, and Presidente Dutra (Irecê region) were selected. Four rural properties with recently established maize/bean intercropping systems were chosen at random from each municipality; insect collection began when plants reached 10-15 days of age at 15-day intervals through the complete growth cycle. Insects were collected in plastic bags or in small flasks containing alcohol-70%. Insects with the highest incidence were leafhoppers (*Empoasca* sp.), cutworms (*Spodoptera frugiperda*) and lesser corn stalk borers (*Elasmopalpus lignosellus*). There were no predominant insects per region or per cv. *(Summary by F.G. Trans. by L.M.F.)* D03 F01

0094

17866 FEDERER, W.T.; CONNIGALE, J.C., RUTGER, J.N.; WIJESINHA, A. 1982. **Statistical analyses of yields from uniblends and biblends of eight dry bean cultivars.** Crop Science 22(1):111-115. Engl., Sum. Engl., 9 Refs.

Phaseolus vulgaris. **Cultivars. Intercropping. Cultivation systems. Statistical analysis. Yields.**

Response model equations and corresponding statistical analyses are presented for expt. involving mixtures of pairs of cv. (biblends), both when the individual yields in a biblend and when only the total yields are available. These were applied to yield data for 8 dry bean cv. Data were obtained from 4 expt. conducted in 2 yr (1966 and 1967) at 2 locations (Ithaca and Aurora, New York, USA). Concepts of general mixing and specific mixing effects are discussed and are related to the concepts of general and specific combining

ability in diallel crossing expt. In diallel crossing expt., only the total of the 2 components is available, whereas in the bean expt., individual yields of the 2 cv. in a biblend were available. This additional information may be used for further evaluation of the mixtures. *(Author's summary)* D03

0095

17883 CHAGAS, J.M.; KLUTHCOUSKI, J.; AQUINO, A.R.L. DE 1981. *Leucaena leucocephala* **como adubo verde para a cultura de feijão em cerrado.** *(Leucaena leucocephala as green manure for beans growing in cerrado soils).* Pesquisa Agropecuária Brasileira 16(6):809-814. Port., Sum. Port., Engl., 11 Refs.

Phaseolus vulgaris. **Cover crops. Intercropping. Yields. Fertilizers. N. P. Brazil.**

Two trials were conducted to evaluate *Leucaena leucocephala* as green manure in a dark red Latosol under cerrado vegetation in the municipality of Goiania, GO, Brazil. In the 1st trial, the green manure was planted with 2, 3, 4, and 5 m between rows, 30 seeds/m. Growth analysis showed an increase in DM production/ha and in N, P, K, Ca, and Mg contents/sample as spacing decreased. In the 2nd trial, beans were planted between the rows of *Leucaena* after pruning lateral shoots, leaving only the main stalk cut at a height of 1.5 m. Treatments consisted of the incorporation or nonincorporation of the *Leucaena*, combined with N (30 kg/ha) or P (120 kg/ha), or N + P. The incorporation of *Leucaena* in the soil alone resulted in a bean production equivalent to that of treatments receiving chemical fertilization. *(Author's summary)* D03 D01

0096

18056 SAITO, S.M.T. 1982. **The nitrogen relationships of maize/bean associations.** *In* Graham, P.H.; Harris, S.C., eds. Biological nitrogen fixation technology for tropical agriculture, Cali, Colombia, 1981. Papers presented. Cali, Centro Internacional de Agricultura Tropical. pp.631-639. Engl., Sum. Engl., 52 Refs., Illus.

Phaseolus vulgaris. **Intercropping.** *Zea mays.* **Nitrogen fixation. N.**

The influence of association on the N balance of legumes and nonlegumes is reviewed, paying particular attention to N_2 fixation and N transfer. *(Author's summary)* D03 I01

0097

17440 JIMENEZ S., H. 1979. **El sistema de cultivo maíz-fríjol en Samulali, Nicaragua.** *(Maize/bean intercropping system in Samulali, Nicaragua).* Actividades en Turrialba 7(2):6-9. Span., Illus.

Phaseolus vulgaris. **Intercropping.** *Zea mays.* **Technological package. Planting. Spacing. Fertilizers. N. P. Yields. Nicaragua.**

A description is given of an improved alternative to the maize/bean intercropping system used in the farm community of Samulali, Nicaragua, proposed by the Instituto Nicaragüense de Tecnología Agropecuaria (INTA) and the Centro Agronómico Tropical de Investigación y Enseñanza (CATIE). Major recommendations are to modify the spatial arrangement of bean planting to reduce plant population; in maize, modify fertilization rates (increased N and P), frequency, and dates; make further soil applications of herbicides and fertilize beans. With the traditional system used by the farmer 552.5 and 2500 kg of beans and maize, resp., were obtained per ha. With the proposed alternative, farmers obtained av. of 780 and 4300 kg/ha of beans and maize, resp. *(Summary by F.G. Trans. by L.M.F.)* D03 D02

0098

18078 SOLORZANO V., E., LLPIZ I., R. 1980. **Estudio del cultivo en asociación maíz-fríjol bajo condiciones de temporal en El Llano, Ags.** *(Study on maize-bean intercropping under rainfed conditions in El Llano, Aguascalientes, Mexico).* Chapingo 23/24:50-57. Span., Sum. Engl., Span., 5 Refs., Illus.

***Phaseolus vulgaris*. Intercropping. *Zea mays*. Yields. Spacing. Mexico.**

Under the limited rainfall conditions in the El Llano region of Mexico, beans are usually intercropped with maize. The effectiveness of this multiple cropping system was studied over a 3 yr period, using maize var. VS 201 and the native bean var. Bayo. The no. of maize plants varied from 20-40 thousand/ha and the no. of bean plants from 50-110 thousand. The combination of 25 thousand plants/ha of both crops, as practiced by farmers, was also included. A fertilizer mixture of 40-60-0 was applied at the time of sowing. Although significant differences in yield among treatments were found, the outputs of maize-bean combinations was in no case higher than those of maize and bean sown alone. From an economic point of view, beans alone were superior to all other treatments examined. *(Summary by Abstracts on Tropical Agriculture)* D03

D04 Seed Production

0099

17344 VIEIRA, R.F.; KLUTHCOUSKI, J. 1980. **Efeito do plantio de sementes de feijão (*Phaseolus vulgaris* L.) provenientes de diferentes níveis de adubação com fósforo e cálcio.** *(Effect of planting bean seeds from plants grown on soils with different levels of phosphorus and calcium fertilization).* Goiânia-GO, Brasil, Empresa Brasileira de Pesquisa Agropecuária. Centro Nacional de Pesquisa-Arroz, Feijão. Pesquisa em Andamento no. 25. 2p. Port.

Phaseolus vulgaris. **Seed production. Fertilizers. P. Ca. Germination. Seed vigor. Brazil.**

In the 1979/80 crop year, 2 trials were conducted (one during the rainy season and the other during the dry season) to study the effect of different levels of P and Ca on seed germination, vigor, and production. Seeds of cv. Rio Tibagi and Ipa 7419 were used, tested under 2 levels of fertilization, 0-30-0 and 30-100-60 NPK, resp., in a random block design with 4 replications. To assess the effect of P, seeds were harvested from plants grown with 2, 10, and 32 ppm P; to assess the effect of Ca, 500, 1500, and 4000 kg Ca/ha were used. The addition of P and Ca increased the av. wt. of 100 seeds. In the trial conducted during the rainy season, production tended to increase from 2 to 10 ppm P. During both seasons seeds of plants receiving higher rates of Ca gave a higher no. of plants in the field. *(Summary by F.G. Trans. by L.M.F.)* D04 D01

0100

16747 GIRALDO Z., M. 1981?. **Alternativas para mejorar la producción de semilla de frijol.** *(Alternatives for improving bean seed production).* Bogotá, Ministerio de Agricultura. Caja de Crédito Agrario Industrial y Minero. 9p. Span.

Phaseolus vulgaris. **Seed production. Cultivars. Seed color. Plant habit. Adaptation. Yields. Colombia.**

A historical review on certified seed production in Colombia is given. Companies producing seed (Cresemillas, Proacol, Semillas Valle, and Semillas Andree) and production areas and amount of seed produced are listed. Growth habit, bean color, size, and shape, adaptation, and yield of var. Diacol Calima, ICA-Palmar, Diacol Catio, and ICA-Viboral (preferred in Colombia) and black bean var. ICA-Tui and ICA-Pijao (for exportation) are given. Official regulations, requisites for certified seed production, and alternatives to improve production are included along with the projects of the Legume Grain Program at the Instituto Colombiano Agropecuario (ICA): bean production for exportation, cold, temperate, and warm climates, *Xanthomonas phaseoli*-resistant var. for warm climates and *Colletotrichum lindemuthianum*-resistant var. for intermediate climates, basic seed production. *(Summary by F.G. Trans. by L.M.F.)* D04

0101

18040 ALMEIDA, L.D'A. DE; BULISANI, E.A.; MAEDA, J.A.; MASCARENHAS, H.A.A. 1980. **Efeito da região de produção e escolha manual, na germinação, emergência e produção de sementes de feijão.** *(Effect of hand-cleaning and production region on germination, plant emergence, and yield of bean seeds).* Campinas-SP, Brasil, Instituto Agronômico. Circular no. 107. 14p. Port., Sum. Port., Engl., 7 Refs.

Phaseolus vulgaris. Seed. Germination. Emergence. Seed vigor. Seed production. Brazil.

Dry bean seeds of bean cv. Carioca were harvested from 5 bean producing regions of the state of São Paulo (Campinas, Mococa, Taguai, Coronel, Macedo, and Itaporanga), Brazil, to evaluate the effect of hand-cleaning of the seeds compared with non hand-cleaning on lab. germination, field emergence, and yield. All the seed lots originally presented a high % of impurities and a low germination index, with the exception of the lot produced at Itaporanga. Hand-cleaned seeds from all production regions presented germination and an emergence index superior to those not cleaned. It was also observed that the field emergence % of all lots, cleaned or not, was always inferior to the resp. lab. germination index. The yields provided by hand-cleaned seeds were always superior to those not cleaned for all the production regions studied. *(Author's summary)* D04 C02

See also 0081 0086

suelo y abonar el fríjol. Con el sistema tradicional del agricultor se obtienen 552.5 y 2500 kg de fríjol y maíz/ha, resp. Los agricultores obtuvieron prom. de 780 y 4300 kg de fríjol y maíz/ha, resp. con la alternativa recomendada. *(Resumen por F.G.)* D03 D02

0098

18078 SOLORZANO V., E.; LEPIZ I., R. 1980. **Estudio del cultivo en asociación maíz-fríjol bajo condiciones de temporal en El Llano, Ags.** Chapingo 23/24:50-57. Esp., Res. Ingl., Esp., 5 Refs., Ilus.

Phaseolus vulgaris. Cultivos asociados. *Zea mays.* Rendimiento. Densidad. México.

En condiciones de precipitación limitada en la región El Llano de México generalmente se siembra el fríjol intercalado con maíz. Se estudió la efectividad de este sistema de cultivo múltiple durante un período de 3 años utilizando maíz var. VS 201 y fríjol nativo var. Bayo. El no. de plantas de maíz varió de 20-40 mil/ha y el no. de plantas de fríjol de 50-110 mil/ha. También se incluyó la combinación de 25 mil plantas/ha de ambos cultivos utilizada por el agricultor. Se aplicó una mezcla de fertilizante de 40-60-0 en el momento de la siembra. Aunque se encontraron diferencias significativas en el rendimiento entre tratamientos, el producto de las asociaciones maíz/fríjol no fue mayor que aquellos de los monocultivos de maíz y de fríjol. Desde el punto de vista económico el monocultivo del fríjol fue superior a todos los otros tratamientos examinados. *(Resumen por Abstracts on Tropical Agriculture. Trad. por F.G.)* D03

E00 PLANT PATHOLOGY

0103

17343 VIEIRA, R.F.; SARTORATO, A. 1980. **Efeito de plantio de sementes de feijão (*Phaseolus vulgaris* L.) livres de patógenos, em Goiânia-GO.** *(Effect of planting pathogen-free bean seed in Goiânia-GO).* Goiânia-GO, Brasil, Empresa Brasileira de Pesquisa Agropecuária. Centro Nacional de Pesquisa-Arroz, Feijão. Pesquisa em Andamento no. 26. 3p. Port., Illus.

***Phaseolus vulgaris*. Planting. Seed characters. Yields. Seed transmission. Disease transmission. Brazil.**

In trials conducted at the Centro Nacional de Pesquisa - Arroz, Feijão, bean cv. Rico 23, Rio Tibagi, Carioca, and Rosinha G-2 were used to estimate yield increase by planting healthy seed and to determine how many generations these seeds could be kept healthy. Seeds were assessed for 5 planting seasons. Disease severity was determined as absence of the disease, slight, moderate, and severe infection. Two readings were made during the 1st planting: at the pin-pod stage and at harvest. Slight infection of angular leaf spot (*Isariopsis griseola*), rust (*Uromyces phaseoli*), and bacteriosis (*Xanthomonas* sp.) was noted at the 1st reading and at harvest, 40% of the pods were slightly infected. The same diseases were observed during the 2nd planting season; at flowering, angular leaf spot and bacteriosis were observed and during drying off pods were found to be slightly infected by these 2 diseases. Other harvesting times have not been evaluated. Yields of 770, 780, 650, and 483 kg/ha were obtained with healthy seed of cv. Carioca, Rosinha, Rico 23, and Rio Tibagi, resp. and 647, 578, 483, and 569 kg/ha with infected seed of these same cv. *(Summary by EMBRAPA. Trans. by L.M.F.)* E00 D03

0104

16009 REPUBLICA DOMINICANA. SECRETARIA DE ESTADO DE AGRICULTURA. 1979. **Protección vegetal; incidencia de las enfermedades del fríjol en la Cordillera Central.** *(Plant protection: disease incidence in beans in the Cordillera Central). In* —— . Informe Anual 1979. La Herradura, Santiago de los Caballeros, Centro de Desarrollo Agropecuario, Zona Norte. pp.106-111. Span., Illus.

***Phaseolus vulgaris*. *Uromyces phaseoli*. *Isariopsis griseola*. *Rhizoctonia solani*. Bean common mosaic virus. Bean rugose mosaic virus. Bean golden mosaic virus. Bacteriosea. Symptomatology. Dominican Republic.**

Bean crops located in the farm communities Constanza, Jarabacoa, and San José de las Matas of the highlands of the Cordillera Central, Dominican Republic, were visited to determine the presence and incidence of diseases affecting this crop. The following diseases were observed: rust (*Uromyces appendiculatus*), angular leaf spot (*Isariopsis griseola*), bacteriosis (*Pseudomonas* sp. and *Xanthomonas* sp.), Rhizoctonia root rot (*Rhizoctonia solani*), BCMV, BRMV, and BGMV. Rust, angular leaf spot, bacteriosis, Rhizoctonia root rot, and viroses occurred in all zones. In areas where beans were planted in rotational

cropping with potatoes there was a high incidence of Rhizoctonia root rot. BCMV and BRMV incidence was greater in crops in which the farmer used seed from the previous harvest. Major recommendations include the use of improved seed and integrated pest and disease control. *(Summary by F.G. Trans. by L.M.F.)* E00

E02 Bacterioses

0105

16786 SCHUSTER, M.L.; SCHUSTER, A.M.; NULAND, D.S. 1981. **A new bacterium pathogenic for beans (*Phaseolus vulgaris* L.).** Fitopatologia Brasileira 6:345-358. Engl., Sum. Engl., Port., 23 Refs., Illus.

***Phaseolus vulgaris. Erwinia* sp. Seed. Symptomatology. Isolation. USA.**

A new species of *Erwinia* isolated from pink-discolored bean seed is described. The bacterium produces a white-pinkish pigmented growth on certain media. Its guanine + cytosine content is 54.1 mols% (buoyant density 1.713 g/cm^3). Pathogenicity, morphological, biochemical, and host range tests differentiate this bacterium from other phytopathogenic *Erwinia*. This organism incites bean leaf symptoms which are yellow spots initially and later become irregular necrotic lesions. The most characteristic and striking symptom is the pink discoloration of white bean seed; bacterial growth under Tepary bean and pea seed coats induces a golden-brown color with a noticeable pinkish coloration. The ends of inoculated pods become watersoaked. The type strain of the new *Erwinia*, *E. nulandii*, is Pinky A. *(Author's summary)* E02

0106

18030 LAURENCE, J.A.; REYNOLDS, K.L. 1982. **Effects of concentration of sulfur dioxide and other characteristics of exposure on the development of lesions caused by *Xanthomonas phaseoli* in red kidney bean.** Phytopathology 72(9):1243-1246. Engl., Sum. Engl., 10 Refs., Illus.

***Phaseolus vulgaris*. SO_2. *Xanthomonas phaseoli*. Seed. Inoculation. Symptomatology. Air pollution.**

Sulfur dioxide (SO_2) supplied at constant (square wave) or variable (triangular wave) concn. affected development of lesions caused by *Xanthomonas phaseoli* on plants of bean cv. California Light Red Kidney and Red Kloud by increasing the latent period (time for symptom expression) and suppressing lesion expansion. Similar effects were found with both patterns of exposure. Timing of exposures relative to inoculation was important and generally was most effective when the exposure and inoculation periods were close together. The time between repeated triangular wave SO_2 exposures also affected lesion development and indicated a decay of inhibition if exposures were separated by more than 1 day. *(Author's summary)* E02

See also 0166 0174

E03 Mycoses

0107

17736 WALLEN, V.R. 1979. **The occurrence of the lambda race of bean anthracnose in Ontario.** Canadian Plant Disease Survey 59(3):69. Engl., Sum. Engl., Fr., 2 Refs.

Phaseolus vulgaris. **Races.** *Colletotrichum lindemuthianum.* **Canada.**

Seven isolates of *Colletotrichum lindemuthianum* collected in 1977 during a survey of pedigreed field beans were of the λ race, a 1st report from Canada. *(Author's summary)* E03

0108

17834 SINDHAN, G.S.; BOSE, K. 1981. **Evaluation of fungicides against anthracnose of French bean caused by** *Colletotrichum lindemuthianum.* Indian Phytopathology 34(3):325-329. Engl., Sum. Engl., 9 Refs.

Phaseolus vulgaris. **Snap beans.** *Colletotrichum lindemuthianum.* **Chemical control. Disease control.**

Fourteen fungicides were applied as foliar sprays to control anthracnose (*Colletotrichum lindemuthianum*) in French bean var. Black Queen. Benomyl was effective in reducing disease incidence and in increasing seed yield, followed by carbendazim, ziram, carboxin, ferbam, and lime sulphur. Of 13 seed dressing fungicides tested, benomyl was effective in increasing seed germination, seed yield, and in reducing disease incidence, followed by carbendazim, carboxin, ziram, and Agrosan G.N. Benomyl, carbendazim, carboxin, and ziram were effective both as foliar sprays and as seed dressing. Benomyl, carbendazim, carboxin, and tridemorph had a residual effect up to 15-20 days whereas all other fungicides lost their effect within 5-10 days after application. *(Author's summary)* E03

0109

18031 PFENDER, W.F.; HAGEDORN, D.J. 1982. **Comparative virulence of** *Aphanomyces euteiches f. sp. phaseoli* **and** *Pythium ultimum* **on** *Phaseolus vulgaris* **at naturally occurring inoculum levels.** Phytopathology 72(9):1200-1204. Engl., Sum. Engl., 13 Refs., Illus.

Phaseolus vulgaris. Aphanomyces euteiches. Pythium ultimum. **Snap beans. Virulence. Inoculation.**

Aphanomyces euteiches f. sp. phaseoli was found to occur commonly in the sandy soil of the major snap bean production area in the state of Wisconsin (USA). In greenhouse testing of soil inoculum levels typical for the area, this pathogen caused more damage to beans than did *Pythium ultimum* at 24 and 28°C. The 2 pathogens were equally damaging to beans at 20°C and at 16°C *P. ultimum* caused more severe disease than did *A. euteiches f. sp. phaseoli.* When plants were infected by both pathogens simultaneously, disease severity was similar

at all temp. tested. Plants were seldom killed by either pathogen alone, but 30-40% of the plants grown at 20 or 24°C were killed if simultaneously infected by both pathogens. *(Author's summary)* E03

0110

16448 FIGUEIREDO, J.M. DE 1975. **Compostos fenólicos e fitoalexinas em hipocótilos e raízes de feijoeiro inoculados com *Fusarium solani* f. *phaseoli* (Burk) Snyd. E Hans.** *(Phenolic compounds and phytoalexins in hypocotyls and root of bean inoculated with Fusarium solani f. phaseoli).* Tese Mestrado. Piracicaba-SP, Brasil, Escola Superior de Agricultura Luiz de Queiroz, da Universidade de São Paulo. 55p. Port., Sum. Port., Engl., 29 Refs., Illus.

***Phaseolus vulgaris.* Roots. Hypocotyls. Phenolic content. Phytoalexins. *Fusarium solani phaseoli.* Inoculation. Symptomatology. Host-plant resistance. Brazil.**

Hypocotyls and roots of bean plants were inoculated with 2 isolates of *Fusarium solani* f. *phaseoli.* The inoculated plants showed disease symptoms that became more severe with longer periods after inoculation. Noninoculated plants showed no symptoms. Hypocotyls and roots of the inoculated plants were used for quantitative and qualitative analyses of total phenols at different intervals after inoculation. The ethanol extracts of hypocotyl and root were prepared using a ration of 1:4 (wt.:vol.) of 95% ethanol p.a. The total phenols were determined by the Folin-Denis method and the results expressed as equivalents of chlorogenic acid/vol. of extract or per dry wt. of extracted tissues. The concn. of total phenols in the inoculated hypocotyl extract increased with time, attaining a max. 13 days after inoculation while in the noninoculated hypocotyls, the concn. was very low even during final intervals. In the inoculated roots the total phenol concn. increased up to the 6th day after inoculation, later becoming very irregular. The curve showed significantly higher levels of total phenol content regarding plant dry wt. The extracts of healthy roots presented a high level of total phenols. Root extracts of inoculated plants showed 2 substances (Rf 0.68 and 0.70) that reacted to phenols and another (Rf 0.60) that was fluorescent yellow in ultraviolet light but which did not react to phenols. No such substances were found in healthy plant extracts. When fractionating ethanol extracts of roots of inoculated plants with petroleum ether, this substance moved into the ether phase. All the extracts from inoculated and noninoculated roots and hypocotyls were tested against pathogenic and nonpathogenic fungi. The extracts inhibited nonpathogenic fungi, while only the extracts of inoculated roots inhibited pathogenic fungi. *(Author's summary)* E03 C03

0111

17837 MARSHALL, D.S. 1982. **Effect of *Trichoderma harzianum* seed treatment and *Rhizoctonia solani* inoculum concentration on damping-off of snap bean in acidic soils.** Plant Disease 66(9):788-789. Engl., Sum. Engl., 10 Refs.

***Phaseolus vulgaris.* Snap beans. Seed treatment. *Trichoderma harzianum. Rhizoctonia solani.* pH. Inoculation. Biological control.**

The efficiency of biocontrol on damping-off of snap bean induced by *Rhizoctonia solani* depends on soil reaction and inoculum concn. of the pathogen. Soil was acidified to pH 3.5 or 5.6 and infested with *R. solani* inoculum at concn. of zero, 0.1, 1.0, 5.0, or 10.0 g/kg of soil. Seeds were coated with conidia of *Trichoderma harzianum* and planted in the acidified, infested soils. As inoculum concn. of *R. solani* increased from 0.1 g/kg of soil, there was a corresponding increase in disease incidence (proportion of plants damped off). Disease incidence was reduced by 32% in soil of pH 3.5 compared with soil of pH 5.6 and by 65% when seeds were treated with conidia of *T. harzianum* as opposed to untreated seed. Piecewise linear regression indicated that the rate of increase of damping-off was greater when the range of *R. solani* inoculum was from 0-0.1 than from 0.1-10.0 g/kg of soil. Results suggest that *T. harzianum* seed treatment of snap bean reduces incidence of *R. solani* damping-off in acidic soils. *(Author's summary)* E03

0112

17761 SICCHI, V.A. 1982. **Perdas causadas pela ferrugem, em duas cultivares de feijoeiro (*Phaseolus vulgaris* L.), inoculadas com *Uromyces phaseoli* (Reben) Wint., no estádio de floração.** *(Crop losses caused by rust in two bean cultivars, inoculated with Uromyces phaseoli at the flowering stage)* Tese Mest. Agr. Porto Alegre, Universidade Federal do Rio Grande do Sul. 197p. Port., Sum. Port., Engl., 98 Refs., Illus.

Phaseolus vulgaris. **Laboratory experiments. Cultivars. Inoculation.** *Uromyces phaseoli.* **Flowering. Chemical control. Yields. Toxicity. Brazil.**

The effects of *Uromyces phaseoli* on 2 bean cv. (Rico 23 and Cornell 49-242) were studied under greenhouse conditions at the Faculty of Agronomy, U. Federal do Rio Grande do Sul, Porto Alegre (Brazil). Bean plants were inoculated with an inoculum density of 2.5 x 10^4 uredospores/ml, directed to lower leaves (1st - 5th node), upper leaves (6th - 9th node), and to the whole plant. All plants were inoculated at the flowering stage. Sixty hours after inoculation, the inoculated areas were sprayed with oxycarboxin (2250 ppm). The control (noninoculated) was also sprayed with the fungicide. The highest yield reduction (approx. 40%) was observed when the whole plant was inoculated. There were no significant differences in the yield reduction of the 2 bean cv. There was no difference, as far as disease severity is concerned, among partially-treated plants and the whole-treated plants with oxycarboxin, but they differed significantly from the untreated plants. Toxic effects of the fungicide were evident in all treated plants especially on those of the cv. Cornell. Treated plants of Rico 23 showed a higher yield than the inoculated and untreated plants of the same cv. *(Author's summary)* 103

0113

17701 TU, J.C. 1982. **Etiology of black pod disease and seed coat discoloration of white beans.** Canadian Journal of Plant Science 62:277-284. Engl., Sum. Engl., Fr., 9 Refs., Illus.

Phaseolus vulgaris. Alternaria alternata. **Cultivars. Inoculation. Symptomatology. Etiology. Disease control. Chemical control. Canada.**

Alternaria alternata was identified as the cause of the black pod disease and greyish discoloration of the seed coat of white beans. The severity of pod discoloration varied from dark grey flecks or stipples to dark grey patches which later coalesced. Seeds from severely affected pods often showed varying degrees of discoloration, which persisted through processing. Benomyl and chlorothalonil sprays, used to control white mold (*Sclerotinia sclerotiorum*), significantly increased the incidence of discoloration. In vitro, *A. alternata* was insensitive to both fungicides. There was more black pod disease and seed coat discoloration in the early-maturing cv. Seafarer, than in the late-maturing cv. Fleetwood. *(Author's summary)* 103

0114

17855 ICHAVEZ B., R., FREYTAG, G.F. 1981?. **Resistencia de campo a la mancha angular del frijol de líneas avanzadas desarrolladas en Puerto Rico.** *(Field resistance to angular leaf spot of beans in advanced lines developed in Puerto Rico).* Mayaguez, Puerto Rico, Instituto Mayaguerano de Agricultura Tropical. 4p. Span.

Phaseolus vulgaris. **Field experiments. Snap beans. Cultivars.** *Isariopsis griseola.* **Host-plant resistance. Yields. Puerto Rico.**

Forty-five advanced snap bean lines developed by the Edible Legume Improvement Program at the University of Puerto Rico/Mayaguez Institute of Tropical Agriculture were assessed for angular leaf spot (*Isariopsis griseola*) during the 1st months of 1981. Three lines (2B-5-1, 3B-36, and 3B-76) showed field resistance to *I. griseola*, and 2 lines (5B-42-2-1 and 4W-44)

were slightly susceptible. Disease indices of the resistant lines were slightly higher than those of the 2 local checks and those of 3 susceptible bean lines. However, the yields of the last 3 were significantly higher than those of resistant lines. *(Author's summary. Trans. by L.M.F.)* E03

0115

16792 KUSHALAPPA, A.C., SANTOS, D.P. 1981. **An improved method to determine cumulative proportions of disease and of host to calculate growth rates.** Fitopatologia Brasileira 6:409-415. Port., Sum. Engl., Port., 14 Refs., Illus.

Phaseolus vulgaris. Uromyces phaseoli. **Brazil.**

In Viçosa, MG, Brazil, 0.3 ha of bean cv. Rico 23 was naturally infected with rust *(Uromyces phaseoli)*. Twenty-five plants were marked at 1st trifoliate stage and 25 were selected at random/date of sampling. Data on presence and fall of leaflets was registered at weekly intervals. Rust intensity (x) was estimated as the proportion of leaflets infected (PLI) or as the proportion of leaflet area infected (PLAI). Plant growth was quantified as the no. of leaflets formed, and represented as the proportion of the cumulative total no. of leaflets formed at harvest (PL). To determine leaflet fall in marked plants, data on individual nodes between subsequent readings were compared whereas in plants selected at random, data for all the nodes were calculated. The infection rate, r, was calculated by regression of logit x with time. Infection rates for PLI were 0.165 and 0.175, and for PLAI were 0.136 and 0.139; k (= r) for PL were 0.18 and 0.188 for marked and random sampling methods, resp. *(Author's summary)* L03

0116

17877 CAMPOS A., J., FUCIKOVSKY Z., L. 1981 **Estudio de algunos aspectos de la mancha angular causada por *Isariopsis griseola* Sacc. en el cultivo del frijol.** *(Study on some aspects of angular leaf spot caused by Isariopsis griseola on beans).* Fitopatologia 16(1) 16-19. Span., Sum. Engl., Span., 14 Refs.

Phaseolus vulgaris. Isariopsis griseola. **Isolation. Inoculation. Symptomatology. Cultivars. Host-plant resistance. Mexico.**

Incidences of *Isariopsis griseola* up to 90% have been reported in bean producing areas of Mexico such as Chiapas, Oaxaca, and Durango. The fungus was isolated from synemas on infected leaves and the conidia were then transferred to PDA. The best medium for the fungi was V8-Agar. Optimal growth temp. was 24°C in V8-liquid medium and max. sporulation was obtained at 16°C and pH 6.0. Fifty-six hours of 95% RH was necessary for the plants to show the highest infection, 12 days after inoculation. In the greenhouse, cv. tolerant to infection by angular leaf spot were VII-13 Amarillo 153, Jamapa, P-524, Negro Puriuma, and Amapolo; susceptible cv. being Ojabra, Pinto Nacional, Delicias-71, Chimbo, and Sesentanos. Other *Phaseolus* species also susceptible to *I. griseola* were *P. coccineus, P. angularis, P. lunatus, P. acutifolius, P. calcaratus,* and *P. vulgaris* (wild). *Vigna sinensis, Cajanus cajan, Glycine max, Vicia faba, Medicago sativa, Pisum sativum,* and *Lupinus* sp. did not show any disease symptoms. *(Author's summary)* E03 G01

0117

16450 CARDOSO, C.O.N. 1967. **Contribuição ao estudo das relações entre *Fusarium oxysporum* f. *phaseoli* (Schlecht) Kendr. e Snyd. e *Phaseolus vulgaris* L.** *(Contribution to the study of relationships between Fusarium oxysporum f. phaseoli and Phaseolus vulgaris).* Tese Mag. Sc. Piracicaba-SP, Brasil, Escola Superior de Agricultura Luiz de Queiroz, da Universidade de São Paulo. 48p. Port., Sum. Port., Engl., 17 Refs.

Phaseolus vulgaris. **Cultivars.** *Fusarium oxysporum.* **Inoculation. Symptomatology. Host-plant resistance. Brazil.**

Two methods of inoculation were evaluated with different bean var.: dipping and the Armstrong method. By using the index of resistance which measures the development of symptoms, var. differences and variations in inoculum concn. were studied, whereas analysis was not possible when the % of dead plants at the end of the expt. was used since there was no variance. Armstrong's method of inoculation was used to evaluate the effect of different concn. of inoculum, var., and host plant age on the % of dead plants. No significant differences were observed for inoculum concn. or plant age. Of the 2 methods of inoculation used, the former was more precise. Three var. were inoculated with 9 different concn. of the inoculum from isolate 3700 by the dipping method and the index of resistance was measured. Significant differences were observed among the var. and among inoculum concn. Under these exptl. conditions, high or low degrees of susceptibility were correlated with a rapid or slow appearance of symptoms. Results revealed that there are at least 2 pathogenic races of *Fusarium oxysporum* f. *phaseoli* in the state of São Paulo (Brazil): race 1, represented by bean isolate 3700, not pathogenic on snap bean var. Manteiga, and race 2, represented by snap bean isolates 5800 and 6400 and pathogenic on this var. The 3 isolates were plated on PDA in 2 physiologically distinct groups. The isolate of race 1 produced white colonies with abundant aerial mycelia and the isolate of race 2 produced dark red colonies with few aerial mycelia. Significant differences were observed between isolates of race 2 regarding the effects of inoculum of different concn. and the pathogenicity of different var. *(Author's summary)* E03

0118

17836 TU, J.C. 1982. **Effect of temperature on incidence and severity of anthracnose on white bean.** Plant Disease 66(9):781-783. Engl., Sum. Engl., 8 Refs., Illus.

Phaseolus vulgaris. Colletotrichum lindemuthianum. **Temperature. Symptomatology. Canada.**

In southern Ontario, Canada, summer temp. are generally favorable for infection of beans by *Colletotrichum lindemuthianum* if free moisture is present on white bean foliage. Symptoms did not develop on inoculated plants held at constant temp. of 28 and 32°C, but did if night temp. were lowered. Symptoms readily occurred in the field because such high temp. usually lasted only a few hours during daytime. Plants held at 28 and 32°C continuously for 2-3 days prior to inoculation were only slightly less susceptible. Increases in high day temp. as the summer advanced prolonged the incubation period and slightly decreased disease severity. *(Author's summary)* E03

0119

17856 ECHAVEZ B., R., FREYTAG, G.F. 1981. **Severidad de la mancha angular (*Isariopsis griseola* Sacc.) del frijol (*Phaseolus vulgaris* L.) en Puerto Rico. [*Severity of angular leaf spot (Isariopsis griseola) of bean in Puerto Rico*].** Mayagüez, Puerto Rico, Instituto Mayagüezano de Agricultura Tropical. Sp. Span., 7 Refs.

Phaseolus vulgaris. **Field experiments. Snap beans.** *Isariopsis griseola.* **Host-plant resistance. Cultivars. Yields. Puerto Rico.**

In 1980 a high incidence and severity of angular leaf spot of beans (*Isariopsis griseola*) was observed in 2 exptl. plots in Puerto Rico. Therefore the U. of Puerto Rico/Mayaguez Institute of Tropical Agriculture joint program for the improvement of edible legumes conducted a preliminary study, during Jan.-April, 1981, to determine the severity of angular leaf spot on yield of advanced bean lines developed by the program. The incidence of bacteriosis (*Xanthomonas* sp.) and rust (*Uromyces appendiculatus*) was also considered. Results indicate that although there was a positive and significant correlation (r = 0.16 and r = 0.13 for Isabela and Adjuntas, resp.) between angular leaf spot and yield, some *I. griseola*-susceptible lines gave relatively high yields, proving to be tolerant to this fungus. There was no direct correlation between yield and bacteriosis and rust. *(Author's summary. Trans. by L.M.F.)* E03

0120

17835 SINDHAN, G.S.; BOSE, S.K. 1981. **Epidemiology of anthracnose of French bean caused by *Colletotrichum lindemuthianum*.** Indian Phytopathology 34(4):484-487. Engl., Sum. Engl., 4 Refs.

***Phaseolus vulgaris*. Snap beans. *Colletotrichum lindemuthianum*. Epidemiology. India.**

In the hill region of Uttar Pradesh (India) anthracnose of French bean, caused by *Colletotrichum lindemuthianum*, appeared the 2nd or 3rd wk. of June with max. damage from the beginning of August to the middle of Sept. French bean plants of all ages were susceptible, but infection was less on 2 wk. than 6 wk. old plants. Disease intensity increased with the plant age. Inoculum, 10-20 days old with 400-800 spores/ml, was more infectious than inoculum 5, 30, and 60 days old with 100, 200, and 1600 spores/ml. Best planting time of French bean was between mid April-mid May for max. yields and min. disease incidence. *(Author's summary)* E03

0121

17446 SHARMA, S.R.; SOHI, H.S. 1980. **Assessment of losses in French bean due to *Rhizoctonia solani*.** Indian Phytopathology 33(2):366-369. Engl., 8 Refs.

***Phaseolus vulgaris*. Snap beans. *Rhizoctonia solani*. Inoculation. Cultivars. Rots. Yields. India.**

Two expt. were conducted at the Indian Institute of Horticultural Research Exptl. Farm at Hessaraghatta in 1978 to determine the losses in French bean due to *Rhizoctonia solani*. Cv. Premier and Contender were used in the 1st expt. Four hundred seeds of each cv. were sown on ridges in 5 x 3 m^2 plots, each having 5 rows. One wk. before planting, 100, 150, and 200 g of *R. solani* inoculum were applied per plot. Each treatment had 3 replications in a random block design. Plots without inoculum served as control. Observations were recorded on preemergence damping off, postemergence mortality, root rot index (0-5 scale), and green pod yield in both of the cv. separately. In the 2nd expt. seeds of cv. Premier were inoculated at planting and 10, 20, 30, and 40 days after germination with 200 g inoculum/plot. Data were recorded on pre- and postemergence mortality and green pod yield of surviving plants/plot. Preemergence damping-off, postemergence mortality, and root rot index were greater with higher levels of inoculum in both cv. Loss in green pod yield varied from 28.5-53.64% in cv. Premier and 12.96-43.81% in cv. Contender at different levels of inoculum. In the 2nd expt. max. pre- and postemergence mortality was recorded when seed inoculation was followed by inoculation 10, 20, 30, and 40 days after germination. Loss in green pod yield varied from 8.45-64.78%. *(Summary by F.G. Trans. by L.M.F.)* E03

0122

16923 HUBBELING, N. 1980. **Laboratory/glasshouse screening for identifying resistance to soil-borne diseases in beans.** *In* Nene, Y.L., eds. Consultants' Group Discussion on the Resistance to Soil-Borne Diseases of Legumes, Patancheru, India, 1979. Proceedings. Patancheru, International Crops Research Institute for the Semi-Arid Tropics. pp.123-128. Engl., 3 Refs.

***Phaseolus vulgaris*. *Fusarium solani phaseoli*. *Fusarium oxysporum*. Races. Isolates. Culture media. Inoculation. Rots. Host-plant resistance. Selection. Laboratory experiments.**

Lab /greenhouse methods are described for screening resistance to soil-borne diseases. These are mainly based on experience with *Fusarium oxysporum* and *F. solani* of beans and peas. Nevertheless, these methods might also be useful in breeding for resistance to other fungi and in modifying the preparation of inoculum. Adequate screening is only possible under controlled temp. conditions in artificially infested soil, generally of a low pH and, to some extent, deficient in Ca. *(Extracted from author's summary)* E03 D01

0123

17840 CORREA, J.R.V. 1982. **Controle da murcha da teia micélica na Transamazônica.** *(Control of web blight in the Transamazonic Region).* Altamira-PA, Brasil, Empresa Brasileira de Pesquisa Agropecuária. Comunicado Técnico no. 02. 8p. Port., 7 Refs.

Phaseolus vulgaris. **Field experiments.** *Rhizoctonia solani.* **Planting. Timing. Disease control. Spacing. Yields. Brazil.**

In 1979 research work began at the Campo Exptl. do km 23 da Rodovia Tansamazônica, on the road Altamira/Itaituba (Brazil), on a Terra Roxa Estruturada soil to study control methods of web blight (*Thanatephorus cucumeris*). A random block, split-split plot design was used with 3 replications. Main plots corresponded to planting dates (15/03/79; 30/04/79, and 18/06/79) and the split plots, the combination of 3 plant densities (0.50 x 0.30 m; 0.60 x 0.40 m, and 0.75 x 0.50 m) and 2 cv. (Jamapa and Jalo) The % of infected plants was recorded at 10-day intervals up to 80 days. When cv. Jamapa was planted the 15/03/79 and 30/04/79 at 0.75 x 0.30 m, the rate of disease spread was reduced 60 days after planting, disease incidence was 50% and yields, 425 and 355 kg/ha, resp. The expt. was repeated in 1980 using 4 planting dates (15/04/80; 01/05/80; 15/05/80; and 02/06/80), 3 plant densities (0.50 x 0.30 m, 0.50 x 0.40 m; and 0.60 x 0.40 m) and 2 local cv. (Rosinha and Jalinho) Cv. Rosinha planted the 15/04/80 at 0.60 x 0.40 and 0.50 x 0.40 m had a 5% incidence of web blight during its growth cycle and gave yields of 882 and 868 kg/ha, resp. In the Transamazonic Region it is recommended that beans be planted the last 15 days of April at 0.60 x 0.40 and 0.50 x 0.40 m, leaving 2 plants/hill after thinning. *(Summary by F.G Trans. by L.M.F.)* I 03 D02

0124

18087 SIPPELL, D.W., HALL, R. 1982. **Effects of *Fusarium solani phaseoli*, *Phythium ultimum*, and *F. oxysporum* on yield components of white bean.** Canadian Journal of Plant Pathology 4(1) 54-58. Engl., Sum. Engl., Fr., 26 Refs.

Phaseolus vulgaris. Fusarium solani phaseoli. Pythium ultimum. F. oxysporum. **Seed production. Yield components.**

The effects of *Fusarium solani phaseoli* (500 conidia/g potting mix), *Pythium ultimum* (100 sporangia/g), and *F. oxysporum* (1000 conidia/g), alone and in all combinations, on components of seed yield of white bean cv. Seafarer were determined in microplots in the field. All 3 fungi hastened senescence. *F. solani phaseoli* and *P. ultimum* reduced seed wt./plant by 29.1% and 33.2%, resp. In combination these 2 fungi reduced yields by 48.2%. Their individual effects were statistically additive. *F. solani phaseoli* reduced yields primarily by reducing the wt. of seed/pod whereas *P. ultimum* reduced yields by reducing the no. of pods/plant. In combination they did both. *F. oxysporum* did not significantly reduce seed wt./plant either alone or in combination with the other 2 fungi. *(Author's summary)* E03

0125

17426 PEGG, K.G., ALCORN, J.L. 1967. **Ascochyta disease of French beans.** Queensland Agricultural Journal 93(6):321-323. Engl., Illus.

Phaseolus vulgaris. Ascochyta. **Symptomatology. Plant injuries. Disease control. Snap beans.**

The symptomatology, plant damage, and control of the Ascochyta leaf spot in snap beans in Queensland, Australia, are described. *(Summary by F.G. Trans. by L.M.F.)* E03

0126

18092 GALINDO, J.J., ABAWI, G.S., THURSTON, H.D. 1982. **Variability among isolates of *Rhizoctonia solani* associated with snap bean hypocotyls and soils in New York.** Plant Disease 66(5):390-394. Engl., Sum. Engl., 18 Refs.

Phaseolus vulgaris. Leaves. Hypocotyls. *Rhizoctonia solani*. Virulence. Isolation. Snap beans.

The 33 isolates of *Rhizoctonia solani* associated with snap bean hypocotyls and soils in NY, USA and 6 from bean leaves in Colombia varied considerably in growth rate, sclerotial production, color of vegetative hyphae, and zonation in culture. A positive association was found between virulence to beans and growth rate. Disease severity generally was greater at higher soil moisture and higher RH. Isolates from NY varied from weakly to highly virulent on hypocotyls. Several caused damping-off but most only reduced plant growth. Isolates with fast to intermediate growth rates could also infect leaves. All the Colombian isolates were highly virulent to both hypocotyls and leaves. Such virulence differed widely between anastomosis groups (AG) but not within each group. Of the 33 NY isolates, 18 were in AG-4, 4 in AG-1, 5 in AG-2, and none in AG-3. All 6 Colombian isolates were in AG-1. *(Author's summary)* E.03

0127

15857 CANDAL NETO, J.F. PACOVA, B.E.V. DAN, E. VENTURA, J.A. 1981. Ocorrência de mancha de ascoquita (*Ascochyta* sp.) na cultura do feijão (*Phaseolus vulgaris* L.) no Espírito Santo. [*Presence of Ascochyta leaf spot (Ascochyta sp.) in beans in Espirito Santo*] Cariacica-ES, Brasil, Empresa Capixaba de Pesquisa Agropecuária. Serie Comunicado EMCAPA v.3, no. 1. 9p. Port., 18 Refs., Illus.

Phaseolus vulgaris. *Ascochyta phaseolorum*. Symptomatology. Disease control. Brazil.

A literature review is given on the presence of Ascochyta leaf spot of beans (*Ascochyta phaseolorum*) in the state of Espirito Santo, Brazil. Symptomatology and disease control are included. *(Summary by F.G. Trans. by L.M.F.)* E.03

0128

18039 CARDOSO, J.E. 1980. Eficiência de três fungicidas no controle da murcha da teia micélica do feijoeiro no Acre. *(Effect of three fungicides on the control of web blight in beans in Acre)*. Rio Branco-AC, Brasil, Empresa Brasileira de Pesquisa Agropecuária. Unidade de Execução de Pesquisa de Ambito Estadual. Comunicado Técnico no. 13. 4p. Port.

Phaseolus vulgaris. *Rhizoctonia solani*. Disease control. Chemical control. Yields. Brazil.

The efficiency of 3 fungicide (benomyl, mancozeb, and copper oxychloride) in controlling web blight (*Thanatephorus cucumeris*) in beans in the state of Acre, Brazil, was evaluated. Four applications were made at 15-day intervals starting 15 days after planting. The indexes of disease incidence were 0.5, 26.3, 41.0, and 35.8% and yields reached were 895, 817, 632, and 677 kg/ha for the benomyl, mancozeb, copper oxychloride, and the check treatments, resp. Benomyl proved to be the most efficient fungicide in controlling web blight. Benomyl- and mancozeb-treated plants gave higher yields than the untreated check, although this difference was not significant. *(Summary by F.G. Trans. by L.M.F.)* E.03

See also 0085 0170 0174

E04 Viroses

0129

17861 TU, J.C. 1980. **Occurrence and identification of a flexuous rod virus from a mosaic complex of white beans in southern Ontario.** Phytopathologische Zeitschrift 99(2):163-174. Engl., Sum. Engl., Germ., 18 Refs., Illus.

Phaseolus vulgaris. **Bean yellow mosaic virus. Symptomatology. Identification. Cultivars. Host-plant resistance. Canada.**

In S. Ontario, Canada, a mosaic disease typified by severe mosaic, epinasty, leaf deformation, and tip and branch wilt was identified as a strain of BYMV. This identification was based on symptomatology, reaction of indicator plants, physical properties, mode of transmission, serology, and electron microscopy. Among *Phaseolus vulgaris* var. tested for reaction to the virus, Amanda, Great Northern UI34, UI123, Imuna, and Kentwood were resistant. *(Extracted from author's summary)* E04

0130

15870 MENTEN, J.O.M.; ROSTON, A.J. 1980. **Mosaico dourado e a necessidade da regionalização da cultura do feijoeiro no Estado de São Paulo.** *(Golden mosaic and the need to regionalize bean cultivation in the state of São Paulo).* Revista de Agricultura (São Paulo) 54(4):287-300. Port., 24 Refs., Illus.

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

Currently BGMV is one of the major constraints to bean cul. ion in Brazil. Its rapid dissemination is related to increased soybean cultivation. Soybeans, as well as other spontaneous legumes, favor the multiplication of the whitefly, *Bemisia tabaci*, vector of this virus. A regionalization of bean crops in the state of São Paulo and in the rest of the country is proposed along with other cultural measures since the use of insecticides is ineffective due to the wide range of vector hosts. It is suggested that soybeans be grown in the N and SE areas of the state, the Sorocaba region of the Divisão Regional Agrícola (DIRA) being kept exclusively for beans. Infrastructure and traditional agricultural practices are mentioned. Solutions to problems resulting from the proposed regionalization are given. *(Summary by I.B. Trans. by L.M.F.)* E04

0131

17833 JOSHI, R.D.; GUPTA, A.K.; SHUKLA, K. 1981. **Effect of bean common mosaic virus infection on primary productivity of French bean.** Indian Phytopathology 34(1):48-49. Engl., Sum. Engl., 5 Refs.

Phaseolus vulgaris. **Snap beans. Bean common mosaic virus. Leaves. Yields. Leaf area. Plant pigments.**

The primary productivity of French bean infected by BCMV was assessed. Leaves of approx. uniform size from healthy and systemically infected plants were collected at 7 a.m. Care was taken to sample leaves of the same physiological age. Discs of 1 cm in Ø were taken and primary productivity was determined by the method described by Misra *et al* (1968). Morphological characteristics of infected plant parts were highly affected. The av. no. of trifoliate leaves was higher in healthy plants than in infected ones. Av. fresh wt. and leaf area were also less in infected samples. Net primary production in healthy leaves is much higher (250 mg/m²/h) than in diseased ones (-210 kg/m²/h). There is a 42.55% reduction in gross primary production in infected leaves. Analysis of pigment content revealed that there is a general loss of chlorophyll and carotenoids in the infected leaves. *(Summary by F.G. Trans. by L.M.F.)* E04

0132

17814 KASSANIS, B. 1981. **Some speculations on the nature of the natural defence mechanism of plants against virus infection.** Phytopathologische Zeitschrift 102(3/4):277-291. Engl., Sum. Engl., Germ., 38 Refs., Illus.

Phaseolus vulgaris. **Host-plant resistance. Viruses.**

The phenomenon of acquired resistance which is induced after virus infection or treatment with certain chemicals is described and 3 possible ways by which this defense mechanism might operate are discussed. The appearance of 3-10 proteins associated with resistance, and normally not present in healthy or untreated plants, is also discussed. Although there is no obvious correlation between protein concn. and resistance, it is likely that one or more of these proteins play some part in acquired resistance. Although the proteins are not present in healthy plants it seems that one or more appear in plants at flowering. The possible connections between general resistance and acquired resistance are discussed. *(Author's summary)* E04

0133

18027 TREMAINE, J.H.; RONALD, W.P.; KELLY, E.M. 1982. **Intermediates of the in vitro assembly and disassembly of southern bean mosaic virus.** Virology 118(1):35-44. Engl., Sum. Engl., 14 Refs., Illus.

Phaseolus vulgaris. **Bean southern mosaic virus. Analysis. RNA. Proteins. Electron microscopy.**

BSMV was swollen by treatment with EDTA at pH 7.5 and dissociated into RNA and protein in 1 *M* NaCl. Aliquots of this preparation were diluted with appropriate buffers to obtain samples in varying concn. of NaCl and components of these samples were sedimented through sucrose solutions and dissolved in 0.01 *M* Tris-HCl buffer, pH 7.5. The protein content and sedimentation properties of components in these preparations were determined. When the NaCl molarity in the treatment exceeded 0.6 *M* the preparations contained RNA with approx. 6 protein subunits/BSMV RNA molecule. The protein content of the preparations increased from 30 to 145 protein subunits/RNA molecule as the NaCl molarity used in the treatment was decreased from 0.5-0.1 *M*. The positions of sedimentation of components in these preparations in density gradient centrifugation were intermediate between those of RNA and EDTA-swollen virus. The sedimentation rate of these assembled components increased as the NaCl molarity used in the treatment was decreased. Similar components were assembled when preparations of RNA and protein dissociated from BSMV by dialysis in neutral buffers containing EDTA and 1 *M* NaCl were diluted to lower NaCl molarities. When BSMV was swollen by treatment with EDTA and dissociated in various concn. of NaCl, the components formed were similar to those obtained by assembly in the same NaCl molarities. Preparations in the pH 7.5 buffer contained single components which sedimented at 56 S, 55 S, 54 S, 51 S, 46 S, 38 S, 33 S, and 24 S. With the exception of the 24 S component, components formed by disassembly in the same NaCl molarities and dissolved in pH 5.0 buffer sedimented faster. *(Author's summary)* E04

0134

17863 KUDAMATSU, M.; BARRADAS, M.M.; ALBA, A.P.C. 1981. **Characterization of the Bouquet strain of tomato black ring virus from imported seed-potato in Brazil.** Turrialba 31(3):195-200. Engl., Sum. Span., Engl., 20 Refs., Illus.

Phaseolus vulgaris. **Cultivars. Inoculation. Viroses. Host-plant resistance. Brazil.**

A virus isolated from imported seed of potato cv. Sieglinde was characterized as the potato Bouquet strain of the tomato black ring virus, a nepovirus. The virus was identified by determining host range, stability in sap, particle morphology, and serological tests. Out of the 20 *Phaseolus vulgaris* var. inoculated with this virus, in the course of an investigation of its host range, 16 appeared to be immune. *(Summary by Plant Breeding Abstracts)* E04

0135

18007 SURLI, J.A.; LASTRES, N.; RIVERA, M. 1981. **Actividad de las peroxidasas en plantas de *Phaseolus vulgaris* infectadas con el virus del mosaico común del frijol (BCMV).** *(Peroxidase activity in Phaseolus vulgaris plants infested with the bean common mosaic virus).* Ciencias de la Agricultura 9:61-70. Span., Sum. Span., Engl., 24 Refs., Illus.

Phaseolus vulgaris. **Cultivars. Bean common mosaic virus. Enzymes. Host-plant resistance. Inoculation.**

Peroxidase activity was determined in 2 bean var., one resistant (Bolita 42) and the other susceptible (Caruaro) to BCMV. The greatest activity was localized in the roots, followed by the leaves and hypocotyls. Healthy tissues of the susceptible var. showed a greater activity than those of the resistant one, while infected plants of the resistant var. showed higher increases. *(Author's summary)* E04 G01

0136

18010 SURLI, J.A.; RIVERA, M. 1982. **Análisis de las isoperoxidasas ante el estímulo de una infección viral en *Phaseolus vulgaris.*** *(Analysis of isoperoxidases stimulated by the presence of a viral disease in Phaseolus vulgaris).* Ciencias de la Agricultura 11:45-48. Span., Sum. Span., Engl., 5 Refs., Illus.

Phaseolus vulgaris. **Cultivars. Bean common mosaic virus. Laboratory experiments. Isolation. Inoculation. Enzymes. Host-plant resistance.**

Changes in the activity of isoperoxidases were studied in leaves of *Phaseolus vulgaris* infected with BCMV. Isoenzymes of resistant var. Bolita 42 increased faster and higher than those of susceptible var. Caruaro, in a way similar to phytoalexins. *(Author's summary)* E04

0137

18011 VALDES, E.; PEREZ, N.; SURLI, J.A. 1982. **Inclusiones citoplasmáticas en plantas de frijol infectadas con el virus del mosaico común del frijol (BCMV).** [*Cytoplasmic inclusions in bean plants infected with the bean common mosaic virus (BCMV)*]. Ciencias de la Agricultura 11:49-52. Span., Sum. Span., Engl., 14 Refs.

Phaseolus vulgaris. **Cultivars. Inoculation. Bean common mosaic virus. Plant anatomy. Plant injuries.**

Epidermic sections were taken of roots, hypocotyls, stems, petioles, and leaves of 2 BCMV-susceptible bean var., Caruaro and Velasco, and one BCMV resistant var., Bolita 42, grown under glasshouse conditions, to determine if BCMV produces inclusions in bean plants, the types of inclusions produced, and their site of appearance. Cytoplasmic inclusions were observed in the epidermic sections of leaves of bean plants infected with the BCMV. These inclusions were of 2 types: amorphous and crystalline. The amorphous inclusions are

granulated and vacuolated while crystalline inclusions are cubiform and hexagonal. In Bolita 42, inclusions were not observed in healthy or inoculated plants. *(Author's summary)* E04 B00

0138

18089 TAVANTZIS, S.M.; SMITH, S.H. 1982. **Isolation and evaluation of a plant-virus-inhibiting quinone from sporophores of *Agaricus bisporus*.** Phytopathology 72(6):619-621. Engl., Sum. Engl., 14 Refs.

***Phaseolus vulgaris*. Inhibitors. Host-plant resistance. Inoculation. Tobacco mosaic virus. Tobacco ring spot virus.**

A pink quinone, tentatively identified as γ-L-glutaminyl-3,4-benzoquinone, from the cultivated mushroom (*Agaricus bisporus*), is a potent, systemic inhibitor of plant virus infection. A high level of resistance (98.5 or 81.5% reduction in no. of lesions) was observed when cowpea or pinto bean plants were mechanically inoculated with tobacco ringspot or tobacco mosaic virus, resp., 8 days after treatment. *(Author's summary)* E04 G01

0139

18066 HABER, S.; IKEGAMI, M.; BAJET, N.B.; GOODMAN, R.M. 1981. **Evidence for a divided genome in bean golden mosaic virus, a geminivirus.** Nature 289:324-326. Engl., Sum. Engl., 22 Refs., Illus.

***Phaseolus vulgaris*. Bean golden mosaic virus. DNA. Analysis.**

The DNA of a geminivirus using restriction endonucleases and a biological assay of infectivity was investigated and evidence for a divided genome in BGMV is reported. Two different nucleotide sequences were found and both seemed to be required for infectivity. *(Author's summary)* E04

0140

15854 SIQUEIRA, O.; CAETANO, V. DA R.; COSTA, J.C. DA; BRANDES, D. 1971. **Ocorrência do mosaico comum do feijão (*Phaseolus vulgaris* L.) no Rio Grande do Sul e em Santa Catarina.** *(Presence of the bean common mosaic virus in Rio Grande do Sul and in Santa Catarina).* Revista da Sociedade Brasileira de Fitopatologia 4(4):69-70. 1971. Port.

***Phaseolus vulgaris*. Cultivars. Germplasm. Bean common mosaic virus. Host-plant resistance. Yields. Brazil.**

A total of 350 var. from the Instituto de Pesquisas e Experimentação Agropecuárias do Sul and the Rio Caçador Exptl. Station in Santa Catarina, Brazil, were assessed and a great majority of these were found to be 100% infected with BCMV. Approx. 50 var. have good tolerance and 21 are disease-free. Although var. Rica 23 and Cuva 168-N were 100% infected in most of the trials, they gave the highest yields. Materials from São Paulo (Rosinha G-2 and Bico-de-ouro), Costa Rica (collection of 20 var.), and the USA (Sanilac, Seminola, Tendercrop, Gratiot, and Pinto 111) were also evaluated. Var. Bico-de-ouro and Pinto 111 showed few symptoms, the others were susceptible. The most effective insect vectors in the south are listed: *Aphis rumicis, Macrosiphum solanifolii, Myzus persicae*, and *A. gossypii*. *(Summary by EMBRAPA. Trans. by L.M.F.)* E04

0141

18006 SURLI, J.A.; LASTRES, N.; RIVERA, M. 1981. **Isoperoxidasas en plantas de *Phaseolus vulgaris* infectadas con el virus del mosaico común del frijol (BCMV).** *[Isoperoxidases in Phaseolus vulgaris plants infected with the bean common mosaic virus (BCMV)]*. Ciencias de la Agricultura 9:71-78. Span., Sum. Span., Engl., 14 Refs., Illus.

Phaseolus vulgaris. Bean common mosaic virus. Cultivars. Host-plant resistance. Symptomatology. Enzymes.

The isoperoxidase pattern was determined in 2 bean var., one resistant (Bolita 42) and the other susceptible (Caruaro) to BCl4V. The patterns showed differences regarding the var., date of sampling, and infection. Infected plant tissues showed bands with increased activity compared with healthy plants; such tissues also had bands that did not appear in healthy plant tissue. *(Author's summary)* E04

See also 0053 0170

E05 Nematodes

0142

17885 CARVALHO, J.M.F.C.; FERRAZ, S.; CARDOSO, A.A.; DHINGRA, O.D. 1981. **Tratamento de sementes de feijão (*Phaseolus vulgaris* L.) com oxamil dissolvido em acetona ou etanol para controle de fitonematóides.** *(Treating bean seed with oxamyl dissolved in acetone or ethanol to control plant nematodes).* Revista Ceres 28(160):580-587. Port., Sum. Port., Engl., 10 Refs., Illus.

Phaseolus vulgaris. **Seed. Seed treatment. Nematode control. Germination.** *Meloidogyne javanica.*

The effects of different concn. of oxamyl, dissolved either in acetone or ethanol, and the effects of time of immersion in oxamyl with acetone and with ethanol were studied in relation to the germination % of the dry bean cv. Rico 23. The effects of different concn. of oxamyl in acetone or ethanol, during 2 immersion times, as a seed treatment for the control of nematodes were also studied under greenhouse conditions. Results from preliminary tests showed that bean seeds treated with oxamyl at concn. ranging from 0.25-8% a.i. for a period up to 90 min germinated normally, but when the seeds were immersed in oxamyl concn. of 2% a.i. or more for 180 min, germination was reduced regardless of the solvent used. In the main test under greenhouse conditions, the parameters of plant height, wt. of plant canopy, and the wt. of the root system were positively influenced by the treatments with oxamyl dissolved in acetone but no such response was shown by the treatments where oxamyl was dissolved in ethanol. On the other hand, the no. of root knots and the no. of *Meloidogyne javanica* larvae in the soil were significantly reduced by the seed treatments with oxamyl dissolved either in acetone or ethanol. Populations of *Macrophomina* sp., *Helicotylenchus* sp., and saprophytic species in the soil were not influenced by the application of oxamyl. There was no phytotoxic effect of oxamyl on bean plants. *(Author's summary)* E05

0143

15008 HADISOEGANDA, W.W.; SASSER, J.N. 1982. **Resistance of tomato, bean, southern pea, and garden pea cultivars to root-knot nematodes based on host suitability.** Plant Disease 66(2):145-150. Engl., Sum. Engl., 24 Refs., Illus.

Phaseolus vulgaris. **Cultivars. Nematodes.** *Meloidogyne incognita. M. javanica.* **Host-plant resistance.**

Fifty tomato cv., 7 bean cv. (Big Boy, Contender, INRA 223, Kentucky Wonder, Manoa Wonder, Saginaw, and SV. 223), 2 cowpea cv., 1 pea cv., and 1 lima bean cv. were evaluated for resistance to species and races of the root knot nematode (*Meloidogyne* spp.). Plants were inoculated with 2500 eggs/pot and grown under greenhouse conditions with av. min. and max. temp. of 22 and 30°C for *M. incognita, M. arenaria,* and *M. javanica* and 21 and 23°C for *M. hapla.* Each treatment was replicated 4 times. Bean cv. Contender was very

resistant to races 2, 3, and 4 of *M. incognita* but it was only moderately resistant to race 1. Cv. Manoa Wonder was very resistant to all *Meloidogyne* spp. Other bean cv. ranged from moderately resistant to susceptible to *M. hapla*, they were less susceptible to *M. javanica* than to either race of *M. arenaria* or *M. hapla* *(Summary by F.G. Trans. by I. M.F.)* E05

0144

18013 SANTOS, J M DOS 1981. Ocorrência de *Bacillus penetrans* parasitando *Meloidogyne javanica* (Nematoda: Meloidogynidae) no Brasil. *(Occurrence of Bacillus penetrans parasitizing Meloidogyne javanica in Brazil)*. Fitopatologia Brasileira 6(3) 519-522. Port., Sum. Port., Engl., 17 Refs., Illus.

Phaseolus vulgaris. *Meloidogyne javanica*. **Biological control. Brazil.**

Bacillus penetrans was found, for the 1st time in Brazil, infecting 11% of 2nd-stage juveniles of *Meloidogyne javanica* from soil collected around the rhizosphere of *Phaseolus vulgaris* in Petrolina, Pernambuco. *(Summary by Helminthological Abstracts)* E05

E06 Physiological Disorders

0145

16716 MILLER, C.A.; DAVIS, D.D. 1981. **Response of pinto bean plants exposed to O_3, SO_2, or mixtures at varying temperatures.** HortScience 16(4):548-550. Engl., Sum. Engl., 13 Refs.

Phaseolus vulgaris. **Ozone. SO_2. Temperature. Foliage. Symptomatology. Air pollution. Plant injuries. Plant physiological disorders. USA.**

Phaseolus vulgaris cv. Pinto 111 at the unifoliate leaf stage was exposed for 3 h to 0.8 ppm SO_2, 0.25 ppm O_3, or a mixture of the 2 pollutants at these levels at 15, 24, or 32°C. Foliage exposed to O_3 alone developed adaxial markings and leaves exposed to SO_2 alone developed interveinal necrosis. O_3 and SO_2 mixture induced O_3-type symptoms at 32°C, SO_2-type symptoms at 15°C, and both types at 24°C. Foliar injury at 15 and 32°C was greater than at 24°C for SO_2 or O_3, but in combination the greatest injury was at 15°. *(Extracted from author's summary)* E06

0146

18004 HUCL, P.; BEVERSDORF, W.D. 1982. **The response of selected *Phaseolus vulgaris* L. cultivars to ozone under controlled fumigation and ambient field levels.** Canadian Journal of Plant Science 62:561-569. Engl., Sum. Engl., 18 Refs.

Phaseolus vulgaris. **Cultivars. Laboratory experiments. Field experiments. Ozone. Yields. Air pollution. Plant injuries. Selection. Plant physiological disorders. Canada.**

In 1977, a cross section of the *Phaseolus vulgaris* world collection was screened for ozone (O_3) insensitivity in fumigation chambers. A no. of cv. were selected for their high level of insensitivity to O_3. These selections, along with 3 cv. reported as highly insensitive and a no. of white bean cv., were further evaluated under more stringent conditions in a controlled environment as well as under field conditions in Ontario (Canada) over a 2-yr period. All the white bean cv. were sensitive to O_3 under controlled conditions, but under field conditions later maturing cv. escaped serious injury from ambient O_3 levels. Early-maturing white bean cv. tended to suffer reduced yields and earlier senescence compared with plots chemically protected from ambient O_3 injury. The yields of cv. selected as O_3-insensitive in chamber fumigations were not affected by ambient field O_3 levels in the field trials. *(Author's summary)* E06

0147

18083 SWIECKI, T.J., ENDRESS, A.G.; TAYLOR, O.C. 1982. **The role of surface wax in susceptibility of plants to air pollutant injury.** Canadian Journal of Botany 60(4):316-319. Engl., Sum. Engl., 21 Refs., Illus.

Phaseolus vulgaris. **Air pollution. Plant physiological disorders. Plant injuries**

The relationship between quantity of epicuticular wax and plant sensitivity to HCl gas was investigated using 8-, 12-, and 16-day-old pinto bean var. U.I. 111 plants exposed for 20 min to 27.6 ± 3.9 mg HCl/m³. Twelve-day-old plants were more sensitive than 8-or 16-day-old plants and possessed the lowest mean surface wax quantity. Multiple regression analysis showed that surface wax quantity was negatively linearly related to % of leaves glazed. Necrotic injury was also negatively correlated with surface wax quantity, but to a lesser degree than glazing. Chamber temp. also affected the amount of necrotic injury incurred. Plant age and HCl concn. did not contribute to the observed variation in any of the injury variables in the regression analysis. Results support the hypothesis that cuticular resistance, which is influenced by the amount of epicuticular wax, is a major factor influencing leaf glazing due to gaseous HCl. Since necrotic injury was affected by both surface wax quantity and chamber temp., the incidence and severity of necrotic injury may be controlled by both cuticular and stomatal resistances. *(Author's summary)* E06

0148

18096 LEE, E.H.; BENNETT, J.H. 1982. **Superoxide dismutase a possible protective enzyme against ozone injury in snap beans (*Phaseolus vulgaris* L.).** Plant Physiology 69(6):1444-1449. Engl., Sum. Engl., 23 Refs., Illus.

***Phaseolus vulgaris*. Enzymes. Plant injuries. Snap beans. Ozone. Air pollution. Plant physiological disorders.**

An expt'l. chemical, *N*-[2-(2-oxo-1-imidazolidinyl)ethyl]-*N'*-phenylurea (EDU), is an effective protectant against acute and chronic foliar injury due to O_3 when sprayed on intact leaves or supplied to the plants through soil application. O_3-sensitive snap bean cv. Bush Blue Lake 290 was systemically treated with EDU (0, 25, 50, and 100 mg/15-cm Φ pot) to determine if EDU induced or activated protective oxyradical and peroxyl scavenging enzymes. EDU-enhanced tolerance to O_3 injury always correlated with increases in superoxide dismutase (SOD) and catalase activities in the leaves. Peroxidase levels correlated more closely with foliar injury. Greater SOD levels in young leaves compared with old leaves were associated with lower O_3 sensitivities in these tissues. Polyacrylamide slab gel electrophoresis separations and specific determinations of SOD activity showed that EDU-treated plants possessed markedly greater SOD activity than non-treated plants. Tolerant plant tissues may have enhanced enzyme scavenging capabilities for the protection against toxic oxyradicals. Expt'l. confirmation for the oxyradical theory for O_3 phytotoxicity and SOD involvement in the detoxification process are presented. *(Author's summary)* E06

F00 PEST CONTROL AND ENTOMOLOGY

0149

17823 STOLTZ, R.L.; McNEAL JUNIOR, C.D. 1982. **Assessment of insect emigration from alfalfa hay to bean fields.** Environmental Entomology 11(3):578-580. Engl., Sum. Engl., 7 Refs., Illus.

Phaseolus vulgaris, Injurious insects, USA.

Populations of 5 insect species (*Lygus hesperus*; the western flower thrips, *Frankliniella occidentalis*; the pea aphid, *Acyrthosiphon pisum*; a damsel bug, *Nabis americoferus*; and the minute pirate bug, *Orius tristicolor*) increased slightly in bean fields near Twin Falls, Idaho (USA) after cutting of alfalfa hay. More definite increases of insects in bean fields occurred after hay cutting in 1978, when all hay study fields were cut on the same day, as opposed to 1979 and 1980, when adjacent hay fields were cut over a 10-day period. Proximity to a hay field did not correlate with large insect buildup in bean fields. No significant differences were recorded in no. of these insects 10, 50, and 100 m into bean fields when adjacent hay fields were cut. Lygus bugs and thrips did not appear in beans in large no., and invaded beans only late in the growing season. *(Author's summary)* F00

F01 Injurious Insects, Mites and their Control

0150

17706 POHRONEZNY, K.; McSORLEY, R.; WADDILL, V.H. 1981. **Integrated management of pests of snap bean in Florida.** Proceedings of the Florida State Horticultural Society 94:137-140. Engl., Sum. Engl., 17 Refs., Illus.

Phaseolus vulgaris. Snap bean. Cultivation. *Diabrotica balteata. Trichoplusia ni. Liriomyza* spp. *Pythium* spp. Disease control. Insect control. *Rotylenchulus reniformis.* Nematode control. Chemical control. USA.

Insects, diseases, and nematodes were monitored in several expt. in Homestead (Florida, USA) area snap bean fields. Traditional management (TM) plots were compared with adjacent integrated pest management (IPM) plots. Although low levels of insect defoliators, such as banded cucumber beetle (*Diabrotica balteata*) and cabbage looper (*Trichoplusia ni*), were present, in addition to moderate levels of the vegetable leafminer (*Liriomyza sativae*), levels of defoliation in the IPM plots did not exceed action thresholds of 20 and 10% for prebloom and postbloom, resp. Extension recommendations were developed for an insecticide spray at the pinpod stage, based on monitoring of crop phenology. There were substantial savings in insecticide costs in the IPM plots compared with the TM plots, ranging from 48-83%, with no demonstrable reduction in yield or quality. In 2 of 3 large-plot demonstration tests, there were significant insecticide-induced buildups of vegetable leafminer populations in the TM plots. A *Pythium* crown rot was identified during the course of 1 of the demonstration expt. and appropriate alternatives in the fungicide spray program were initiated. Yields of snap beans were negatively correlated with populations of *Rotylenchulus reniformis* at harvest, but not with populations of *Quinisulcius acutus* or *Helicotylenchus dihystera* at anytime in crop development. In several expt. in commercial fields, growers did not experience sufficient nematode populations to significantly affect yield. *(Author's summary)* F01

0151

17853 BARROS, A.L. DE C.; OLIVEIRA, A.M.A.; ROSA, C.R.; CALAFIORI, M. H.; FRANCO, J.F. 1980. **Ensaio em feijão (*Phaseolus vulgaris* L.) com sistêmicos.** *(Bean trials with systemic insecticides).* Ecossistema 5(1):113-114. Port., Sum. Engl.

Phaseolus vulgaris. Field experiments. Thysanoptera. Injurious insects. Chemical control. Brazil.

The efficiency of systemic insecticides applied at planting on the control of bean plant insects was studied in a randomized block design with 6 treatments and 4 replications. Treatments were: aldicarb at 5, 10, and 20 kg/ha; carbofuran, 40 kg/ha; aldoxycarb, 1.5 kg/100 kg of seeds; and the control. Bean var. Carioquinha was used. Thrip populations were assessed 57 days after the test was installed, showing differences between the control

and treatments with aldoxycarb and aldicarb (20 kg/ha). There were also significant differences between aldicarb (20 kg/ha) and carbofuran. *(Author's summary)* F01

0152

17850 JARRY, M.; BONET, A. 1981. **Premières observations sur la contamination par *Zabrotes subfasciatus* Boh. (Coleoptera: Bruchidae) de gousses de *Phaseolus vulgaris* L. et *P. lunatus* L. au Mexique.** [*Initial observations on the infestation of pods of Phaseolus vulgaris L. and P. lunatus L. by Zabrotes subfasciatus (Coleoptera: Bruchidae) in Mexico*]. Acta Oecologica, Oecologia Applicata 2(4): 311-315. Fr., Sum. Fr., Engl., 9 Refs.

Phaseolus vulgaris. Zabrotes subfasciatus. Stored grain pests. Pods. Mexico.

In Tepoztlan, Mexico, female *Zabrotes subfasciatus* were found to deposit their eggs on seeds inside dry pods of *Phaseolus vulgaris* (dehiscent) in wild or subspontaneous populations of *P. vulgaris* and *P. coccineus*. *P. coccineus* was not infested. In Zacatepec, active female *Z. subfasciatus* were found at harvest in Feb., April, June, July, and Oct. in *P. vulgaris* grown throughout the year. At the same site eggs of *Z. subfasciatus* were found on subspontaneous perennial bushes of *P. lunatus*. In all cases, infestation was low. The importance of conducting an in-depth ecological study on this insect and one regarding infestation conditions during harvest is highlighted. It is suggested that *Z. subfasciatus* should be tentatively classified among the groups proposed by Loukianovitch & Terminasian (1957). *(Summary by I.B. Trans. by L.M.F.)* F01

0153

17351 McPHERSON, J.E. 1975. **Effects of developmental photoperiod on adult morphology in *Euschistus tristigmus tristigmus* (Say) (Hemiptera: Pentatomidae).** Annals of the Entomological Society of America 68(6):1107-1110. Engl., Sum. Engl., 3 Refs.

Phaseolus vulgaris. Photoperiod. *Euschistus tristigmus tristigmus.* Insect biology. USA.

Dimorphism in shoulder shape and no. of midventral abdominal spots of adult *Euschistus tristigmus tristigmus*, fed snap beans, in response to 12L:12D (light:dark) and 24L:0D photoperiods, resulted from an accumulation of photoperiod effects on 2 or more immature stages. More immature stages were receptive to 12L:12D than 24L:0D photoperiod influence. *(Author's summary)* F01

0154

15862 MENTEN, L.A.S.; WIENDL, F.M.; MENTEN, J.O.M. 1981. **Determinação do raio de vôo (ação) de *Acanthoscelides obtectus*, (Say, 1813) (Col. Bruchidae) por meio de traçador radioativo ^{131}I.** [*Determination of the flight range of Acanthoscelides obtectus (Coleoptera Bruchidae) using ^{131}I as radioactive tracer*]. Energia Nuclear e Agricultura 3(1):34-43. Port., Sum. Port., Engl., 9 Refs., Illus.

Phaseolus vulgaris. Acanthoscelides obtectus. Entomology. Brazil.

To determine the flight range (activity) of the bean weevil (*Acanthoscelides obtectus*), 800 adult insects were labelled with sodium iodide ($Na^{131}I$) at 0.468 mCi/ml. In order to label the weevils, they were kept on Petri dishes with filter paper embedded in 3.2 ml $Na^{131}I$ radioactive solution. The labelled insects [over 800,000 counts/min (c.p.m.)/800 insects at 5 cm distance] were released in the middle of a plantation of bean cv. Rosinha G-2 at physiological maturation stage. The labelled insects were located using a Victoreen monochannel γ spectrometer with NaI (Tl) cristal, the countings in the field being repeated 8 times. The 1st 2 countings (2 and 3 h after release) showed that the insects had flown in different directions, reaching about 20 m from the release point. The 3rd and 4th countings (6 and 7 h after release) indicated that they reached around 30 m. According to the 5th,

6th, and 7th countings (8, 50, and 54 h after release) the dispersion of the insects continued, maintaining a radius of 30 m. At the last counting (120 h after release) a greater uniformity in the dispersion rate was observed, probably because the insects adapted themselves to the local environmental conditions. It was also noted that during the day the insects were located under small soil aggregates or crop residues, close to the nutrients but never on the foliage. *(Author's summary)* F01

0155

17874 BORTOLI, S.A. DE; GIACOMINI, P.L. 1981. **Ação de alguns inseticidas granulados sistêmicos sobre *Bemisia tabaci* (Gennadius, 1889) (Homoptera-Aleyrodidae) e *Empoasca kraemeri* Ross & Moore, 1957 (Homoptera-Cicadellidae) e seus efeitos na produtividade do feijoeiro (*Phaseolus vulgaris* L.).** [*Action of some granulated systemic insecticides against Bemisia tabaci (Homoptera-Aleyrodidae) and Empoasca kraemeri (Homoptera-Cicadellidae) and their effect on bean yields*]. Anais da Sociedade Entomologica do Brasil 10(1):97-104. Port., Sum. Engl., Port., 6 Refs.

Phaseolus vulgaris. Bemisia tabaci. Empoasca kraemeri. **Insect control. Chemical control. Yields. Brazil.**

An insecticide trial was carried out at Jaboticabal, SP, Brazil, during the 1976-1977 planting season, in order to evaluate the action of aldicarb 10G (4.0, 2.0, 1.0, and 0.5 kg a.i./ha); thiofanox 10G (2.0 and 1.0 kg a.i./ha), and bufencarb 10G (2.0 and 1.0 kg a.i./ha) on the control of *Bemisia tabaci* and *Empoasca kraemeri* and their effect on seed yield. Insect control by insecticides was evaluated by means of several insect surveys in the field and lab. and also by yield. To control *B. tabaci*, aldicarb at 4.0 kg/ha was the best treatment. Aldicarb at 2.0 and 1.0 kg/ha and thiofanox at 2.0 kg/ha were also efficient and gave better control than all the other treatments. To control *E. kraemeri*, aldicarb at 4.0 and 2.0 kg/ha were the best treatments, their efficiency was observed 26 days after application. Aldicarb at 4.0 kg/ha was the only treatment that showed a significant increase in yield when compared with the other treatments. *(Author's summary)* F01

0156

17875 CARDONA, C.; GONZALEZ, R.; SCHOONHOVEN, A.VAN 1982. **Evaluation of damage to common beans by larvae and adults of *Diabrotica balteata* and *Cerotoma facialis*.** Journal of Economic Entomology 75(2):324-327. Engl., Sum. Engl., 11 Refs., Illus.

Phaseolus vulgaris. Diabrotica balteata. Cerotoma facialis. **Plant injuries. Crop losses. Yields. Growth. Colombia.**

Damage to beans by feeding of larvae and adults of *Diabrotica balteata* and *Cerotoma facialis* was evaluated under greenhouse and field conditions at CIAT, Palmira, Colombia. The 2nd and 3rd instars were more damaging than 1st instars and caused stand losses of up to 100%. In general, although *C. facialis* larvae were more damaging than those of *D. balteata*, both caused significant reductions of leaf area in plants that survived infestation at 1, 4, and 7 days after seeding. No significant reduction in leaf area was found when 14-day-old or older plants were infested with 10 larvae/plant. The effect of adult feeding on yield was measured at different growth stages of the plant. Mixed and pure populations of these species at the rate of 2 and 4 adults/plant caused losses of up to 60% during the initial period of growth (8-15 days) and to a lesser extent during flowering. No significant damage was detected at other stages of the growth cycle. Since av. adult field populations (0.6-1.0 adults/plant) are below these critical levels, it is concluded that, in areas in which the adults are not acting as virus vectors, the common practice of spraying against these insects is seldom justified. *(Author's summary)* F01

0157

18025 POUZAT, J. 1982. **The effect of antennal amputation on oogenesis in the bean weevil (*Acanthoscelides obtectus*).** Entomologia Experimentalis et Applicata 31(4):333-338. Engl., Sum. Engl., Fr., 32 Refs.

***Phaseolus vulgaris. Acanthoscelides obtectus.* Insect biology.**

Complete amputation of both antennae results in an increase of oogenesis in virgin females of the bean weevil, *Acanthoscelides obtectus*. This effect seems independent of all known external stimuli and especially from specific ones, such as host plant (bean s). This is best explained by the possible existence of spontaneous activity in some sensory receptors of the antenna which may inhibit the oogenesis in the intact females (unknown unspecific stimuli may also be involved). This idea is supported by the results of unilateral amputations; the increase in oogenesis is directly related to the no. of antennal receptors removed. Parts of the host plant have a stimulating effect on oogenesis in the intact females. This is the consequence of a taste perception. Antennal amputation does not prevent this host plant effect. But the observed effect caused by these 2 stimulating factors, the host plant and antennal amputation, is less than the calculated sum of the 2 separate effects. This may be explained by assuming that the virgin females have a certain max. intrinsic rate of oocyte production which is reached here. The observed variability, thought to be of genetic origin, is discussed. It is stressed that this phenomenon is often ignored or underestimated. *(Author's summary)* F01

0158

18022 McCLANAHAN, R.J. 1981. **Effectiveness of insecticides against the Mexican bean beetle.** Journal of Economic Entomology 74(2):163-164. Engl., Sum. Engl., 3 Refs.

***Phaseolus vulgaris. Epilachna varivestis.* Chemical control. Insect control.**

The contact action of 21 insecticides was evaluated against 1st instars of *Epilachna varivestis* by using a Potter spray tower. All insecticides were toxic to larvae, and differences were indicated by tabulated values of the LD_{50} and LD_{95}, as well as their confidence limits. The most toxic materials were the synthetic pyrethroids, carbofuran, methomyl, and carbaryl. The least toxic, malathion, still gave 93% mortality at 100 mg a.i./l. The same insecticides tested against eggs of *E. varivestis* gave less uniform mortality. The 4 pyrethroids were effective at low dosages, and 11 other insecticides prevented hatching when applied at levels approx. 10 times higher than the larval LD_{95}. Azinphosmethyl, malathion, phosmet, endosulfan, and methomyl had little or no effect at 1000 mg of a.i./l. Lab. efficiency of insecticides was related to present recommendations for field control, and suggestions are presented for future field tests. *(Author's summary)* F01

0159

17415 COSTILLA, M.A.; BASCO, H.J. 1981. **Principales plagas del porото.** *(Major bean pests).* Avance Agroindustrial 2(7):15-16. Span., Illus.

***Phaseolus vulgaris. Empoasca kraemeri. Bemisia tabaci. Diabrotica speciosa.* Thysanoptera. Plant injuries. Chemical control. Insect control. Argentina.**

Major bean pests in Argentina are described: leafhoppers (*Empoasca kraemeri* and *E. fabae*), whiteflies (*Bemisia* sp.), thrips, and chrysomelids (*Diabrotica* sp.). Damage caused to the plant and recommended chemical control measures are included. *(Summary by F.G. Trans. by L.M.F.)* F01

0160

18085 HOY, M.A.; CASTRO, D.; CAHN, D. 1982. **Two methods for large scale production of pesticide-resistant strains of the spider mite predator *Metaseiulus occidentalis* (Nesbitt) (Acarina, Phytoseiidae).** Zeitschrift fur Angewandte Entomologie 94(1) 1-9. Engl., Sum. Engl., Germ., 13 Refs.

Phaseolus vulgaris. **Biological control.** *Tetranychus telarius.* **Integrated control. Predators.**

Two methods developed in the USA in 1981 for large-scale rearing of pesticide-resistant strains of *Typhlodromus occidentalis (Metaseiulus occidentalis)* for the biological control of the spider mite *Tetranychus urticae* are described. In the 1st, more than 1.5 million predators resistant to carbaryl-organophosphorus, sulfur-organophosphorus, and permethrin-organophosphorus were reared on pinto bean plants infested with *T. urticae* in 45.5 m^3 of greenhouse bench space between June-Sept. In the 2nd, about 62 million predators resistant to carbaryl and organophosphorus were reared in a 0.2-ha soybean field plot after the release of about 180,000 females in June. In both expt. propargite was used to maintain correct densities of *T. urticae*, while diazinon, carbaryl, sulfur, or permethrin were used to maintain pure resistant *T. occidentalis* colonies and eliminated most contaminants such as other phytoseiids and insects. The advantages and disadvantages of the 2 methods are discussed. *(Author's summary)* F01

0161

18050 HUIGNARD, J.; LEROI, B. 1981. **Influence of adult food on the reproduction of virgin females of an *Acanthoscelides obtectus* strain originating from Colombian altiplanos.** Experientia 37(8) 831-833. Engl., Sum. Engl., 17 Refs., Illus.

Phaseolus vulgaris. **Seed.** *Acanthoscelides obtectus.* **Stored grain pests. Insect biology.**

The reproductive activity of virgin females of a strain of *Acanthoscelides obtectus* originating from harvested bean seeds from the high plateau of Colombia (the insect's zone of origin) was variable. Some females did not synthesize vitellogenin during adult life, while others produced mature oocytes. In the case of virgin females without reproductive activity, the supply of pollen in the adult diet did not stimulate synthesis and incorporation of vitellogenin. On the other hand, the supply of pollen always induced a higher vitellogenin titre in the hemolymph of females that produced oocytes and stimulated ovarian production. These results are considered to be related to the adaptation of the bruchid's life-cycle to that of the food-plant. *(Author's summary)* F01

0162

17740 SALGUERO, V. 1981. **Plagas de frijol en Guatemala.** *(Bean pests in Guatemala)* Guatemala, Instituto de Ciencia y Tecnología Agrícola. Programa de Frijol. 20p. Span., 24 Refs.

Paper presented at Curso Nacional de Frijol, 1o., Jutiapa, Guatemala, 1981.

Phaseolus vulgaris. **Integrated control.** *Bemisia tabaci. Empoasca kraemeri. Apion godmani. Diabrotica.* **Stored grain pests. Guatemala.**

The bean program of the Instituto de Ciencia y Tecnología Agrícola in Guatemala has tested a series of alternatives included in the different existent pest control methods in order to establish adequate pest management practices as part of an integrated control system. The degree of incidence, characteristics, and control of *Bemisia tabaci, Empoasca kraemeri*, chrysomelids, and *Apion godmani* are described. Minor pests attacking bean seedlings (cutworms and slugs), foliage, and stored grain are listed. *(Summary by F.G. Trans. by L.M. F.)* F01

0163

17876 DEBOLT, J.W. 1982. **Meridic diet for rearing successive generations of *Lygus hesperus*.** Annals of the Entomological Society of America 75(2):119-122. Engl., Sum. Engl., 7 Refs.

***Phaseolus vulgaris*. Uses. Predators. *Lygus hesperus*. Insect biology. Snap beans. *Spodoptera exigua*.**

An artificial diet is described that was developed in the USA and tested for rearing the predacious mirid *Lygus hesperus*. Nymphs were reared successfully individually and en masse. The development time was comparable with that on a diet of green beans. Females reared on the artificial diet laid more eggs and lived longer than those reared on green beans. The % egg hatch for diet-reared bugs was 5.5% lower than for bugs on green beans, but diet-reared bugs weighed more than those on green beans. *L. hesperus* was reared continuously for more than 13 generations on the artificial diet. The % of 1st-instar nymphs reaching the adult stage was 16.7% higher on artificial diet than on a diet of green beans + heat-killed larvae of *Spodoptera exigua*. This is the 1st report of the continuous rearing of any mirid on an atificial diet. *(Author's summary)* F01

See also 0093 0165 0166 0170

G00 GENETICS AND PLANT BREEDING

G01 Breeding, Selection and Germplasm

0164

16775 RODRIGUEZ DE LEON, C.A.; ALDANA DE LEON, L.F.; MASAYA S., P. 1981. **Caracterización de variedades de fríjol (*Phaseolus vulgaris*, L.) usadas en el sur-oriente de Guatemala.** *(Characterization of bean varieties used in southeastern Guatemala). In* Reunión Anual del Programa Cooperativo Centroamericano para el Mejoramiento de Cultivos Alimenticios, 27a., Santo Domingo, República Dominicana, 1981. Memoria. Santo Domingo, Secretaría de Estado de Agricultura. v.3, pp. L1-1-L1-11. Span., Illus.

Phaseolus vulgaris. Cultivars. Yields. Maturation. Agronomic characters. Genetics. Selection. Guatemala.

A total of 269 bean seed samples were collected from 17 municipalities of SE Guatemala and planted in Monjas, Jalapa in single rows 6 m long with 2 replications to survey the var. used by farmers. Eleven improved var. were also planted. Data on yields of grains containing 14% MC, days to flowering, days to physiological maturity, stem color, the presence of vines, flower color, no. of nodes and pods on the main stem, no. of pods on branches, no. of grains/pod, and av. seed wt. were recorded. The correlation between major characteristics were estimated for all samples. In this region 13% of the farmers use improved var.; 65% of the var. flower earlier than the improved var. included in the trial and 50% of this group (collected var.) are early-maturing. There was genetic variability for the characters studied in the var. collected, except for the no. of grains/pod. In improved var. the significant negative correlation between days to flowering and yield shows that late-maturing var. are not necessarily the highest yielders, although at the test site conditions were optimum for expressing yield potential. *(Summary by F.G. Trans. by L.M.F.)* G01

0165

17843 LYMAN, J.M.; CARDONA, C. 1982. **Resistance in lima beans to a leafhopper, *Empoasca kraemeri*.** Journal of Economic Entomology 75(2):281-286. Engl., Sum. Engl., 19 Refs., Illus.

Phaseolus lunatus. Empoasca kraemeri. Injurious insects. Host-plant resistance. Cultivars. Colombia.

Lima bean, *Phaseolus lunatus*, lines resistant to *Empoasca kraemeri* were identified by a visual rating system in Palmira, Colombia. Resistance levels were superior to those in common beans. Nymphal populations were highly and positively correlated with insect damage. Trichome density on the 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 the 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 revealed a highly negative correlation, confirming the important role of trichomes in leafh)pper resistance. *(Author's summary)* G01 F01

0166

16925 LYMAN, J.M. 1980. **Adaptation and breeding studies on the lima bean, *Phaseolus lunatus* L., as a food legume for Latin America.** Ph.D. Thesis. Ithaca, N.Y. Cornell University. 257 p. Engl., Sum. Engl., 195 Refs., Illus.

***Phaseolus lunatus*. Adaptation. Cultivars. Climbing beans. Hybridizing. Host-plant resistance. *Xanthomonas phaseoli*. *Empoasca kraemeri*. Colombia.**

The potential of the lima bean as a food legume for L.A. was evaluated in Colombia. Objectives of an adaptation study were to examine plant development and productivity under varying conditions, and to identify major production constraints. Thirty-six climbing lima bean lines were grown on trellises with min. chemical inputs in 5 trials at 4 Colombian sites. The mean dry seed yield of all lines was 2.8 t/ha. The mean yield at the least favorable site was 1.7 t/ha; at the most favorable site, 5.1 t/ha. Although growth was adversely affected on a soil with pH 4.2, the mean yield was 2.3 t/ha. Mean daily dry seed productivity rates of all lines ranged from 15.2-47.3 kg/ha/day for all sites, exceeding rates reported for common beans and other legumes at the same locations. Mean yield and no. of pods/plant varied significantly between sites. Days to flower and to dry seed harvest were relatively stable. No relationship was found between yield and seed coat color. Major production constraints were common bacterial blight and leafhoppers. Breeding studies focused on these constraints. Lines with high and low levels of resistance were crossed to determine the mode of inheritance. Growth habit and seed coat color traits were the most useful marker traits for verification of hybridization; seed size was not useful. These studies demonstrated high productivity of lima beans under adverse and favorable climatic and soil conditions and in the presence of an important insect pest. Increased resistance to common bacterial blight and adapted bush types are needed. Greater efforts must be made in tropical lima bean research and extension programs to realize the potential of this crop as a food legume for L.A. *(Extracted from author's summary)* G01 E02 F01

0167

17751 MEINERS, J.P.; ELDEN, T.C. 1978. **Resistance to insects and diseases in *Phaseolus*.** *In* Summerfield, R.J.; Bunting, A.H., eds. International Legume Conference, Kew, England, 1978. [illegible]nces in legume science. Proceedings. Kew, England, Royal Botanical Gardens. v. [illegible] [illegible]44. Engl., Sum. Engl., 59 Refs.

***Phaseolus vulgaris*. Plant breeding. Host-plant [illegible]ance. Pests.**

Phaseolus spp. suffer from numerous insect pests and diseases in nearly all production areas. Host-plant resistance may provide the most efficient control. Resistance to a no. of insects has been identified but remains to be exploited in the development of resistant cv. Many *Phaseolus* cv. are resistant to one or more diseases but, again, the potential has yet to be fully exploited. Max. pest control through resistance will be realized only by diligent interdisciplinary application of both established and innovative scientific principles and methods. *(Author's summary)* G01

0168

17841 ALVAREZ, M.N.; ASCHER, P.D.; DAVIS, D.W. 1981. **Interspecific hybridization in Euphaseolus through embryo rescue.** HortScience 16(4):541-543. Engl., Sum. Engl., 16 Refs.

***Phaseolus vulgaris*. Hybridizing. Embryo (plant). *P. acutifolius*. *P. coccineus*. *P. lunatus*. USA.**

About 2000 pollinations of *Phaseolus coccineus* x *P. acutifolius*, *P. coccineus* x *P. vulgaris*, *P. vulgaris* x *P. acutifolius*, and F_2 (*P. vulgaris* x *P. coccineus*) x *P. acutifolius* produced more than 1500 excisable embryos, about half of which elongated and produced leaves and roots when embryo cultured on a relatively simple medium in the dark. Damaging cotyledonary buds on small embryos or removing cotyledons from larger embryos before culture enhanced germination. Transplanting germinated embryos into pots resulted in greater than 50% mortality. Hybrids tended to be intermediate to parental species in vegetative and floral characteristics but % stainable pollen was lower. Anthers did not dehisce and % stainable pollen was lowest in *P. vulgaris* x *P. acutifolius* and F_2 (*P. vulgaris* x *P. coccineus*) x *P. acutifolius* hybrids. Since *P. coccineus* x *P. acutifolius* and *P. coccineus* x *P. vulgaris* hybrids were sufficiently fertile to produce advanced generations, *P. coccineus* may be useful as a bridge between *P. vulgaris* and *P. acutifolius*. *(Author's summary)* G01

0169

17844 ANTUNES, I.F., TEIXEIRA, M.G., ZIMMERMANN, M.J. DE O. 1980. **Maximização da eficiência de cruzamentos artificiais em feijão (*Phaseolus vulgaris* L.).** *(Maximizing the efficiency of artificial crossings in bean).* Goiânia-GO, Brazil. Empresa Brasileira de Pesquisa Agropecuária. Centro Nacional de Pesquisa em Arroz e Feijão. Pesquisa em Andamento no. 16. 3p. Port.

Phaseolus vulgaris. Crossbreeding. Hybridizing. Pollination. Yields. Brazil.

In order to determine the viability of crossings under field conditions and the most efficient method of artificial hybridization, an expt was conducted to evaluate 5 methods of crossing (3 using the practice of flower bud emasculation and 2 without this practice) under greenhouse and field conditions. The following parameters were determined (1) no. of pollinations producing pods, (2) no. of self-pollinated seeds/pod, (3) no. of hybrid seeds/pod, and (4) total no. of pods produced/method. Tested techniques that presented the best results under the conditions of Goiânia (Brazil) regardless of planting date were those that did not include flower bud emasculation under both greenhouse and field conditions. *(Summary by F.G. Trans. by L.M.F.)* G01

0170

17800 GALVEZ, G.E. 1982. **Investigaciones sobre el picudo del fríjol, la mustia hilachosa y el mosaico dorado en Centroamérica y México.** *(Research on the bean pod weevil, web blight, and the golden mosaic in Central America and Mexico).* Cali, Colombia. Centro Internacional de Agricultura Tropical. Seminarios Internos. Serie SF-11-82. 7p. Span

Phaseolus vulgaris. *Apion godmani*. *Rhizoctonia solani*. Bean golden mosaic virus. Cultivars. Host-plant resistance. Integrated control. Disease control. Mexico. Central America.

Advances in research conducted by the Centro Internacional de Agricultura Tropical together with its technicians in Central America, and the close collaboration with national programs are analyzed regarding factors limiting bean productivity in Central America: the bean pod weevil (*Apion godmani*), BGMV, and web blight (*Thanatephorus cucumeris*). A total of 28 bean pod weevil-resistant lines have been obtained in which the % of damaged seeds and pods was reduced by 72 and 42%, resp. Lines Bat 1235, BAT 1230, Porrillo 70, S-603B, and Porrillo 1 have showed tolerance to web blight in trials in international nurseries (Colombia, Panama, Costa Rica, Nicaragua, El Salvador, Guatemala, and Mexico). Since this tolerance is not sufficient to control the disease, studies have been conducted on chemical and cultural control. The use of mulches combined with a min. tillage system and the use of postemergence herbicides is the most significant practice to obtain an efficient control. With this integrated control system yields up to 1500 kg/ha have been obtained with ICA-Palmar in Panama compared with 500 kg/ha when this system is not used. BGMV-tolerant lines have been released. In Preliminary Trials in 1981 2 tolerant lines were recorded A171 and A174. *(Summary by F.G. Trans. by L.M.F.)* G01 E03 E04 F01

0171

18005 ISASI, E.M.; BUSTO G., I. 1981. **Duración óptima del tratamiento mutagénico con distintas dosis de etil-metan-sulfonato (EMS) en fríjol común (*Phaseolus vulgaris* L.).** [*Optimum duration of mutagenic treatments with different doses of ethyl methane sulphonate (EMS) in beans*]. Ciencias de la Agricultura 9:85-89. Span., Sum. Span., Engl., 13 Refs.

***Phaseolus vulgaris*. Seed. Mutation.**

Seeds of black bean var. Selección 1 were treated with different doses of EMS for 12, 24, 36, 48, 60, and 72 h to determine the optimum length of the treatment. The % of chlorophyll mutation showed significant differences regarding the length of the treatments, but not for the doses. Results of the Duncan test showed highly significant differences regarding the 12 and 24 h/treatments, besides having the highest % of viable chlorophyll mutations and the lowest % of nonviable ones. At the same time plants with important agronomical characteristics (tall, compact, and erect growth habit) were observed, these maintaining their stability in M_3. Although rust (*Uromyces phaseoli*) and virus (BCMV, bean yellow stipple virus) infections were observed in the exptl. plots, disease-free plants were selected that keep these characteristics in the 3rd generation. *(Author's summary)* G01

0172

18072 BEVERSDORF, W.D.; HUME, D.J. 1981. **Ex Rico 23 white bean.** Canadian Journal of Plant Science 61(4):1017-1018. Engl., Sum. Engl., Fr., 1 Ref.

***Phaseolus vulgaris*. Agronomic characters. Cultivars. Host-plant resistance. *Whetzelinia sclerotiorum*. Yields.**

Bush type navy bean cv. Ex Rico 23, adapted to field bean production in SW Ontario, Canada, is described. It exhibits much more tolerance to white mold (*Sclerotinia sclerotiorum*) than other cv. tested in var. trials, along with good agronomic performance and cooking quality. In 1977-80 it yielded 2.95 t seed/ha compared with 2.77, 2.66, and 2.38 t in cv. Fleetwood, Kentwood, and Seafarer, resp. *(Author's summary)* G01

0173

18019 SINGH, K. 1981. **Discovery of red gold in Jammu and Kashmir State.** Pulse Crops Newsletter 1(2):61-62. Engl., Illus.

***Phaseolus vulgaris*. Cultivars. Plant habit. Yields. Cultivation. India.**

The new introduced (from Himachal Pradesh) *Phaseolus vulgaris* cv. Jwala grown in Jammu and Kashmir, India, matured in 3 mo. and gave seed yields 2.5 times higher than those of local cv. Its plants form an erect bush and need no mechanical support for growth. Jwala can give 2 crops/yr in the upper Shiwalik hills (alt. 3000-4000 ft.). Notes on its cultivation are given. *(Summary by Field Crop Abstracts)* G01

0174

17884 HERNANDEZ, T.; FAURE, B.; IRAÑETA, M. 1981. **Evaluaciones de 48 variedades de fríjol común (*Phaseolus vulgaris*) en cuanto a la incidencia de dos enfermedades fungosas y una bacteriana.** *(Assessment of 48 bean varieties regarding the incidence of one bacterial and two fungal diseases).* Ciencia y Técnica en la Agricultura: Viandas, Hortalizas y Granos 4(1):31-47. Span., Sum. Span., Engl., 11 Refs., Illus.

***Phaseolus vulgaris*. Field experiments. Cultivars. *Uromyces phaseoli*. *Colletotrichum lindemuthianum*. *Xanthomonas phaseoli*. Host-plant resistance. Selection. Cuba.**

The performance of 48 bean var. regarding their resistance to diseases including rust (*Uromyces phaseoli*), anthracnose (*Colletotrichum lindemuthianum*), and bacterial blight (*Xanthomonas phaseoli*) was assessed under field conditions at the Estación de Papa y Granos El Tomeguín, Alquízar, La Habana (Cuba). These var. were selected from 302 introductions from Colombia and 6 from the U.S.A. in 1978. As result of this work, 16 var. of different colored grains were selected; these were outstanding for their resistance to the mentioned diseases. Black-seeded var. were Ipala 72, Turrialba 4, and Criollo Santo Domingo; red-seeded, Red Kloud and Montcalm, white-seeded, Caballero, White Morrow fat, and Canario; beige-seeded, FF16-3, FF16-3-1, and Villa Rica; mottled-seeded, Diacol Calima, Pinto Nacional, and Pintado; brown-seeded, Paraná lote 3 and FF16-13. All of these var. will undergo further evaluation for disease resistance. *(Author's summary)* G01 E02 E03

0175

18051 McPERSON, J., BLISS, F.A.; ROSAS, J.C. 1982. **Selection for enhanced nitrogen fixation in common beans,** *Phaseolus vulgaris. In* Graham, P.H.; Harris, S.C., eds. Biological nitrogen fixation technology for tropical agriculture, Cali, Colombia, 1981. Papers presented. Cali, Centro Internacional de Agricultura Tropical. pp.39-44. Engl., Sum., Engl., 8 Refs., Illus.

Phaseolus vulgaris. **Cultivars. Backcrossing. Nitrogen fixation. Yields.**

A backcross/inbred method of population development in which Puebla 152 was the donor parent and Jamapa, Porrillo Sintético, ICA Pijao, Ex Rico 23, and Sanilac were the recurrent parents, was used to develop a no. of nearly homozygous lines, similar in most traits to the recurrent parent. When these materials were evaluated for $N_2(C_2H_2)$ fixation and yield under field conditions, considerable variation in both traits was found, with transgressive segregation evident. In population 24, most families proved better than the recurrent parent, Sanilac, in both yield and $N_2(C_2H_2)$ fixation. *(Author's summary)* G01 I01

0176

16757 CENTRO DE INVESTIGACIONES FITOTECNICAS DE PAIRUMANI. BOLIVIA. 1980? **Variedades de frijol.** *(Bean varieties)* Cochabamba, Instituto Boliviano de Tecnología Agropecuaria. 1p. Span., Illus.

Phaseolus vulgaris. **Cultivars. Adaptation. Plant habit. Yields. Bolivia.**

The origin, growth cycle, adaptation, grain color and size, and yield of the following bean var. are briefly described: Pairumani FI-27, ICA-Tui, Pairumani FI-69, and Pairumani CF-39. These are offered by the Centro Fitotécnico de Pairumani through the extension agencies of the Instituto Boliviano de Tecnología Agropecuaria, IBTA. *(Summary by F.G. Trans. by L.M.F.)* G01

0177

16008 REPUBLICA DOMINICANA. SECRETARIA DE ESTADO DE AGRICULTURA. 1979. **Fitotecnia: tolerancia del frijol a altas temperaturas.** *(Plant breeding: bean tolerance to high temperatures). In* ——. Informe Anual 1979. La Herradura, Santiago de los Caballeros, Centro de Desarrollo Agropecuario, Zona Norte. pp.20-25. Span., Illus.

Phaseolus vulgaris. **Host-plant resistance. Cultivars. Temperature. Yields. Dominican Republic.**

An exp[illegible] was conducted at the Quinigua Exptl. Station, Dominican Republic, under irrigated conditions to assess both regional and introduced bean var. from CIAT as to their tolerance to high temp. Planting took place in July so that the growth cycle would coincide with the highest regional temp. (av. values of 27.1-29.0°C). Red, black, and white beans were compared. Black bean var. adapted best to high temp. and among them, ICA-Pijao

yielded 1717 kg/ha. Yields of red beans were good, although significantly lower than those obtained under better conditions. Var. Pompadour Checa had the highest yields (952 kg/ha). *(Summary by F.G. Trans. by L.M.F.)* G01 D01

0178

18097 LEAL, N.R.; HAMAD, I.A.; BLISS, F. 1982. **Avaliação dos progenitores e linhas avançadas de melhoramento de feijão-de-vagem de crescimento determinado.** *(Evaluation of parents and advanced breeding lines of bush type snap beans).* Pesquisa Agropecuária Brasileira 17(2):225-231. Port., Sum. Port., Engl., 11 Refs.

Phaseolus vulgaris. **Snap beans. Dwarf beans. Crossbreeding. Cultivars. Plant breeding. Brazil.**

Ninety-five snap bean breeding lines from 5 parents crossed in a diallel mating design were studied. The parental cv. were Green Isle (GI), Tempo (T), Bush Blue Lake 274 (BBL), Gala Green (GG), and Cascade (CAS). The parental evaluation was based on progeny performance. GI was the best parent for no. of lines which exceeded the best parent mean in no. of pods/plant. BBL was the best parent for pod wt./plant, individual pod wt., pod length, and no. of lines exceeding the best parent. CAS progenies showed the largest variability for pod wt./plant, while GG ranked 1st based on total no. of standard deviations units over the midparent for this trait. T had the lowest incidence of interlocular cavitation based on parental mean progeny mean, no. of lines that exceeded the best parent, no. of deviations over midparents and also the best progenies for ovule no./pod. Thirteen lines exceeded the best parent yield in g/plant in at least 10%. Line 1 from GG x CAS showed the best yield exceeding the best parent by 40%. *(Author's summary)* G01

0179

16001 ANTUNES, I.F.; COSTA, J.G.C.; OLIVEIRA, E.A. 1974. **Feijão - cultivar IAS-3 - Tambó.** *(Bean cultivar IAS-3-Tambó).* Pelotas-RS, Brasil, Empresa Brasileira de Pesquisa Agropecuária. Instituto de Pesquisas e Experimentação Agropecuárias do Sul. Boletim Técnico no 96. 4p. Port., 5 Refs.

Phaseolus vulgaris. **Cultivars. Agronomic characters. Host-plant resistance.** *Uromyces phaseoli. Colletotrichum lindemuthianum.* **Yields.**

The agronomic characteristics of bean cv. IAS-3, Tambó, obtained through mass selection of the introduced germplasm at the Instituto de Pesquisas e Experimentação Agropecuárias do Sul (Brazil) are given. This cv. is resistant to races B_1, B_2, B_3, B_7, B_{13}, and B_{16} and susceptible to races B_5, B_6, B_{10}, B_{11}, and B_{14} of *Uromyces phaseoli*; resistant to races of β, mex. 1, and γ groups and susceptible to α, δ, and brasileiro 1 of *Colletotrichum lindemuthianum*. Data on its yield in trials conducted during 1969/70 and 1971/72 are analyzed. Recommendations on the most appropriate planting time and density for its cultivation are included. *(Summary by F.G. Trans. by L.M.F.)* G01

See also 0079 0116 0135 0138 0190

H00 NUTRITION

H01 Foods and Nutritive Value

0180

18029 SUAREZ S., M.E.; ALUJA, A.S. DE; BERRA, R.; NIETO, Z.; VILLANUEVA, J. 1981. **Efecto de la alimentación con fríjol negro (*Phaseolus vulgaris*) sometido a diferentes tiempos de cocción en ratas. Estudio histológico de hígado y gónadas.** *(Effect of feeding rats with diets containing black beans cooked for different lengths of time. Histological study of liver and gonads).* Veterinaria (México) 12(3): 129-145. Span., Sum. Span., Engl., 40 Refs., Illus.

Phaseolus vulgaris. **Laboratory animals. Cooking. Diets. Animal nutrition. Nutritive value.**

Wistar rats were fed for 65 days on a diet with black beans Querétaro as the only source of protein. The beans were cooked in an autoclave for 10, 30, 50, 60, or 80 min at a pressure of 15 lb/in^2. The PER of the diet decreased with cooking up to 50 min. At 60 and 80 min the value increased again but did not equal the value at 10 min. Female rats showed much delay in sexual maturity when given beans cooked for 50 and 60 min; no corpus luteum was present in their ovaries. Male rats had delayed spermatogenesis when fed on beans cooked for 50, 60, and 80 min, no sperm cells being present in the epididymides. The liver cells showed variable degrees of vacuolization in all groups except controls. Black beans for human consumption should be cooked in autoclave for 60-80 min at 15 lb pressure. *(Extracted from author's summary)* H01

0181

18081 CONTRERAS, G.; ELIAS, L.G.; BRESSANI, R. 1981. **Efecto de la suplementación con vitaminas y minerales sobre la utilización de la proteína de mezclas de maíz:fríjol.** *(Effects of supplements of vitamins and minerals on protein utilization of maize and bean mixtures).* Archivos Latinoamericanos de Nutrición 31 (4): 808-826. Span., Sum. Span., Engl., 11 Refs., Illus.

Phaseolus vulgaris. **Laboratory animals. Proteins. Vitamin deficiencies. Human nutrition. Minerals and nutrients. Lysine. Methionine. Tryptophane.**

For 4 wk., groups of 8 Wistar rats initially 21-days old had freely water and feed based on ground white maize and black beans at 87:13 or 70:30 with mineral mixture, vitamin solution, soybean oil, and cod liver oil. Diets contained protein 8.5 and 10.6% and the control had 10% casein. Thiamin, niacin, vitamin B-6, riboflavin, or vitamin A, or none or all of them were excluded. Omission of Fe, Zn, I, or Mg or of none or all of them was tested similarly. Effect of adding L-lysine, DL-met., and DL-tryptophan was tested in conjunction with the other treatments. Wt. gain and feed intake were monitored and utilizable protein was calculated. Utilization of protein was greater for 70:30 than for 87:13 with or without supplementary amino acids. Omission of one nutrient such as Mg seemed as crucial as combined deficiency of all vitamins or all minerals; utilization of protein was consistently greatest when no vitamin or mineral was omitted. Addition of amino acids was effective only with complete supplies of vitamins, minerals, and energy. Carcass, but not liver,

contained significantly more fat with 70:30 than with 87:13 mixture. *(Summary by Nutrition Abstracts and Reviews)* H01

0182

17865 DeFOUW, C.; ZABIK, M.E.; UEBERSAX, M.A.; AGUILERA, J.M.; LUSAS, E. 1982. **Effects of heat treatment and level of navy bean hulls in sugar-snap cookies.** Cereal Chemistry 59(4):245-248. Engl., Sum. Engl., 11 Refs.

***Phaseolus vulgaris*. Seed coat. Heat treatment. Uses. Fibre content. Bean flour.**

The effects of levels of navy bean hull incorporation and of navy bean heat treatment on the physical and sensory qualities of sugar-snap cookies were investigated. Levels of 0-30% substitution of navy bean hulls were substituted for flour. The hulls were either not roasted or subjected to 1 of 2 roasting temp.:160 or 240°C. The major differences attributed to roasting were cookie color, moisture, and flavor. Flavor and physical characteristics, including top grain and spread, were adversely affected as the level of substitution increased. Approx. 0.2, 0.7, 1.2, and 1.7 g of dietary fiber was available per cookie with 0, 10, 20, and 30% navy bean hull substitution, resp. *(Author's summary)* H01

100 MICROBIOLOGY

101 *Rhizobium* spp., Nitrogen Fixation and Nodulation

0183

17852 RAWSTHORNE, S., MINCHIN, F.R., HADLEY, P., SUMMERFIELD, R.J., COOMBS, J. 1981. **Diurnal interrelationships of ^{14}C-bicarbonate and dinitrogen fixation activities of *Phaseolus vulgaris* and *Cicer arietinum* root nodules.** *In* Gibson, A.H., Newton, W.E., eds. Current perspectives in nitrogen fixation. Canberra, Australia. Australian Academy of Science. pp.1-3. Engl., 4 Refs

Phaseolus vulgaris **Laboratory experiments. Nitrogen fixation. Nodulation. Temperature. Snap beans. Roots.**

The interrelationships in *Phaseolus vulgaris* between the activity of root nodule phosphoenolpyruvate carboxylase and dinitrogen fixation activity throughout their growth and development were determined. All plants were grown in controlled environmental conditions at a day temp. of 25 or 30°C and a night temp. of 18°C. Bean seeds were inoculated with *Rhizobium phaseoli* strain R 3644. Diurnal expts. were carried out at 35 days from planting. The following activities were recorded for 3 replicates for *P. vulgaris* and *Cicer arietinum* at 2-h intervals over a 24 h period: (1) incorporation of ^{14}C into 80% ethanol-soluble products from nodules of whole plants fed $H^{14}CO_3$ via the rooting medium; (2) the acetylene reduction activity of decapitated root systems, and (3) the total root respiration activity of decapitated root systems. Bicarbonate metabolism, acetylene reduction, and root respiration activities of dwarf French bean cv. The Prince were positively correlated and increased in the light, then decreased in the dark. *(Summary by F.G. Trans. by L.M.F.)* 101

0184

17832 SAITO, S.M.T. 1982. **Avaliação em campo da capacidade de fixação simbiótica de estirpes de *Rhizobium phaseoli*.** *(Field evaluation of the capacity of symbiotic fixation of Rhizobium phaseoli strains).* Pesquisa Agropecuária Brasileira 17(7) 999-1006. Port., Sum. Port., Engl., 12 Refs

Phaseolus vulgaris. **Field experiments. *Rhizobium phaseoli.* Strains. Nitrogen fixation. Symbiosis. Inoculation. Nodulation. Yields. Brazil.**

The efficiency of N_2 fixation of 10 selected strains of *Rhizobium phaseoli* and their capacity to compete in soils with populations of native strains of *R. phaseoli* were determined in 2 expt. carried out in Terra Roxa Estruturada (TRE) soil at the Estação Exptl. Arello and at the Estação Exptl. de Piracicaba, SP, Brazil. Selection was based on the increase of wt. and/or total N in the seeds and on the infection %. In both soils, a significant increase in the nodulation of inoculated plants was observed. Due to the presence of a high N content in the 1st soil (TRE-1), no significant differences were observed in plant growth due to inoculation. However, increases of 43 and 48% in yield and 40 and 45% in the total-N of the grains were obtained in plots inoculated with the strains CIAT-903 and CIAT-640, resp., estimating contributions of both strains to be 24.2 and 27.8 kg N/ha. In the 2nd soil (TRE-

2), although there were evident increases in the vegetative growth of plants inoculated with CIAT-632, CIAT-676, and CIAT-903, a significant increase of 47% in grain yield was obtained only when beans were inoculated with CIAT-903, which contributed with only 2.86 kg of fixed N/ha. *(Author's summary)* 101

0185

18033 BOUCHER, D.H.; ESPINOSA M., J. 19[illegible]. Cropping system and growth and nodulation responses of beans to nitrogen in Tabasco, Mexico. Tropical Agriculture 59(4) 279-282. Engl., Sum. Engl., 16 Refs.

Phaseolus vulgaris. Fertilizers. N. Growth. Nodulation. Cultivation systems. Inoculation. *Rhizobium phaseoli*. Mexico.

Growth and nodulation responses of bean cv. Necajuca to N fertilization in a greenhouse expt were used to assess the effects on the soil of several seasons of continuous cropping of maize, legumes, and maize/legume polyculture. Maize monoculture soils showed significantly higher responses in both growth and nodulation, indicating faster depletion of soil N. Results suggest that polyculture may be advantageous in maintaining long-term yields in humid tropical lowland soils. *(Author's summary)* 101 C02

0186

17363 BETHLENFALVAY, G.J.; PHILLIPS, D.A. 1977. Photosynthesis and symbiotic nitrogen fixation in *Phaseolus vulgaris* L. *In* Hollaender, A.; Burris, R.H.; Day, P.R.; Hardy, R.W.F.; Helinski, D.R.; Lamborg, M.R.; Owens, L.; Valentine, R.C., eds. Genetic engineering for nitrogen fixation. New York, Plenum Press. pp. 401-409. Engl., 21 Refs., Illus.

Phaseolus vulgaris. Photosynthesis. Nitrogen fixation. Symbiosis.

Literature available on the relationship between photosynthesis and symbiotic N fixation is reviewed and discussed. An understanding of the dynamic interactions between photosynthesis and N fixation may provide a basis for testing an hypothesis that specific heritable traits can increase N_2 fixation by increasing the efficiency or duration of photosynthesis. Photosynthetic efficiency is discussed, measurements of carboxylation efficiency can be limited to lower leaves which are particularly important for supplying photosynthates to root nodules. Finally net photosynthesis and N_2 fixation are discussed. Based on the determination of relative efficiency (RE) of electron transfer to N via nitrogenase (RE = 1 - rate of H_2 evolution in the air/rate of C_2H_2 reduction), RE was shown not to be constant during the life cycle of beans, increasing with the anthesis of flowers in the axil of the 1st trifoliate leaf. The mechanism of the increase in RE of symbiotic N_2 fixation in the beans and peas is still unknown. *(Summary by EDITEC. Trans. by I.M.F.)* 101 C00

0187

17893 FRANCO, A.A.; MUNNS, D.N. 1982. Nodulation and growth of *Phaseolus vulgaris* in solution culture. Plant and Soil 66: 149-160. Engl., Sum. Engl., 18 Refs., Illus.

Phaseolus vulgaris. Laboratory experiments. Nutrient solution. Nodulation. *Rhizobium phaseoli*. Inoculation. Symbiosis. Growth. Nitrogen fixation.

Conditions and techniques for achieving good nodulation of *Phaseolus vulgaris* in continuously aerated solution were developed from greenhouse expt. If nodules had been established, their growth and activity and the growth of the plant were at least as good in solution culture as in gravel culture. Nodule formation was observed within 10 days of inoculation in small vol. of solution culture (1 *l*). In large vol. (19 *l*), similarly prompt nodu-

lation occurred only if the plants were inoculated before or immediately after the seedlings were transferred to the solution from gravel or vermiculite; the nodules were restricted to the roots that had been present at the time of transfer. Delayed inoculation, 2 days after transfer to large vol. solutions, led to sparse nodulation observed only after 3 wk. Delay or inhibition of nodulation in large vol. of solution could not be explained by failure of bacteria to colonize roots or by sparsity of root hairs. Nodule initiation in solution culture was severely inhibited at pH < 5.4. An additional problem in growing N_2-dependent bean in solution culture was the buildup of Cl^- to toxic levels in the plant in nitrate-free media, even at solution concn. as low as 0.4 mM Cl^-. Daily addition of 0.5-1.0 mg N/plant delayed nodule growth and activity slightly, but increased plant growth and alleviated the severe N-deficiency that otherwise developed before the onset of N_2-fixation. *(Author's summary)* 101 C02

0188

18048 BARKDOLL, A.W. 1982. ***Rhizobium* soil implant inoculation methodology for beans (*Phaseolus vulgaris* L.) in Honduras.** Mag. Sc. Thesis. Gainesville, University of Florida. 84p. Engl., Sum. Engl., 62 Refs., Illus.

Phaseolus vulgaris. Rhizobium. **Inoculation. Fertilizers. N. Cultivars. P. Strains. Yields. Honduras.**

Two variations of soil implant inoculation using granular and pellet forms of *Rhizobium* inoculant were compared with 2 levels of applied N fertilizer. Four bean var. (Porrillo-70, Acacias 4, Zamorano, and Mexico 27-R) were planted at 2 sites, San Nicolas and Monte Redondo (El Zamarano, Honduras) which differed in their cropping history. Ten treatments were used at each site: 0 kg N + 60 kg P/ha, 60 kg N + 60 kg P/ha, 60 kg N + 120 kg P/ha, 200 kg N + 120 kg P/ha, and CIAT, Honduran, and Nitragin inoculants in each of the 2 forms + 60 kg P/ha. The effects of inoculation, N and P fertilizer levels on yield and total N were compared. The performance of the indigenous Honduran strains was compared with that of the introduced CIAT and Nitragin strains. Inoculation produced yields comparable to those obtained with 60 and 200 kg N/ha at both sites. At Monte Redondo, the granular form produced significantly greater yields than the pellet and the indigenous and Nitragin strains produced the highest yields of all the inoculants. Inoculated cv. Acacias 4 and Zamorano yields were equivalent to those produced by 200 kg N/ha. The indigenous inoculant always produced a significantly greater yield than the control at this site except with cv. Porrillo-70. At San Nicolas, the var. yields of the N-treated plots were not different from the control,except for Porrillo-70 which yielded significantly higher than the control with both 60 and 200 kg N/ha. Inoculant form did not significantly affect yield although the pellet forms of the indigenous and Nitragin strains were generally the highest yielding inoculants but were only occasionally significantly greater than the control. For both sites inoculation occasionally increased total N especially at pod fill without increasing yields. The granular inoculant produced a significantly higher plant population for both fields. At Monte Redondo the granular inoculant also produced a higher yield/plant and a higher total bean N than the pellet. The different P levels did not significantly affect yield at either site. These results indicate that the soil implant inoculation method using indigenous *Rhizobium* strains may be effectively used instead of N fertilizer. Although the granular form seems to give the best yields, the pellet may prove easier to use. *(Author's summary)* 101

0189

17900 RENNIE, R.J.; KEMP, G.A. 1982. **Dinitrogen fixation in *Phaseolus vulgaris* at low temperatures: interaction of temperature, growth stage, and time of inoculation.** Canadian Journal of Botany 60(8):1423-1427. Engl., Sum. Engl., Fr., 17 Refs., Illus.

Phaseolus vulgaris. **Snap beans. Cultivars. Developmental stages. Inoculation. Temperature.** *Rhizobium phaseoli.* **Nodulation. Nitrogen fixation.**

Nodulation and N_2 fixation have not been reported in beans below a temp. of 13°C but, in southern Alberta, Canada, temp. at planting may be as low as 10°C. Two var. of snap beans, Aurora and Kentwood, were inoculated at 3 growth stages (seeding, primary leaf horizontal, or 1st trifoliate leaf open) and grown at 10, 12, 14, or 16°C. Nodulation and acetylene (C_2H_2) reduction occurred in both var. at temp. as low as 10°C. At the lower temp. cold adaptability of the plant for early root growth determined the ability for nodulation and N_2 fixation. At higher temp. plant growth stage was a determining factor. Aurora was superior to Kentwood at 10°C in nodulation, DM, N yield, and N_2 fixation because of its tolerance to low temp. during early root growth. Inoculation with *Rhizobium phaseoli* at more advanced plant growth stages decreased the time for nodulation at all 4 temp. but resulted in higher yield and more N_2 fixation in Aurora only at 14 and 16°C. At 10°C, inoculation at seeding was more effective than at the other 2 growth stages for both var. Thus plant growth stages and growth temp. both determined the ability of a bean var. to support N_2 fixation at various low temp. *(Author's summary)* 101

0190

18053 DUQUE, F.F.; SALLES, L.T.G.; PEREIRA, J.C.; DOBEREINER, J. 1982. **Influence of plant genotype on some parameters of nitrogen fixation in *Phaseolus vulgaris*.** *In* Graham, P.H.; Harris, S.C., eds. Biological nitrogen fixation technology for tropical agriculture. Cali, Colombia, 1981. Papers presented. Cali, Centro Internacional de Agricultura Tropical. pp.63-66. Engl., Sum. Engl., 2 Refs., Illus.

Phaseolus vulgaris. Genotypes. Nitrogen fixation. Symbiosis. Cultivars. Brazil.

The influence of plant genotype on symbiotic N_2 fixation in 16 bean cv. was evaluated in a red yellow podzolic soil, low in mineral N, at the km 47 exptl. farm, RJ, Brazil. Max. N_2(C_2H_2) fixation was found 44 days after planting and correlated well with nodule wt. and % of pink nodules. Nitrate reductase activity was least at the 44-day harvest and, in general, showed a pattern opposite to that of N_2 fixation. Bean HI and N-use efficiency (kg grain produced/kg N in tops) were positively correlated with yield. *(Author's summary)* 101 G01

0191

18052 KEYA, S.O.; BALASUNDARAM, V.R.; SSALI, H.; MUGANE, C. 1982. **Multi-locational field responses of *Phaseolus vulgaris* to inoculation in Eastern Africa.** *In* Graham, P.H.; Harris, S.C., eds. Biological nitrogen fixation technology for tropical agriculture, Cali, Colombia, 1981. Papers presented. Cali, Centro Internacional de Agricultura Tropical. pp.231-234. Engl., Sum. Engl., 5 Refs.

Phaseolus vulgaris. Inoculation. *Rhizobium phaseoli*. Symbiosis. Kenya. Tanzania. Uganda.

Field expt. undertaken in Kenya, Tanzania, and Uganda examined the response of *Phaseolus vulgaris* to inoculation. In Kenya a survey of 68 bean producing regions showed that most soils contained *Rhizobium phaseoli* and that bean plants could symbiose effectively with the native rhizobia. Despite this, yield responses to inoculation ranging from 7-47% were obtained in field trials. Among inoculation treatments best results were usually obtained using the commercial, imported inoculant culture. *(Author's summary)* 101

0192

18054 SARTAIN, J.B.; HUBBELL, D.H.; MENENDEZ, O. 1982. **Alternate inoculation methodologies for bean farmers in tropical countries.** *In* Graham, P.H.; Harris, S.C., eds. Biological nitrogen fixation technology for tropical agriculture. Cali, Colombia, 1981. Papers presented. Cali, Centro Internacional de Agricultura Tropical. pp.235-240. Engl., Sum. Engl.

Phaseolus vulgaris. Cultivars. Strains. *Rhizobium phaseoli*. Inoculation. Yields. El Salvador.

Inoculation studies with dry beans at 4 sites (Ahuachapan, Armenia, Quezaltepeque, and Turin) in El Salvador in 1979 compared the response of 4 selected, locally important cv. (Rojo de Seda, Nahulzalco Rojo, S-184N, and Porrillo 70) to inoculation with 2 different strain mixtures of *Rhizobium phaseoli* applied to the soil, either as granular formulations or as pellets. Large differences in yield between cv. were obtained and were associated with both site and season. Porrillo 70 produced the highest yield during both seasons. Inoculant form, granular or pellet, had little influence on any of the measured parameters. Inoculant source (strain composition) had a variable influence on yield, nodule no. and wt., which was dependent upon the season and location. At Ahuachapan the CIAT strains produced a higher yield than those from Nitragin, but at Turin and Quezaltepeque the reverse was true. Nodule no. and nodule wt. were not strongly correlated with bean yield. *(Author's summary)* 101

0193

18046 CUAUTLE F., M.E. 1979. **Efecto de la fertilización, fumigación del suelo e inoculación con *Rhizobium*, sobre la nodulación, contenido de nitrógeno y rendimiento de fríjol (*Phaseolus vulgaris* L.) en Chapingo, Mex.** *(Effect of fertilization, soil fumigation, and Rhizobium inoculation on bean nodulation, nitrogen content, and yields in Chapingo, Mexico).* Tesis Mag. Sc. Chapingo, México, Colegio de Postgraduados. 141p. Span., Sum. Span., 92 Refs., Illus.

Phaseolus vulgaris. **Nodulation. Symbiosis.** *Rhizobium.* **Inoculation. Irrigation. Fertilizers. Cultivars. Yields. N. Mexico.**

In 1977 2 field trials, one under rainfed conditions at Lomas de San Juan and the other under irrigated conditions in Xaltepa, and 2 greenhouse trials (one using soil from Lomas de San Juan and other, soil from Xaltepa) were established in order to determine and assess factors affecting nodulation and the capacity of symbiotic fixation of *Rhizobium* in beans in the Valle de México. Three inoculants prepared from strains isolated from the sampled soils and 2 commercial inoculants were tested on bean var. Negro-150 and Negro-Puebla, planted on fumigated and non fumigated soil, fertilized (80 kg N/ha) or unfertilized. In the field trial under rainfed conditions lower bean yields were obtained than under irrigated conditions. Max. yields were reached with 80 kg N applied per ha and soil fumigation and the total no. of nodules also decreased. Soil fumigation increased yields from 1100 to 1300 kg/ha for both var.; however, there was no significant statistical difference. The total no. of nodules decreased from 251 to 171 for var. Negro-150 and from 362 to 181 for var. Negro-Puebla. Moreover, there was no difference between the check treatment (not inoculated or fertilized) and the treatments with the different strains tested as to the nodule no. Higher yields and a higher total no. of nodules were obtained in the irrigated field trial with fumigated soil. Fumigation increased yields from 1835 to 2393 and from 2063 to 2963 kg/ha for var. Negro-150 and Negro-Puebla, resp. The no. of nodules/plant increased with soil fumigation from 204 to 352 and from 159 to 235 for these same var. There were no differences regarding bean yield between the treatment in which 80 kg N were applied per ha and treatments with inoculants prepared with native strains or with the 2 commercial inoculants. In the greenhouse trials, more treatments were used than in the field. A higher soil fumigation rate was used as well as more inoculant bacteria/seed; the same bean var. were used. These showed differences in nodulation. With both types of soils, var. Negro-Puebla had a higher nodule no. and dry wt. than var. Negro-150. Soil fumigation and N fertilization under field and greenhouse conditions decreased the no. of early-and late-maturing nodules, regardless of the var. and strain used for inoculation. Av. no. of nodules/plant in fumigated and non fumigated soil were 127 and 177, resp. Nodule contents in N-fertilized and unfertilized noninoculated treatments were 58 and 161 nodules/plant, resp. Both in the greenhouse and in the field there were no significant differences regarding the no. of nodules or DM yields between inoculated or noninoculated treatments, either with native or commercial strains. The capacity of symbiotic N fixation of the tested strains was not determined due to the numerous highly infective and competitive native strains existing

in the sampled soils. In noninoculated treatments the great no. of nodules formed in the bean root system revealed the infective capacity of native *Rhizobium* strains under field and greenhouse conditions in both fumigated and non fumigated soil. Nodule no. of field-planted beans was higher compared with plants in the greenhouse. There was no correlation between the no. of nodules and bean yield unde. field conditions while under greenhouse conditions nodule no. and DM yields were correlated. Under rainfed conditions a higher no. of late-maturing nodules were found than under irrigated conditions. *(Extracted from author's summary. Trans. by L.M.F.)* 101 D01

See also 0070 0076 0096 0175

J00 ECONOMICS AND DEVELOPMENT

0194

15881 LONDOÑO, N.R.; GATHEEE, J.W.; SANDERS, J.H. 1981. **Bean production trends in Africa 1966-1979.** *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.19-29. Engl., 5 Refs., Illus.

Phaseolus vulgaris. **Production. Marketing. Consumption. Africa.**

Statistical data on the production, trade, and consumption of beans in Africa are analyzed on the basis of African sources and FAO estimates, which differ due to the difficulty in estimating the production of a basic food crop, which is principally kept for home consumption in a large no. of farms. Several comparisons are made with the situation of beans in L.A. In Africa beans are a much smaller proportion (27%) of dry legumes; per capita consumption is also lower, except for Rwanda, Burundi, and Uganda in E. Africa and Niger (50.6, 44.3, 29.3, and 51.2 kg/capita, resp.). Bean production increase has been obtained principally with area expansion (3.8%). In the principal production area, E. Africa, production increased more rapidly than the demand in the 1960-70 decade, decreasing during the seventies. Except for S. Africa and Egypt where high yields have been attained, absolute yields are generally low reflecting planting in association, low inputs, soil depletion, and shifts to more marginal agricultural areas. Countries such as Mexico and Colombia have overcome similar problems and have been able to obtain significant increases in yield through the selection and production of new var. *(Summary by I.B. Trans. by L. M.F.)* J00

0195

15900 OPPEN, M. VON 1981. **Prospects for grain legume production in Asia.** Andhra Pradesh, India, International Crops Research Institute for the Semi-Arid Tropics. Economics Program Progress Report no. 19. 21p. Engl., 9 Refs., Illus.

Phaseolus vulgaris. **Production. Trade. Marketing. Prices. Asia.**

The prospects of grain legume production in the developing market economies of Asia are analyzed regarding the biological and technical limitations in increasing production and regional economic factors and policies. Up to date there appears to be a limited potential for rapid yield increases of existing pulse crops. Subsidies on N fertilizer prices will tend to neutralize the advantage pulses have to fix N. The development of market channels is important to initiate widespread adoption of new pulses. There is a possibility of generating considerable increases in the production of pulses when the adverse effects of restricted trade in grain legumes are recognized and the conditions for interregional and international trade are accordingly improved. *(Summary by EDITEC. Trans. by L.M.F.)* J00

0196

17327 EMPRESA BRASILEIRA DE PESQUISA AGROPECUARIA. 1981. **Programa nacional de pesquisa de feijão.** *(National Research Program in Beans).* Brasília, Brasil, Departamento de Informação e Documentação. 117p. Port., Sum. Port., Illus.

Phaseolus vulgaris. Research. Technological package. Intercropping. *Vigna unguiculata.* Pests. Brazil.

The Brazilian National Research Program in Beans, which includes the research projects in beans and cowpeas approved for a 3-yr period, is described. Short- and middle-term objectives of the Program include: (1) the development of technologies enabling increased efficiency of these 2 crops in intercropping systems, taking into account the specific conditions of each planting season; (2) the development of technologies that allow yields of beans in monoculture to be stabilized for each planting season; (3) the development of adequate technology for establishing a 3rd planting date for beans in Brazil; and (4) research on methods for obtaining good quality seed. The long-term objective is to develop cv. that increase productivity through multiple disease and pest resistance and greater adaptation to environmental stress. The production of the 2 crops in Brazil and problems encountered in their cultivation are analyzed. A list of approved research projects in different fields and the institution in charge of their execution is included. *(Summary by EDITEC. Trans. by L.M.F.)* 100

See also 0063 0064 0065 0066 0068 0088

L00 GRAIN STORAGE

0197

18094 LUSE, R.A. 1979. **A practical method for bean storage.** Cajanus 12(4): 224-225. Engl.

Phaseolus vulgaris. **Storage. Insect control. Stored grain pests.**

One kg of navy beans hand mixed with 5 ml of crude oil were protected from insects for up to 75 days in studies at CIAT. In similar expt. at the International Institute of Tropical Agriculture, Ibadan, Nigeria, 5 ml of groundnut oil was enough to protect cowpeas against weevils for 180 days. *(Summary by Abstracts on Tropical Agriculture)* L00

L01 Stored Grain Pests

0198

17896 SCHOONHOVEN, A. VAN; DAM, W.V. 1982. **Control of *Zabrotes subfasciatus* (Boh.) (Coleoptera: Bruchidae) with seed protectant fungicides.** Journal of Stored Product Research 18:143-146. Engl., Sum. Engl., 9 Refs.

Phaseolus vulgaris. Zabrotes subfasciatus. **Stored grain pests. Insect control. Chemical control.**

Arasan (75% thiram, 2% methoxychlor) applied at the recommended dosage of 85 g/100 kg beans as a seed dressing to control soil-borne diseases of beans, provided control of *Zabrotes subfasciatus* in beans of the commercial var. Diacol-Calima lasting over 1 yr. Minimal dosage of Arasan to provide control was between 23-45 ppm. Arasan and its components thiram and methoxychlor, when tested separately in the relative dosages used as in Arasan, provided similar levels of control. Adult mortality, however, was significantly higher on beans treated with methoxychlor, as compared with Arasan or thiram. Besides Arasan, the fungicides fentin acetate and quintozene gave long lasting insect control, while benomyl and captan were less effective *(Author's summary)* L01

0199

17420 PERE, W.M.; MAGOYA, J.K.; RHEENEN, H.A. VAN 1981?. **Bean storage against weevils.** Thika, Kenya, Ministry of Agriculture. National Horticultural Research Station. 4p. Engl., Illus.

Phaseolus vulgaris. Acanthoscelides obtectus. **Stored grain pests. Insect control. Chemical control. Integrated control.**

Three methods of protecting bean grains from the attack of the bruchid *Acanthoscelides obtectus* are discussed: (1) chemical control with malathion (2%) or lindane (1%); (2) treatment with wood ashes; (3) treatment with vegetable oils. Moreless 3% of the farmers of central and eastern part of the province of Kenya control bruchids using ashes. Researchers at the National Horticultural Research Station in Thika also found some protection with this method; however it proved to be inadequate when infestation was severe. When 2 cc of sunflower oil was applied per kg of bean seed, good control of bruchids was obtained. The percentage of grains infested by weevils was 16.5, 2.3, 2.9, and 39.9% for the ash, sunflower oil, chemical control, and untreated grain treatments, resp. *(Summary by F. G. Trans. by L.M.F.)* L01

Z00 GENERAL

0200

17827 ALVARENGA, L.C. DE; FORTES, M.; PINHEIRO FILHO, J.B.; HARA, T. 1980. **Transporte de umidade no interior de grãos de feijão-preto sob condições de secagem.** *(Internal moisture movement of black bean grains under drying).* Revista Brasileira de Armazenamento 5(1):5-18. Port., Sum. Port., Engl., 22 Refs., Illus.

Phaseolus vulgaris. **Drying. Statistical analysis. Brazil.**

Internal moisture distribution of black bean grains was simulated for several drying conditions, simulation studies being based on the liquid diffusion and capillary theories (Fortes and Okos). Model validation and analysis were based on exptl. data. The diffusion coefficient was found to follow an Arrhenius-type equation. The liquid diffusion theory can explain drying phenomena in the initial 60 min with a temp. range of 30-50°C. Vapor diffusion is important for longer drying periods (lower MC). *(Author's summary)* Z00

0201

17825 SATHIER, M.D.G.B.; PINHEIRO FILHO, J.B.; HARA, T.; FORTES, M.; SEDIYAMA, G.C.; CONDE, A.R. 1980. **Secagem de feijão *(Phaseolus vulgaris* L.) em camadas finas, a baixas temperaturas, e seus efeitos na germinação das sementes.** *(Drying beans in thin layers at low temperatures and its effect on seed germination).* Revista Brasileira de Armazenamento 5(1):43-49. Port., Sum. Port., Engl., 32 Refs., Illus.

Phaseolus vulgaris. **Drying. Germination. Temperature. Statistical analysis. Brazil.**

Lab. trials were carried out at the Centro de Ciências Agrárias, U. Federal de Viçosa, MG, Brazil, to establish the curves for bean drying in thin layers, at temp. of 30, 35, 40, and 50°C, 40 and 50% RH at a constant speed to verify the effects of these conditions on bean seed germination. An especially designed exptl. drier was used. After drying, the standard germination test was applied to the beans to observe the effects on germination. Results were submitted to regression analysis to test the adjustment of the drying conditions used in this expt. to Page and Thompson's models. The standard test of germination to determine the % of germination was used in a completely randomized design arranged in a factorial scheme. Duncan's test was used to compare means and the T test for comparing the highest av. of seed germination after drying with the mean % of initial seed germination. Bean seed MC decreased exponentially with time under the conditions tested. An exponential function similar to Page's model can describe bean drying under similar conditions. Bean seed germination decreased with increasing temp. *(Author's summary)* Z00

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 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)
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	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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