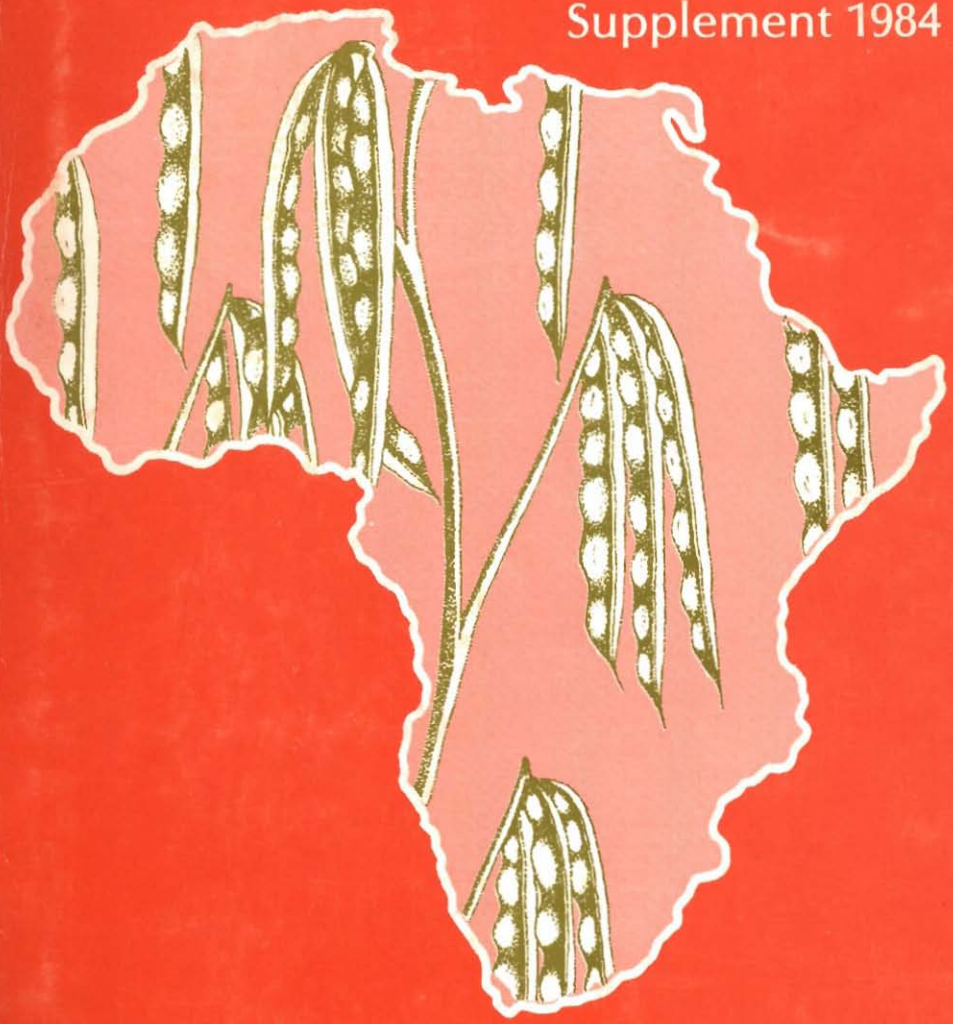
Bibliography on bean research in Africa

Supplement 1984



Centro Internacional de Agricultura Tropical

CIAT is a nonprofit organization devoted to the agricultural and economic development of the lowland tropics. The government of Colombia provides support as host country for CIAT and furnishes a 522-hectare site near Cali for CIAT's headquarters. In addition, The Colombian Foundation for Higher Education (FES) makes available to CIAT a 184-hectare substation in Quilichao and a 73-hectare substation near Popayán; the Colombian Rice Growers Federation (FEDEARROZ) also makes available to CIAT a 30-hectare farm—Santa Rosa substation—near Villavicencio. CIAT also co-manages with the Colombian Agricultural Institute (ICA) the 22,000-hectare Carimagua Research Center in the Colombian Eastern Plains and carries out collaborative work on several of ICA's expetimental stations in Colombia; similar work is done with national agricultural agencies in other Latin American countries. CIAT is financed by a number of donors represented in the Consultative Group for International Agricultural Research (CGIAR). During 1983 these CIAT donors are the governments of Australia, Belgium, Canada, France, the Federal Republic of Germany, Italy, Japan, the Netherlands, Norway, Spain, Sweden, Switzerland, the United Kingdom, and the United States; the World Bank; the Inter-American Development Bank (BID); the European Economic Community (EEC); the International Fund for Agricultural Development (IFAD); the OPEC Fund for International Development; the Ford Foundation; and the Rockefeller Foundation. In addition, special project funds are supplied by various of the aforementioned donors plus the W. K. Kellogg Foundation, the German Agency for Technical Cooperation (GTZ), the International Fertilizer Development Center (IFDC), the United Nations Development Programme (UNDP), and the International Development Research Centre (IDRC).

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

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CONTENTS

INTRODUCTION

With this publication—Bibliography on Bean Research in Africa. Supplement 1984—CIAT's Bean Information Center provides those researchers interested in Phaseolus bean production in Africa, ongoing access to the scientific literature needed in their work with this important legume. This publication, due to its characteristics, will not only strengthen research at the national level but will also facilitate collaboration among the members of the bean research network in Africa.

Primary and secondary publications considered as important sources of literature on beans were revised for the production of this supplement. However, it was the African researchers who made the greatest contribution, sending the Bean Information Center their own research papers as well as other literature on this crop from their personal collections. Our sincere gratitude goes to all these people for their valuable collaboration. The present supplement contains 358 new entries.

Supplements will be produced; therefore the input of the users of this bibliography, in particular of scientists in the research network, is of paramount importance.

All contributions are actively solicited, and persons who send articles to be added to the collection may order copies of a corresponding number of articles currently in the collection, free of charge.

Citations have been organized by country to highlight the research on beans carried out at the national level and the research papers written in/on each one of these countries. Citations on new countries have also been added, including the Central African Republic, Ivory Coast, Lesotho, and Senegal.

Within each country, the citations have been arranged alphabetically by author; and within each author's papers, in descending chronological order. Citations preceded by an asterisk (*) indicate that the complete document is available from the Bean Information Center. Abstracts have been provided for 200 citations. Whenever possible, the author's abstract was used. The source of abstracts is indicated by the following acronyms:

AS - Author's summary
CIAT - CIAT data base

As of this supplement, the addresses of the first author of each paper published after 1981 are given after the bibliographic citation, inside brackets.

In addition to the author index, an enriched subject index which records cultivars, varieties, and lines is included to facilitate the use of this bibliography. Care was taken to represent concepts specifically by means of permutation of terms, up to a second level of specificity, i.e.,

Ophiomyia phaseoli
Biological control 0848 0946 1162
Resistance 0835 0850 0952

Appendix 1 gives a listing of numbers referring to citations of documents acquired by the Bean Information Center during 1984 and recorded as previously unavailable in the 1983 issue of this bibliography. Appendix 2 provides abstracts to 138 documents cited in the 1983 issue.

When ordering photocopies, the complete reference should be cited or the consecutive number that appears above the reference; this bibliography should be specified as the source. Address requests to: Bean Information Center, Communications and Information Support Unit, CIAT, Apartado Aéreo 6713, Cali, Colombia.

Jorge López S.
Specialized Information Centers
December 1984

0814

* ALLEN, D.J. 1982. Bean diseases. In _____. The pathology of tropical food legumes; disease resistance in crop improvement. New York, Wiley & Sons. pp.150-187,301-395.

The evolution, adaptation, and production of Phaseolus are discussed. The importance of pathogens in the production of beans, and the potential for increased crop yield through disease management are emphasized. The etiology, geographical distribution, and relative economic importance of fungal and viral diseases are summarized in table form. Symptomatology, potential losses, and control of major bean diseases are analyzed in detail: rust (Uromyces phaseoli), anthracnose (Colletotrichum lindemunthianum), angular leaf spot (Isariopsis griseola), BCMV, BGMV, halo blight (Pseudomonas phaseolicola), common blight (Xanthomonas phaseoli), and fuscous blight (X. phaseoli var. fuscans). Disease resistance and improvement of beans are discussed. The best strategy for the successful management of pathogens in tropical subsistence agriculture is likely to be integrated control which involves the production of clean seed, use of good husbandry (including crop rotation), and the exploitation of genetic diversity. (CIAT)

0815

ALLEN, D.J. 1974. A technique for measuring sporulation of rust (Uromyces appendiculatus) on Phaseolus vulgaris. Bean Improvement Cooperative. Annual Report 17:16-18.

0816

* ATTERE, A.F. 1983. Crop genetic resources in Eastern Africa. In Chang, J., ed. Agricultural research in Rwanda: assessment and perspectives, Kigali, Rwanda, 1983. Report of a seminar. Hague, Netherlands, International Service for National Agricultural Research. pp.113-115. [International Laboratory for Research on Animal Diseases, Nairobi, Kenya]

The role, priorities, and activities of the International Board for Plant Genetic Resources (IBPGR) are briefly described. A great deal of progress has been achieved in the collection and conservation of important food crops. By late 1982, more than 38,000 samples had been collected during 50 expeditions in about 26 countries of Africa. Phaseolus samples are ca. 3000. Important efforts are being carried out in conservation, evaluation, and documentation. Two types of conservation centers are recognized: base storage centers for long-term conservation and active storage centers for medium-term conservation, evaluation, documentation, and general seed exchange. In Africa, there are 2 fully operational base storage centers: IITA (Nigeria) and PGRCE (Ethiopia). National centers and programs are considered as essential operating units in the future. In Rwanda, areas are being identified where priority action should be taken. (CIAT)

0817

BENNEH, G. 1972. Systems of agriculture in tropical Africa. Economie-Geographie 48:244-257.

0818

* BERTI, F. 1984. Synthese des travaux réalisés sur Phaseolus aux Zaire, Rwanda et Burundi de 1945 a nos jours. Gembloux, Belgique, Faculté des Sciences Agronomiques de l'Etat. 56p.

Research work on Phaseolus is reviewed and has been grouped into 2 periods: (1) 1945-61, during which the Institut National pour l'Etude Agronomique du Congo Belge carried out research at 11 stations over the ancient Belgian territories in Africa; (2) 1962-83. The work of the national agricultural research institutions in Zaire, Rwanda, and Burundi during the 2nd period is emphasized. For the 1st period, disease resistance was of high priority in var. selection trials at Mulungu. A var. mixture (Ibundu, Beurre d'Alger, Nain de Kiondo, and Colorado) was recommended for release in 1946. A simple technique for early genealogical selection was adopted in 1952. In comparative trials (1961), the highest yields were for small-seeded dwarf bean var. Cuarentino was the best white-seeded bean var. at M'Vuazi. At Gimbi, best planting date was in May, and at Kondo, local var. gave best yields. Although small-seeded black bean var. are highly disease resistant, native populations reject them for their color. Prejudice was found very difficult to overcome in organoleptic tests carried out at Rubona. At Nioka, Mixed Mexico was an outstanding var. and at Mont Hawa, introduced var. showed distinct advantages over local ones. In multiplicacion trials at Kiozi, old lines confirmed their superiority and at Mosso, var. Bayo, Mixed Mexico, Colorado, and Cuarentino outyielded local var. Research done since 1962 in Zaire (M'Vuazi and Mulungu), Burundi, and Rwanda (Rubona, Karama, and Rwerere) is described. In Rwanda, several var. were chosen for multiplication in 1981: Bataaf, Mélange Jaune 1, Emma, Tostado, Saxa, var. 1/2, Ingumba, C-10, Urunyumba 3, Gisenyi 2, Cajamarca, Gisenyi 6, Uruungumba 12, and var. 54. Geographical and climatological data are included. (CIAT)

0819

BRENAN, J.P.M. 1965. The geographical relationship of the genera of Leguminosae in Tropical Africa. Webbia (Italy) 19:545.

0820

DALZIEL, J.M. 1937. The useful plants of West Tropical Africa. London, Crown Agents for the Colonies. 612p.

0821

FAULKNER, O.T.; MACKIE, J.R. 1933. West African agriculture. Cambridge, England, University Press. 168p.

0822

HUTCHINSON, J.; DALZIEL, J.M. 1954. Flora of West Tropical Africa, the British West African territories, Liberia, the French and Portuguese territories south of latitude 18°N. to Lake Chad, and Fernando Po. Millbank, London, Crown Agents v.1 part 1.

0823

JONES, G.H.S. 1942. The effect of leguminous cover crop in building up soil fertility. East African Agricultural and Forestry Journal 8:48-52.

0824

McDONALD, J. 1935. The inoculation of leguminous crops. East African Agricultural and Forestry Journal 1:8-13.

0825

ROBERTSON, C. 1983. Women in African agriculture: Is Southern Africa a model for the future?
Paper presented at the African Studies Association Conference, 1983.

0826

* SINGH, S.R.; EMDEN, H.F. VAN 1979. Insect pests of grain legumes. Annual Review of Entomology 24:255-278.

The production of grain legumes in the tropics is divided into 4 groups; Phaseolus vulgaris belongs to the group of grain legumes grown in the cooler conditions of medium and high altitudes and is the predominant legume of South and Central America (especially Mexico, Costa Rica, El Salvador, Guatemala, Panama, and Brazil) and is also grown extensively in East Africa and Asia. Insect pests are probably the main factor limiting grain legume yields in the tropics. Distribution, damage, life cycle, and control measures are discussed for leafhoppers, aphids, bean flies, beetles, Lepidoptera, thrips, and pod sucking bugs. Pests reported attacking common beans are Empoasca spp., Aphis fabae, Ophiomyia phaseoli, Melanagromyza spp., Epilachna varivestis, Apion godmani, Heliothis armigera, Maruca testulalis, Nezara viridula, among others. A future strategy for pest control is discussed. (CIAT)

0827

STURDY, D. 1939. Leguminous crops in native agricultural practice. East African Agricultural and Forestry Journal 5:31-33.

0828

UNION INTERNATIONAL POUR LA PROTECTION DES OBTENTIONS VEGETAL. 1973. Guidelines for the conduct of tests for distincness, homogeneity and stability of French beans. Switzerland. 13p.

0829

WHITEHEAD, A.G.; KARIUKI, L. 1960. Root knot nematode surveys of cultivated areas in East Africa. East African Agricultural and Forestry Journal 26:87-91.

0830

* BERTI, F. 1984. Synthese des travaux realises sur Phaseolus dans les stations du Zaire, Rwanda et Burundi depuis 1962: Burundi. In _____. Synthèse des travaux réalisés sur Phaseolus aux Zaire, Rwanda et Burundi de 1945 a nos jours. Gembloux, Belgique, Faculté des Sciences Agronomiques de l'Etat. pp.32-38.

Little research was carried out on Phaseolus between 1962-79 at Burundian research stations, where low temp. affected the duration of the vegetative cycle: 80 days at Imbo and more than 120 days at Knozi. Only those var. showing acceptable organoleptic characteristics were selected in 1979. Results can be rapidly attained through var. improvement; var. selection for maize/bean intercropping was a high priority. Var. Karama and Diacol Calima (Colombia) were chosen for low and intermediate alt., resp. Trials on var. mixtures are reported. Var. Doré de Kirundu and Jaune Pointillé were proposed for release for rural areas. In the period 1983-88, the incorporation of disease resistance from CIAT materials is a main goal. (CIAT)

0831

* DEVOS, P.; KABENGELE, K.; NZIMENYA, I.; AUTRIQUE, A. 1983. Amelioration de la culture du haricot: aspect variétal et production de semences. Bujumbura, Institut des Sciences Agronomiques du Burundi. 17p.

A research methodology is presented and phytotechnical data are given for 4 bean var. tested by the Legume Group of Institut des Sciences Agronomiques du Burundi between 1979-83, and currently proposed for release: Karama ½ (800-1200 m.a.s.l.), Calima (1200-1900 m.a.s.l.), Kirundu and Urubonobono (1200-1900 m.a.s.l. and above). Research criteria (acceptability, yield, disease resistance, and protein content), research schemes (screening trials, preliminary trials, multilocation trials, and hybridization), and results of var. improvement work are described. The seed production process is outlined. Background information on the var. used is included. (CIAT)

0832

* DEVOS, P.; VAN DURME, J.; KABENGELE, K. 1983. Phaseolus beans, a staple food in Burundi. Tropicultura 1(2):43-46. [Inst. des Sciences Agronomiques du Burundi, B.P. 795, Bujumbura, Burundi]

The cultivation of beans, the most important food crop in Burundi, is reviewed. Principal areas of cultivation are indicated. Data are included on climate, annual production and cultivation area, cultural practices, utilization, and var. diversity. Major pests and diseases are mentioned. Taking into account these considerations, a strategy for bean research was established. Main emphasis was given on var. selection, establishing multilocation trials at different alt. over several seasons. Based on the results from the 1st series of trials, 2 dwarf bean var. were released: var. Karama 1/2 for the 800-1200 m alt. range, and Diacol Calima for alt. between 1200-1900 m. (AS)

0833

* INSTITUT DES SCIENCES AGRONOMIQUES DU BURUNDI. 1983. Cultures vivrieres: haricot. In _____. Proposition pour un plan quinquennal (septembre 1983-aout 1988) de la recherche agronomique a l'ISABU. Bujumbura. v.2,p.172.

The aims of agricultural research (1983-88) at the Institut des Sciences Agronomiques du Burundi are outlined. With reference to beans, the main food crop of the country, the study of ecological aspects and incidence of diseases (fungal, bacterial, viral) and pests, at different alt., will help determine their relative importance and selection criteria, and identify sites for basic seed production. The influence of intercropping and the factors determining high aphid populations (15% in the dry season, 50% yield loss) will be studied. (CIAT)

0834

* INSTITUT DES SCIENCES AGRONOMIQUES DU BURUNDI. 1983. Légumineuses: haricot. In _____. Proposition pour un plan quinquennal (septembre 1983-aout 1988) de la recherche agronomique a l'ISABU. Bujumbura. v.1,pp.38-44.

A 5-yr plan for the improvement of bean in Burundi is proposed and covers 4 research areas. The 1st, var. improvement, is the research area where most rapid progress can be attained, within a research scheme comprising the following factors: alt., tutoring, fertilization, sources of germplasm (rural areas and CIAT), and diseases. Selection criteria for improvement are acceptability, yields, seed quality and adaptation, disease resistance, and protein content. Selection and planning stages include screening trials, preliminary trials, definitive trials, new screening trials, and artificial hybridization. The 2nd involves trials with var. mixtures to determine the influence of plant architecture, density, growth cycle of components, acceptability of mixtures, and optimal no. of component var. The 3rd consists of the reduction of stock losses, especially by Acanthoscelides obtectus, and the 4th, intercropping. (CIAT)

0835

* INSTITUT DES SCIENCES AGRONOMIQUES DU BURUNDI. 1983. Légumineuses: le haricot. In _____. Rapport Annuel (septembre 1982-aout 1983). Bujumbura. pp.59-93.

Research carried out on beans at the Institut des Sciences Agronomiques du Burundi during 1980-83 is reported. A total of 533 var. were evaluated: 4 proposed for release, 89 of a total of 206 accessions from screening trials, 10 Kenyan var., and 430 CIAT lines and var. In a bush bean multilocation trial, 10 var. (Karama 1/2, Doré de Kirundo, Bataaf, 0688 Colorado, Calima, Jaune Pointillé or Urubonobono, Línea 25, BAT 44, Aroana, and Carioca) were assessed along with a mixture of 6 var. at 8 different sites with alt. ranging from 800 to 2200 m. Based on var. x site interaction, 4 var. are recommended for release: Karama 1/2 (for poor soils and low alt.), Calima (for a broad range of environmental conditions, except for alt. higher than 2000 m and excessive rainfall), Urubonobono (alt. from 1200 to 1900 m), and Kirundo which is apt for high alt. due to its resistance to antracnose (Colletotrichum lindemuthianum). The performance of the var. selected under farmers' conditions was verified at 4 different sites. Bush bean var. (103) were tested at 4 different sites with soil of intermediate fertility and without fertilizer. The 74 best var. were selected for their resistance to diseases caused by Isariopsis griseola, C. lindemuthianum, Uromyces phaseoli, Ramularia phaseoli, adaptability, and tolerance to the bean fly (Ophiomyia phaseoli). The selection threshold was fixed at 100% of the check var. Calima. When screening climbing bean, 32 var. were tested at 2 sites and 39 at another 2 sites, using Cuarentino 817 as check. Nineteen var. were selected for their vigor and pod size. International Bean Yield and Adaptation Nursery var.

trials (1981) were carried out with 6 red bean var. from CIAT and local checks Kirundo and Calima. These latter var. had higher yields than CIAT var. Sixty-five bush bean var. from CIAT were compared with Calima (check) during the replication of the preliminary trial (EP). CIAT var. flowered and matured later and 29 of them yielded less than 100 g/m^2. Several combinations of 2 bush bean var. were tested to determine genotypic influence; no positive interaction was observed. The use of mixtures showed that a great elasticity exists at different sites, but the interaction is only positive when the no. of var. in the mixture is 6 or more. Inoculation trials carried out in collaboration with the FAO did not give positive results due to the high no. of indigenous strains of Rhizobium in the soil and to root rot by Sclerotium rolfsii. Ten F_3 lines from natural crosses of resistant x adapted var. and of adapted x adapted var. for disease resistance were selected and grouped into lines according to their grain characteristics. (CIAT)

0836

FARRELL, J.A.K.; ADAMS, A.N. 1966. Cowpea and bean yield responses to insecticides. Agricultural Research Council Central Africa. Annual Report. 57p.

0837

ABD EL-HADI, A.H.; ALEXANDER, A.; DOERING, H.W. 1982. The effect of substrate salinity on dry matter production and phosphate uptake by bush beans. Egyptian Journal of Soil Science 22(1):31-40. [Ministry of Agriculture, Cairo, Egypt]

0838

ABD EL-MASSIH, M.I.; ELGINDI, A.Y.; MOUSSA, F.F. 198? Plant-parasitic nematodes associated with leguminous crops in the Nile Delta, Egypt. Zoological Society of Egypt Bulletin 0(32):135-140.

0839

ABD-EL-FATTAH, M.I.; HENDI, A. 1980. The biology of Cosmlyce baeticus L., an important pest on leguminous plants in Egypt. In Conference of Plant Protection Research Institute, 1st., Cairo, Egypt, 1980. Proceedings. Cairo, Plant Protection Research Institute. v.1,pp.325-334.

0840

ABDEL-FATTEH, S.A.S.; SHARAF, I.M.P.; EL-SEBAE, A. 1983. Performance of flucythrinate against a wide spectrum of agricultural pests in Egypt. Arab Journal of Plant Protection 1(2):74-78.

0841

* ABDEL-RAHMAN, A-H.Y. 1981. The nutritional value of some legumes as affected by cooking. Alexandria Journal of Agricultural Research (Egypt) 29(1):173-180. [Food Science & Technology Dept., Faculty of Agriculture, Univ. of Alexandria, Alexandria, Egypt]

Nine var. of legumes, collected in Italian markets and which included navy beans and red kidney beans, were analyzed for proximate components before and after cooling by standard household procedures. Determinations were made for Ca, Cu, Fe, Mg, Mn, K, Ni, and Zn contents in raw and cooked legumes and in the cooking water for each. The fatty acids constituents for the legume lipids were determined. Data on yield and cooked legumes showed that lentils had the highest ratio of cooked wt. to dry wt. (2.99), with navy beans presenting 2.24 and red kidney beans, 2.38. Raw lentils and broad beans were the highest in protein content (26.8 and 28.1, resp.) while navy beans and red kidney beans presented 21.6 and 21.8, resp. Analysis of minerals showed differences between the different kinds of legumes. Minerals in cooked legumes were about 1/3 to 1/2 of the values of raw legumes. Cooking water contained measurable amounts of all the minerals. Main components of fatty acids in the lipids of the 9 kinds of legumes were palmitic, stearic, oleic, linoleic, and linolenic. (AS)

0842

ABDEL-RAHMAN, A.M. 1983. Salinity effects on growth and apical dominance in Phaseolus vulgaris L. Israel Journal of Botany 32(3):129-137. [Dept. of Botany, Assiut Univ., Assiut, Egypt]

In a pot trial, plants of bean cv. Baladi and Black Valentine were irrigated with a nutrient solution containing 0, 20, 40, 60 or 80 meq NaCl/l. Concn. up to 20 and 60 meq NaCl/l increased stem growth in cv. Baladi and Black Valentine, resp., while the growth of lateral roots increased at concn. up to 20 and 40 meq NaCl/l in cv. Baladi and Black

Valentine, resp. Total contents of N and Na in the leaves of both cv. increased while P and K contents decreased with increasing NaCl concn. (CIAT)

0843

* ABDEL-RAHMAN, A.M. 1982. Salt-stress and growth in Phaseolus vulgaris L. Bulletin of the Faculty of Science (Egypt) 11(1):105-117. [Dept. of Botany, Faculty of Science (Sohag), Assiut Univ., Egypt]

The effect of irrigation with saline nutrient solutions on the growth and mineral composition of 2 dwarf bean var., Balady and Black Valentine, sown in clay pots was studied to determine critical irrigation water salinity. Saline culture solutions were prepared by adding NaCl to Pfeffer's nutrient solution. Salinity, especially at 20 meq^{-1} NaCl, promoted the main stem growth of Balady, whereas that of Black Valentine was promoted at the level of 60 meq^{-1} NaCl. The growth of lateral shoots was enhanced with the salinity level 20 meq^{-1} NaCl for Balady and up to 80 meq^{-1} NaCl for Black Valentine. Total N and Na contents of leaves of both var. were increased, whereas P and K contents were progressively decreased by salinity. (AS)

0844

ABO EL GHAR, M.R.; MAKSOUD, M.A. 1960. Preliminary experiments on the control of snap bean fly, Agromyza phaseoli Coq. Bulletin de la Societé Entomologique d'Egypte 44:97-103.

0845

ABO-EL-ENEIN, M.A. 1982. The impact of using different kinds of appliances and fuel on food preparation and quality. M.Sc. Thesis. Egypt, University of Alexandria. 148p.

The time and fuel cost needed for cooking, the nutritive value and palatability of cooked foods, the effect of refrigeration storage for several kinds of vegetable such as spinach and bean were estimated. (CIAT)

0846

ABOU EL-FADL, M.; FABMY, M. 1959. Analysis of some factors affecting root-nodule on garden beans in Egypt. Agricultural Research Review (Egypt) 37:73.

0847

* ABUL-NASR, S.; ASSEM, M.A.H. 1968. Chemical control of the bean fly Melanagromyza phaseoli (Tryon) (Diptera:Agromyzidae). Bulletin of the Entomological Society of Egypt(Economic Series) no.2:151-159.

Three expt. were carried out during 3 successive years (1958-60) in Giza, Egypt, to determine the efficiency of 10 different chemical insecticides in controlling the bean fly (Ophiomyia [Melanagromyza] phaseoli). Bean var. Swiss Blanc was planted in Aug. in the 1st 2 expt. and in Sept. in the last expt. Each treatment included 4 replicates of 4 x 4 m. Insecticides used included a seed dresser (phorate), 5 chlorinated hydrocarbon compounds (DDT-lindane, toxaphene, endrin, dieldrin, and methoxychlor), 3 organic P compounds (trichlorfon, azinphos-methyl, and Metaisosystox), and a white oil (mixture of Volck oil and nicotine sulphate). Four to six sprays were applied, the 1st at 7-9 days after planting and the other sprays at weekly

or bi-weekly intervals. Results of treatments were based on the mean no. of larvae and pupae/plant, at weekly inspections and at the end of the season. In the 2nd expt. yield was also considered. Endrin was the most successful in protection and residual effect. DDT-lindane was also successful but adversely affected plant growth and yield. Metaisosystox performed similarly to endrin, but it is advisable to restrain its use due to its systemic effect. The mixture of Volck oil and nicotine sulphate gives a fairly good control if it is applied at weekly intervals. Trichlorfon, especially in the soluble form, had a weak effect. Phorate is not to be recommended since besides its dangerous handling, it hinders seed germination and gives poor control after 1 mo. from planting. (AS)

0848

* ABUL-NASR, S.; ASSEM, M.A.H. 1968. Studies on the biological process of the bean fly, Melanagromyza phaseoli (Tryon) (Diptera:Agromyzidae). Bulletin de la Societé Entomologique d'Egypte 52:283-295.

Ophiomyia [Melanagromyza] phaseoli, a serious pest of beans and cowpeas in Egypt, was reared in the lab. on bean plants for observations on its bionomics. Eggs were laid singly on the leaves, generally on the upper surface near the midrib, close to the petiole. They hatched in 2-4 days depending on the temp., and the larvae mined in the leaves. At 19, 23, and 30°C, the larval stage averaged 12-14, 12-13, and 7-8 days, resp. Full-fed larvae tunnelled downwards from the leaf blades and pupated in the stem or petiole. At constant temp. of 22, 28, and 32°C, the pupal stage averaged 13, 11, and 8 days, resp. Bean plants infested by O. phaseoli could be found in the field from early June to late Jan., and it is thought that there are 10-12 generations/yr. The activity of the fly between Jan. and early June is not known. Parasites reared from the puparia comprised the Pteromalids Eurytoma sp., Cryptoprymna sp., and Halticoptera sp., the Eupelmid Eupelmus urozonus, and the Braconid Diaeretiella (Diaeretus) rapae. (AS)

0849

* ABUL-NASR, S.; ASSEM, M.A.H. 1966. The external morphology of the bean fly, Melanagromyza phaseoli (Tryon) [Diptera:Agromyzidae]. Bulletin de la Societé Entomologique d'Egypte 50:61-69.

Considering the importance that the bean fly (Ophiomyia [Melanagromyza] phaseoli) has acquired as a pest of beans and cowpeas in Egypt, a detailed description is presented on its morphology. (CIAT)

0850

* ABUL-NASR, S.; ASSEM, M.A.H. 1966. Some ecological aspects concerning the bean-fly, Melanagromyza phaseoli (Tryon). Bulletin de la Societé Entomologique d'Egypte 50:163-172.

Infestation with the bean fly (Ophiomyia [Melanagromyza] phaseoli) was found to occur in all regions of Egypt. Symptoms of damage are described in detail. The seedling stage was observed to be very sensitive to infestation. Plants became more resistant as they grew. Cultivation of different leguminous plants has shown that in Egypt, lima beans, 2 cultivated var. of cowpeas, and soybeans are the only host plants for the bean fly. Leaf miners, other than the bean fly, may attack some of the leguminous plants. Soybean was the least affected plant host followed by lima bean. The 2 cowpea var. tested had a similar degree of infestation. Cowpea was more susceptible to infestation than bean. Susceptibility of 4

bean var. (Monte-calm, Seminole, Contender, and Swiss Blanc) was estimated by determining the mean no. of larvae and pupae/plant. Course of infestation was not the same in the 4 tested var., yet there was no significant difference in the degree of infestation. There was no relation between the degree of infestation by the bean fly and yield. The 2 crops (July 30 and Aug. 14) had the highest % of infestation, yet gave the best yield. The earliest crop (July 15) and the latest (Aug. 29) were less infested, yet had the lowest yields. (AS)

0851

* ABUL-NASR, S.; AWADALLA, A.M. 1957. External morphology and biology of the bean pod-borer, Etiella zinckenella Treit. Bulletin de la Societé Entomologique d'Egypte 41:591-620.

The bean pod borer, Etiella zinckenella, is described in detail, including its synonymy and distribution, characteristics and extent of damage, host plants, external morphology, biological processes, annual cycle and fluctuation, and parasites. It has not been reported attacking Phaseolus vulgaris in Egypt; however, it is a major pest of cowpea and lima beans. (CIAT)

0852

AMRA, H.A. 1983. Effect of processing on mycotoxins in legumes. M.Sc. Thesis. Egypt, Cairo University. 168p.

0853

ATWA, A.A.; EL-SHIEKH, T.M.A.; DESSOUKY, S.M. 1980. Effect of some chemicals and different packing methods on green bean. 1. Store under cold storage condition. Agricultural Research Review (Egypt) 58(3): 169-182.

Different chemical treatments and packing methods were tried on similar pods of green bean cv. Giza. Chemical treatments were dipping in IAA (500 ppm), coating with fiavorseal wax, flavorseal + TBZ, washing with tap water, and nonwashed pods (control). Packing methods included packing in nonperforated or perforated polyethylene sacks, and nonpacked pods (control). All treatments were placed in carton boxes which were kept under cold storage conditions (5°C, and 85% RH) for 24 days, and thereafter held under room conditions for studying the shelf life. Results showed that in general the wt. loss increased with prolongation of storage period contrary to the total carbohydrates, chlorophyll, and sugars which decreased. Coating with flavorseal wax led to decreased wt. loss, chlorophyll content, and total sugars. The unpacked pods showed the highest loss in wt. and destruction of chlorophyll and lower values in both sugars and carbohydrates. After transference to room temp., the IAA treated pods kept their quality for the longest period (8 days) compared with the rest of treatments. Packed pods had a longer shelf life at room temp. than the unpacked or polyethylene perforated packages. (AS)

0854

* AWAD, F.; AZIZ, M.A.; OMAR, M.S. 1982. Interaction of phosphorus fertilization and soil moisture depletion on kidney bean (Phaseolus vulgaris L.). 1. Yield of seeds and their N,P,K and protein contents. Egyptian Journal of Soil Science 22(2):135-142. [Soils & Water Use Laboratory, National Research Centre & Soils Dept., Faculty of Agriculture, Ain Shams Univ., Cairo, Egypt]

The effects of superphosphate fertilizer at 75, 150, and 225 kg/feddan (1 feddan = 0.42 ha) and soil moisture depletion at 75, 50, and 25% of available water were investigated in field expt. using Phaseolus vulgaris.

With increasing fertilizer rates seed yield and P content increased, and N, K, and CP contents improved. Highest seed yields were obtained by irrigating at 50% soil moisture depletion. Decreasing soil moisture depletion had a favorable but insignificant influence on N, P, K, and CP contents. Optimum yields and quality were attained when plants were irrigated at 50% soil moisture depletion and given 225 kg superphosphate/feddan. (AS)

0855

BADAWY, A.E.; MAHMOUD, F.A.; KANSOUH, A.S.; SOBEIHA, A.K.; ZIDAN, Z.H. 1980. The degradation of surface and internal residues of malathion and chlorpyrifos on and in stored grains. In Conference of Plant Protection Research Institute, 1st., Cairo, Egypt, 1980. Proceedings. Cairo, Plant Protection Research Institute. v.1,pp.429-439.

0856

EARIS, F.S. 1981. Physiological response of bean varieties and its generations to rust disease. Ph.D. Thesis. Zagazig, Egypt, Zagazig University. 96p.

The response of bean var. Strikton and Giza 4 and its generations to rust (Uromyces phaseoli) was evaluated. (CIAT)

0857

EGYPT. MINISTRY OF AGRICULTURE. 1943. Lepidoptera. Fauna (type-written list, entomology museum). pp.23,35. No. of insect 531.

0858

EL BOUDI, A.; MAKSOUD, A.; MIDAN, A. 1975. Une note sur l'interaction entre N et P du haricot vert. Egyptian Journal of Soil Science 16(1):21-35.

0859

* EL KIFL, A.H.; WAHAB, A.E.A.; ASSEM, M.A.H.; METWALLY, A.A. 1974. List of insects, mites and pests associated with leguminous crops in Egypt. Bulletin de la Societe Entomologique d'Egypte 58:297-302.

A list of the main harmful, visiting, and beneficial insects found in samples of bean, broad bean, cowpea, soybean, and sweet pea plants collected in Egypt at 2-wk. intervals during 1969-72 is presented. Determination work was based on specimens already identified in the existing entomological collections. For bean, species of harmful insects and mites of the orders Acarina, Diptera, Hemiptera, Lepidoptera, Orthoptera, and Thysanoptera are mentioned. (CIAT)

0860

* EL NADI, M.A; HAMDI, Y.A.; LOTFI, M.; NASSAR, S.H.; FARIS, F.S. 1971. Response of different varieties of common beans to certain strains of Rhizobium phaseoli. Agricultural Research Review (Egypt) 49(2):125-130.

Nine Phaseolus vulgaris var. (Seminole, Contender, Giza 3, Triumph, Processor, Tender Long, Resistant Tender Green, Perla, and Regalfin) were inoculated with Rhizobium phaseoli strains 402, 403, 405, and D-400. Inoculated seeds were planted in sterile Nile silt. Plants were grown for 50 days under greenhouse conditions, after which examination for nodulation

took place. All var. nodulated with strain 402 except Tender Long. Var. Seminole, Triumph, Resistant Tender Green, Tender Long, and Regalfin did not nodulate with strain 403. Strain 404 failed to nodulate var. Seminole and Tender Long. Strain 405 was noninfective to var. Seminole and Perla. (AS)

0861

EL-GHOBASHY, R.E.; FRANCIS, R.R.; EL-NAGGAR, H.A.; KHALIFA, M.H. 1983. Effect of dinitamine an flourodifen on yield and carbohydrate fractions in Phaseolus plant. Annals of Agricultural Science 28(2):486-498.

0862

* EL-GUINDY, M.A.; ABO-ELGHAR, M.R.; ABDEL-FATTAH, M.I.; ISSA, Y.H. 1979. Laboratory mass rearing of the bollworm, Heliothis armigera Hbn., on natural and artificial diets. Bulletin de la Societé Entomologique d'Egypte no.62:161-174.

Lab. investigations were made on natural and artificial diets for Heliothis armigera, a pest causing severe damage in cotton in Egypt, to obtain information on its nutritional requirements and biology. The relative development of H. armigera on castor leaves and on 3 artificial diets, of which 2 were based on snap beans and 1 on horse beans (Vicia faba), was evaluated. The insects were reared on the 2nd and 3rd diet for 6 generations, and the results indicated that the 2nd diet was the most suitable, followed by the horse bean diet, castor and the 1st snap bean diet (on which H. armigera did not survive beyond the 2nd generation). (CIAT)

0863

EL-NAHAL, A.K.M.; ASSEM, M.A.H. 1970. The chemical control of certain vegetable leaf miners in U.A.R. (Diptera). Bulletin of the Entomological Society of Egypt(Economic Series) 4:257-263.

In spray tests in field plots in Egypt during 1964 on the control of leaf-mining larvae on vegetable crops, the most effective insecticides against Ophiomyia (Melanagromyza) phaseoli on bean were endrin (0.4%) and fenthion (0.25%). (CIAT)

0864

EL-SAEID, H.M. 1981. Effect of water imbalance on growth in Phaseolus vulgaris. M.Sc. Thesis. Cairo, Egypt, Ain-Shams University. 158p.

0865

EL-SHAFEI, M.A. 1982. Biochemical studies on proteins of some legume seeds. Ph.D. Thesis. Egypt, Minia University. 120p.

0866

EL-SHERIF, M.A.; KHEIR, A.M.; FARAHAT, A.A. 1979. Nematodes associated with economic leguminous crops in the northern coast of Egypt. Bulletin of Faculty of Agriculture (Egypt) 30(1-2):37-46.

0867

EL-TAHAWI, B.S.; DIAB, M.A.; EL-HADIDI, Z.A.; HABIB, M.A.; DRAZ, S.N. 1982. Effect of gibberellic acid and Cycocel on carbohydrate metabolism in Phaseolus vulgaris. Menoufia Journal of Agricultural Research 6:289-301. [Dept. of Soil Science, Menoufia Univ., Shebin El-Kom, Egypt]

In a pot trial, plants of bean cv. Giza 3 were treated with GA_3 and chlormequat at 10, 25, or 50 and 250, 500, or 1000 ppm, resp. Contents of chlorophylls a and b, total carbohydrate content of the leaves, and total carbohydrate content of the produced seeds increased in response to the application of GA_3 to 30-day-old bean plants while diastase and alpha- and beta-amylase activities in the seed decreased. Leaf content of chlorophyll a and b decreased when chlormequat was applied to 30-day-old plants and increased in 70-day-old plants; the total carbohydrate content increased in leaves of 30-day-old plants but decreased in leaves of 70-day-old plants and the produced seeds. There was a reduction in the activity of diastase and alpha- and beta-amylase in the seeds when chlormequat was applied. (CIAT)

0868

EL-TAHAWI, B.S.; DIAB, M.A.; HABIB, M.A.; EL-HADIDI, Z.A.; DRAZ, S.N. 1982. Protein biosynthesis in plants of Phaseolus vulgaris as affected by Cycocel. Menoufia Journal of Agricultural Research (Egypt) 5:421-438. [Faculty of Agriculture, Menoufia Univ., Shebin-El-Kom, Egypt]

0869

* EMAM, K.A. 1982. Physiological studies on ageing and senescence in plant. M.Sc. Thesis. Cairo, Egypt, Ain-Shams University. 101p.

The behavior of endogenous growth substances in response to ageing and senescence in plants of bean cv. Giza 3 was studied in a series of expt. carried out successively during 1978, 1980, and 1981. The 1st expt. studied gibberellins and auxins in intact plants at different ages, parallel with a senescence retardation treatment by disbudding only at the age of 28 days after planting (the stage before yellowing). The 2nd expt., replicated twice, studied the effect of tissue age on callus growth from explants and also included a treatment for retarding leaf senescence by 6-benzylaminopurine (Benzyladenine). The last expt. was almost a replication of the 1st; however, it included measurements of leaf growth, determinations of chlorophyll content and cytokinins. Results showed that retarding senescence by disbudding resulted in a clear increase in the leaf area and the fresh and dry wt. of the primary bean leaves. At all stages following the disbudding, chlorophyll fractions of the primary leaves of the disbudded plants were higher than in the intact ones. BA treatment resulted in a higher chlorophyll content of the primary bean leaves than the control. The behavior of endogenous growth substances in the primary bean leaves throughout the various sampling stages studied was more or less concomitant with the effect of age as the level of each of gibberellins or auxins was almost relatively high in the younger leaves and gradually decreased with age while the cytokinin levels increased gradually in the primary leaves of intact plants to reach a max. at full expansion then decreased as growth extended reaching a min. at yellowing. In addition, a positive correlation was detected between inhibitor levels and primary bean leaf age. Retarding senescence by disbudding resulted in higher levels of all phytohormones in the primary bean leaves than the control. All studied explants from the differently aged petioles gave rise to callus growth with lower values characterizing the youngest and oldest ages. However, explants of the latter age (yellowing) were the only case which showed failure of callus production in nearly 1/3 of the replicates and late callus growth in the others. The anatomical study revealed that the cortical and pith parenchyma of explants, taken from the petioles of primary bean leaves, produced callus tissue. The phloem parenchyma was shown to participate in some cases in the callus development. (AS)

0870

* FADL, F.A.M. 1983. Induced mutations in beans and peas for resistance to rust. In Research Co-ordination Meeting on the Induced Mutations for Disease Resistance in Crop Plants, 2nd., Denmark, 1981. Proceedings. Vienna, FAO/IAEA Division of Isotope and Radiation Applications of Atomic Energy for Food and Agricultural Development. pp.163-170. [Inst. of Plant Pathology, Agricultural Research Centre, Giza, Egypt]

Gamma rays and ethyl methanesulphonate (EMS) were applied in a mutation-induction program for rust (Uromyces phaseoli and U. pisi) resistance in bean and pea. Bean and pea seeds were presoaked for 2 h before irradiation with 9, 10, and 12 krad. For chemical mutagen treatments bean and pea seeds were presoaked for 8 h and treated with 0.5 and 1.5% EMS for 4 h. M_2 seeds of beans and peas were planted in 1979. Resistant M_2 plants were selected for their rust resistance and other morphological characters. M_3 seeds of selected plants were planted in 1980. That same year more seeds of the same var. of beans and peas were treated with 0.1 and 0.3% EMS with the aim to produce rust-resistant mutants. Seed germination was reduced by gamma rays or EMS. Dwarf, malformed, and abnormal plants were noticed. Some resistant M_2 plants selected gave high grain yields. Some were different in morphological characters. In the M_3 of selected plants various other mutant characters appeared, such as different height of plants, early and late flowering, resistance to powdery mildew in peas, altered grain yield, thickness of stem, pod shape and flower color. (AS)

0871

FARRAG, A.M.I.; ABDEL-SALAM, A.S.; EL-GUINDY, M.A.; EL-SAYED, G.N.; WAHBA, M.L. 1980. The spider mite (Tetranychus arabicus Attiah) infestation in relation to varieties and plantation date of bean and its control. In Conference of Plant Protection Research Institute, 1st., Cairo, Egypt, 1980. Proceedings. Cairo, Plant Protection Research Institute. v.3,pp.17-29.

0872

* HARAKLY, F.A.; ASSEM, M.A.H. 1978. Ecological studies on the truely pests of leguminous plants in Egypt. 1. Biting and chewing pests. In Conference on Pest Control, 4th., Cairo, Egypt, 1978. Proceedings. Cairo, National Research Centre. pp.233-236.

During a 1-yr survey on pests attacking leguminous crops in Egypt, many species of different orders (Orthoptera, Dictyoptera, Lepidoptera, Diptera, and Collembola) were recorded. The most injurious ones attacking Phaseolus beans were Ophiomyia (Melanagromyza) phaseoli and Liriomyza bryoniae of order Diptera, and Spodoptera littoralis of order Lepidoptera. (AS)

0873

* HARAKLY, F.A.; ASSEM, M.A.H. 1978. Ecological studies on the truely pests pests of leguminous plants in Egypt. 2. Piercing and sucking pests. In Conference on Pest Control, 4th., Cairo, Egypt., 1978. Proceedings. Cairo, National Research Centre. pp.237-242.

During a 1-yr survey on piercing and sucking pests of leguminous crops in Egypt, the most injurious ones which were also recorded on Phaseolus beans, were: Thrips tabaci, Bemisia tabaci, Icerya purchasi, Aphis gossypii, A. compositas, Empoasca decipiens, Asymmetrasca decedens, and Tetranychus cucurbitacearum. Their seasonal abundance was carefully studied. (AS)

0874

HASSAN, A.S. 1947. The bean fly Agromyza phaseoli Coq. in Egypt. Bulletin de la Societé Entomologique d'Egypte 31:217-224.

0875

KANSOUH, A.S.; SELIM, A.A.; SOBEIHA, A.K.; ZIDAN, Z.H.; AFIFI, F.M.; MAHMOUD, F.A. 1980. Metabolic behaviour of malathion and chlorpyrifos residues in and on treated stored grains. In Conference of Plant Protection Research Institute, 1st., Cairo, Egypt, 1980. Proceedings. Cairo, Plant Protection Research Institute. v.1,pp.409-428.

0876

* KHEIR, A.M.; FARAHAT, A.A. 1981. Comparative interaction of Meloidogyne javanica and five leguminous hosts. Phytopathologia Mediterranea 20(2-3):141-143.

Comparative studies on the development of Meloidogyne javanica on 5 leguminous hosts (bean cv. Giza, pea cv. Little Marvel, broad bean cv. Giza 1, soybean cv. Hampton, and cowpea cv. Azmerly) in relation to syncytial growth were carried out under greenhouse conditions. On common bean, cowpea, or pea the nematode developed and reproduced better than it did on broad bean and soybean. Syncytia were formed in the cortical and stelar regions of common bean, cowpea, and pea, but only in the stele of broad bean and soybean roots. The quantitative growth of syncytia was positively correlated with nematode development. Syncytia of common bean, cowpea, or pea possessed the highest values of syncytial length, width, and boundary. (AS)

0877

MAHER ALI, A. 1957. On the bionomics and control of the bean fly, Agromyza phaseoli Coq. Bulletin de la Societé Entomologique d'Egypte 41:551-554.

0878

METWALLY, M.A.O. 1981. Effect of processing on nutritional factors of hemagglutinin in legume proteins. Ph.D. Thesis. Egypt, Cairo University. 147p.

0879

RAAFAT, A.; SADEGHIAN, E. 1976. Endogenous IAA and GA_3 levels in bean as influenced by senescence retardation of primary leaves created by benzyladenine or disbudding treatment. In Pilet, P-E., ed. International Conference on Plant Growth Substances, 9th., Lausanne, Switzerland, 1976. Collection Abstracts. pp.311-313.

0880

RAAFAT, A.; HOFNER, W.; LINSER, H. 1971. $^{14}CO_2$ assimilation during photosynthesis of ageing bean seedlings. Zeitschrift für Pflanzenphysiologie 64(1):22-33.

0881

* RAAFAT, A.; HOFNER, W. 1971. Effect of age on the fixation of $^{14}CO_2$ in sugars, organic acids and amino acids of bean leaves. Phytochemistry 10(10):2373-2381.

Fixation of $^{14}CO_2$ in sugars, organic acids, and amino acids of primary bean leaves varying in age was determined after 12 h photosynthesis. The period of leaf expansion was characterized by nearly equal amounts of activity in both glucose and fructose. Thereafter, fructose had relatively higher values than glucose at full expansion and remained so during the chlorophyll deteriorative phases towards senescence. The activity in alpha-ketoglutarate, succinate, and fumarate increased gradually till the full expansion stage then decreased with advancing age. On the other hand, no substantial increase in ^{14}C fixation in both citric and malic acids was noticed by the full expansion stage. The drop in ^{14}C fixation in the amino acids as the primary leaves attained their full growth mainly resulted from a drop in labeling of nearly all the amino acids studied with the exception of gamma-amino butyric acid, proline, alanine and serine, all of which recorded an increase. On the appearance of the 1st visible signs of senescence an increased activity was found in glutamine, asparagine, arginine, glutamic acid, serine, and glycine which suggest a sudden direction of the N metabolism in the leaf towards forming the important translocatory as well as the temporary storage forms of N by this stage. Results showed the importance of the amino acid synthesis at the early stages of growth for the development of max. photosynthetic capacity which occurs in a subsequent stage. The changes in $^{14}CO_2$ fixation in the amino acids of primary bean leaves of different age appeared to be more characterized to the specific amino acids themselves as affected by age rather than due to a general effect of age in the case of sugars and organic acids. (AS)

0882

RAAFAT, A.; STUR, J.; SIPOS, M.; MAREK, N. 1970. Some aspects of oxidative-reductive changes in chloroplast suspensions during the process of ageing. Acta Biochemica et Biophysica Academiae Scientiarum Hungaricae 5(3):265-272.

0883

RAAFAT, M.A.; ABOU-RAYA, A.K.; ABOU-HUSSEIM, E.R.M.; GHONEIM, A.; ABOU-EL-HASSAN, A. 1966. Effect of NaOH treatment on the feeding value of wheat and bean straws, maize cobs and cotton stalks. Bulletin. Faculty of Agriculture, Cairo University 16(2):333-340.

0884

RIZK, A.M.; HAMMOUDA, P.M.; LASHIN, S.M.; NOFAL, M.A.; AZAM, S.A.; WOOD, G. 1983. Phytoalexins of green beans (Phaseolus vulgaris L.) induced by Fusarium oxysporum and Botrytis cinerea. Annals of Agricultural Sciences (Egypt) 28(1):33-55. [National Research Center, Cairo, Egypt]

0885

SELIM, A.A.; KANSOUH, A.S.; SOBIHA, A.K.; ZIDAN, Z.H.; MAHMOUD, F.A. 1980. Effect of storage temperature and insecticidal treatments on some biochemical components of bean seeds and wheat grains. In Conference of Plant Protection Research Institute, 1st., Cairo, Egypt, 1980. Proceedings. Cairo, Plant Protection Research Institute. v.1, pp.441-451. [Faculty of Agriculture, Ain-Shams Univ., Cairo, Egypt]

0886

* SHADDAD, M.A.; HEIKAL, M.M. 1982. Interactive effect of gibberellic acid and salinity on kidney bean. Bulletin of the Faculty of Science (Egypt) 11(1):65-81. [Botany Dept., Faculty of Science, Assiut Univ., Egypt]

The changes in transpiration rate, stomatal frequency, growth, pigment content, and mineral composition were studied for kidney bean var. Harvester plants grown in water cultures at different levels of salinity (0-80 meq NaCl/l). In addition, the interaction between GA_3, applied as a foliar spray in concn. of 50 and 100 ppm, and salinity was also studied. Generally, a significant reduction in all the studied parameters of kidney bean was induced by salinization. Spraying with GA_3 was very effective in overcoming the inhibitory effect of salinity on transpiration, stomatal frequency, growth, photosynthetic pigments, and the content of some nutrients (K, Ca, P, and N). (AS)

0887

SHARAKY, M.M.; KAMEL, N.H. 1983. Effect of CCC on nucleic acid contents of maize, summer squash plants and senescent bean leaf segments kept in darkness. Annals of Agricultural Sciences (Egypt) 19(1):171-184. [Dept. of Agriculture, Zagazig Univ., Moshtohor, Egypt]

The effect of CCC on leaf senescence was studied on leaflet segments from 1-mo.-old seedlings of Phaseolus vulgaris cv. Contender floating on 0, 165, 330, or 660 ppm CCC in the dark. CCC was observed to delay the degradation of DNA and RNA during senescence of excised bean leaflet segments. (CIAT)

0888

* SIRRY, A.R.; SALEM, S.H.; GEWAILY, E.M.; TOHAMY, M.R. 1981. Isolation and identification of the causal organisms of bacterial blight of bean plants in Egypt. Egyptian Journal of Microbiology 16(1-2):53-63. [Botany Dept., Faculty of Agriculture, Zagazig Univ., Zagazig, Egypt]

The causal organisms from diseased bean plants showing symptoms of bacterial blight in Egypt were isolated. The pathogenicity test for isolated bacteria using several methods of artificial inoculation (atomizing of bacterial suspension, direct injection into primary leaf node or into the middle leaf vein) was also assessed. Koch's postulates were applied to confirm the pathogenicity of the isolated microorganisms from the diseased plants on the corresponding healthy plants. Morphological and biochemical studies were also conducted on the isolated microbes. Isolated organisms were identified as Pseudomonas aeruginosa, reported for the 1st time as causing bacterial blight of bean plants in Egypt. The procedure of needle puncture into middle leaf vein induced severe necrosis followed by the destruction of the whole leaf. Spraying had a slight effect, if any, on the var. used. (AS)

0889

TAMAN, F.A. 1972. Factors affecting biological activity of insecticides, effect of nutrition, age and temperature on toxicity of insecticides to Spodoptera littoralis. M.Sc. Thesis. Shatby, Egypt, University of Alexandria.

0890

TOHAMY, A.T.A. 1981. The effect of hot-water treatment and certain herbicides on controlling damping-off diseases of certain leguminous crops. M.Sc. Thesis. Shatby, Egypt, University of Alexandria 119p.

To control damping-off disease (Fusarium equiseti) of Vicia faba, Phaseolus vulgaris, and Glycine max, a hot-water treatment and nitralin, futralin, penoxalin, and trifluralin were tested. (CIAT)

0891

* TOLBA, M.A. 1977. Broadbean isolated viruses. In _____. Studies on virus diseases of legume plants. Giza, Egypt, Institute of Plant Pathology. Agricultural Research Center. Project no.EG-ARS-31. pp.3-11.

In an expt. conducted under greenhouse conditions during 1976-77 at the Institute of Plant Pathology of the Agricultural Research Center (Giza, Egypt), 2 strains of BYMV (I and II) obtained from naturally infected plants grown at different localities, were inoculated into 78 species and cv. which included broad bean and bean. Strain I caused necrotic lesions followed by severe mosaic in bean cv. Giza 3 and Seminole while Giza 4, Suisse Blanc, and Contender presented systemic mosaic. All bean cv. showed local necrotic lesions followed by systemic mosaic when inoculated with strain II. The 2 isolates can be differentiated by the characteristic symptoms each induces on specific bean cv. (CIAT)

0892

* TOLBA, M.A. 1977. Cowpea isolated viruses: a mosaic disease of cowpea (Vigna sinensis). In _____. Studies on virus diseases of legume plants. Giza, Egypt, Institute of Plant Pathology. Agricultural Research Center. Project no.EG-ARS-31. pp.21-26.

In expt. conducted under greenhouse conditions during 1976-77 at the Institute of Plant Pathology of the Agricultural Research Center (Giza, Egypt), an isolate was obtained from naturally infected plants showing mosaic symptoms. Ten seedlings of each of the bean cv. to be tested were mechanically inoculated at a suitable stage of growth. Cv. Giza 3, Seminole, and Contender reacted with systemic mosaic while cv. Harvester, Topcrop, Suisse Blanc, and Pinto Bean were not susceptible. No seed transmission was observed. From previous reports in addition to results obtained in this expt., it is postulated that the isolate was similar to cucumber mosaic virus. (CIAT)

0893

* TOLBA, M.A. 1977. Cowpea isolated viruses: a seed-borne virus in Blackeye cowpea (Vigna sinensis). In _____. Studies on virus diseases of legume plants. Giza, Egypt, Institute of Plant Pathology. Agricultural Research Center. Project no.EG-ARS-31. pp.27-32.

In expt. conducted under greenhouse conditions during 1976-77 at the Institute of Plant Pathology of the Agricultural Research Center (Giza, Egypt), a seed-borne virus was observed in Blackeye cowpea seedlings and symptoms of mosaic appeared on primary leaves. The virus was inoculated into 10 seedlings of each bean cv. tested. The ability of aphids (Myzus persicae and Aphis craccivora) to transmit the virus was studied. French bean cv. Giza 3 and Contender reacted with systemic infection while bean cv. Top Crop, Suisse Blanc, and Pinto were not susceptible to inoculation. The virus could not be identified with any of the known viruses transmitted in cowpea seeds. (CIAT)

0894

* TOLBA, M.A. 1977. A preliminary investigation on soybean viruses. In _____. Studies on virus diseases of legume plants. Giza, Egypt, Institute of Plant Pathology. Agricultural Research Center. Project no.EG-ARS-31. pp.33-38.

Two virus isolates, obtained from naturally infected soybean cv. Lee and Hill, were inoculated into several test plant species in expt. conducted

under greenhouse conditions during 1976-77 at the Institute of Plant Pathology of the Agricultural Research Center (Giza, Egypt). The 1st isolate produced systemic mosaic on bean cv. Giza 3 and Suisse Blanc while the 2nd isolate did not induce any symptoms on cv. Giza 3, Contender, and Seminole. Results indicated that both isolates were aphid-transmitted. (CIAT)

0895

* TOLBA, M.A. 1977. Studies on virus diseases of legume plants. Giza, Egypt, Institute of Plant Pathology. Agricultural Research Center. Project no.EG-ARS-31. 38p.

A project was initiated in 1976 at the Institute of Plant Pathology of the Agricultural Research Center (Giza, Egypt), to identify resistance in lines and cv. for future breeding programs. The most important viral diseases of various legumes were identified and their possible means of transmission and spread, effect on host plant and yield, var. susceptibility, physical properties, and seed transmission were studied. Studies on broad bean isolated viruses, var. susceptibility of beans to BYMV isolates, cowpea isolated viruses, seed-born virus in Blackeye cowpea, and a preliminary investigation on soybean viruses are included. A plan for future research is presented. (CIAT)

0896

* TOLBA, M.A. 1977. Varietal susceptibility of Phaseolus vulgaris to bean yellow mosaic virus isolates. In _____. Studies on virus diseases of legume plants. Giza, Egypt, Institute of Plant Pathology. Agricultural Research Center. Project no.EG-ARS-31. pp.12-20.

In an expt. conducted under greenhouse conditions during 1976-77 at the Institute of Plant Pathology of the Agricultural Research Center (Giza, Egypt), 2 isolates were used to determine var. susceptibility of bean to BYMV: isolate I, obtained from a lesion induced on leaves of cv. Pinto Bean and isolate II, obtained from a lesion on leaves of cv. Kentucky Wonder. Seedlings of cv. Seminole and Giza 3 were used as source of inocula for isolates I and II, resp. The reaction of 6 bean cv. (Seminole, Giza 3, Pinto Bean, Kentucky Wonder, Burpess Stringless, and Stringless Green Pod) to infection is tabulated as well as that of the other test plants. All bean cv. were susceptible to isolate I; cv. Pinto Bean was immune to isolate II. In a 2nd expt., 2 viruses were transmitted to cv. Seminole and Giza 3 by the aphid Myzus persicae and propagated to 25 other bean cv. Their susceptibility to infection was studied and results were tabulated, indicating that all 27 cv. were susceptible to isolate I and that the severity of necrosis differed according to cv. With the exception of Pinto, Wade, and Hundred Four One, all other cv. gave systemic mottle caused by isolate II. Previous tests, in addition to results obtained in transmission by M. persicae, indicated that the 2 isolates are strains of BYMV. (CIAT)

0897

* WASFY, E.H.; SHEIR, H.M.; EL-METENY, A.Y.; DARWEESH, M.M. 1984. Changes in peroxidase isoenzyme pattern of bean hypocotyl due to infection with Rhizoctonia solani. Transactions of the British Mycological Society 82(1):154-156. [Plant Pathology Dept., Faculty of Agriculture, Alexandria Univ., Alexandria, Egypt]

The effect of infection by Rhizoctonia solani on peroxidase isoenzymes of hypocotyls of bean cv. Barboni and Swiss Blanc was studied. Pot soil was mixed with the inoculum of each of the 2 isolates at the rate of 20 ml

fungal suspension/pot; enzyme activity was measured at 8, 10, 12, and 14 days after planting. The no. and concn. of these isoenzymes increased in response to R. solani infection. A highly pathogenic isolate from okra (Hibiscus esculentus) stimulated isoenzyme induction more quickly than a weakly pathogenic one from cotton. (AS)

0898

WILLCOCKS, F.C. 1922. A survey of the more important economic insects and mites of Egypt. Cairo, Sultanic Agricultural Society. Bulletin no.1. pp.117,143-144.

0899

ZIDAN, Z.H.; SOBEIHA, A.K.; MAHMOUD, F.A.; KANSOUH, A.S. 1980. Efficiency of certain treatments on the elimination of insecticidal residues from treated stored grains. In Conference of Plant Protection Research Institute, 1st., Cairo, Egypt, 1980. Proceedings. Cairo, Plant Protection Research Institute. v.1,pp.453-467.

0900

* EGWUATU, R.I.; TAYLOR, T.A. 1976. Effects of food and water on the development, fecundity and longevity of Acanthomia tomentosicollis Stal (Hemiptera, Coreidae). Ghana Journal of Agricultural Science 9:11-117.

The effects of the major host plants and some alternate host plants on the development and fecundity of Acanthomia tomentosicollis was studied as well as the effect of free water on development, fecundity, and longevity in view of lab. observations on the habits of the insect and observed peak populations during the dry seasons (Nov.-March). Vigna unguiculata, V. aureus, Pueraria phaseoloides, and Phaseolus vulgaris were suitable as alternate legume food sources for nymphal development of A. tomentosicollis, Centrosema pubescens, Calopogonium mucunoides, Crotolaria juncea, and Sphenostylis stenocarpa did not support nymphal development beyond the 1st-instar stage and Glycine max supported A. tomentosicollis only to the 4th-instar stage. Nymphal development was completed in 13-21 days on the various suitable food sources. Nymphal mortality was affected by the type of food source. Wt. of freshly-emerged adult males and females were significantly influenced by the legume source of food; those reared on P. vulgaris weighed 30.9 + 0.9 and 48.4 + 1.8 mg for males and females, resp. The longevity of adults reared on Cajanus cajan and V. unguiculata was not different, but the fecundity of the females reared on the latter plant was significantly higher. Access to free water decreased the rate of development but significantly increased both the fecundity and longevity of females. (AS)

0901

SPENCER, K. 1959. Ethiopian Agromyzidae (Diptera), Melanagromyza phaseoli (Tryon). Transactions of the Royal Entomological Society of London 111:237-329.

0902

STEWART, R.D.; YIRGOU, D. 1967. Index of plant diseases in Ethiopia. Haile Selassie I University. College of Agriculture. Experiment Station. Bulletin no.3. 95p.

0903

* STOETZER, H.A.I. 1984. Natural cross-pollination in bean in Ethiopia. Bean Improvement Cooperative. Annual Report 27:99-100. [Grain Legume Project, National Horticultural Research Station, P.O. Box 220, Thika, Kenya]

A program was initiated in 1974 at the Awasa Expt. Station (Sidamo, Ethiopia) to produce white haricot beans with horizontal resistance to all locally important diseases. Random polycrosses were made between 60 colored bean cv. and 75 white bean cv., planted in alternating single rows. Insects were expected to do the natural cross-pollination. One colony of honeybees (Apis mellifera) was taken to the bean plot during flowering and its efficiency to cross-pollinate the beans was tested by placing an insect-proof cage of 17.5 m^2 over 3 white and 4 colored bean rows. One beehive was included in the enclosure. Carpenter bees (Xylocopa spp.) and other wild bees were observed to visit the cv. Cross-pollination was estimated at 4.8 + 1.1% for the main field and only 0.1% for the enclosure. It was concluded that Carpenter bees and/or other wild bees were likely to have cross-pollinated the beans. (CIAT)

* WESTPHAL, E. 1975. Agricultural systems in Ethiopia. Wageningen, the Netherlands, Centre for Agricultural Publications and Documentation. Agricultural Research Reports no.826. 278p.

0905

THORNTON, D.S. 1973. Agriculture in South East Ghana. 1. Summary report. Reading, England, University of Reading. Department of Agricultural Economics and Management. Development Study no.12. 219p.

0906

* FAUQUET, C.; THOUVENEL, J.C. 1980. La mosaique deformante du vigna/ southern bean mosaic virus. In _____. Maladies virales des plantes cultivées en Cote d'Ivoire. Paris, Oficce de la Recherche Scientifique et Technique Outre-Mer, Initiations-Documentations Techniques no.46. pp.105-108.

Data on the BSMV are outlined: symptomatology; natural hosts (which include bean); geographical distribution; transmission; stability in sap; purification; particle structure; biophysical, biochemical, and serological properties; field control. A map of its distribution on the African continent is included. (CIAT)

0907

* BEAN/COWPEA COLLABORATIVE RESEARCH SUPPORT PROGRAM. U.S.A. 1983. Improvement of drought and heat tolerance of disease resistant beans in semiarid regions of Kenya. In _____. 1983. Annual Report. East Lansing, Michigan State University. pp.86-90.
Also in Spanish.

Main objectives of a project of improvement of drought and heat tolerance of disease-resistant beans of semiarid regions of Kenya were to: (1) establish collaborative relationships between Kenyan scientists at the U. of Nairobi and at other locations and USA scientists; (2) carry out a pilot project on the effects of environmental stress on flower and pod abscission and yield in California; (3) develop screening techniques for characteristics that improve drought and heat adaptation of beans at the U. of California at Davis; (4) introduce and exchange germplasm between Kenya and the USA; (5) identify Kenyan students and/or technicians for training in the USA; (6) initiate a bean/Phaseolus acutifolius var. latifolius breeding program for improving yield potential of beans in the U. of California at Riverside. Techniques to establish beans x tepary plants were obtained in addition to 11 cv. tolerant to heat and to drought, and data on growth parameters related to yield and abscission. Personnel is being trained in the USA. Professional and organizational linkages were established, among others, with CIAT, Tanzania/Washington State U., and Senegal/U. of California. Massive screening trials were carried out in Kenya and at the U. of California to identify disease resistance and drought and heat tolerance in bean cv. from seed obtained from CIAT, Tanzania, Washington State U. and Arizona (USA), and Kenya. The following aspects are also analyzed: institutional resources contributed to the project, progress towards objectives and constraints to their achievement, literature search on the crop and its storage, and future research plans. (CIAT)

0908

* BOCK, K.R.; GUTHRIE, E.J.; PEARSON, M.N. 1975. Notes on East African plant virus diseases. 9. Cucumber mosaic virus. East African Agricultural and Forestry Journal 41(1):81-84.

The identification of the cucumber mosaic virus (CMV) in Kenya, based on morphology and serology, is reported. CMV was isolated from Capsicum frutescens and Notonia abyssinica. Although variations in symptom expression were found between the 2 viruses, CMV-131 and CMV-417, both isolates were similar in their wide host ranges. In snap bean pinpoint local necrotic lesions were observed in 4 days; the virus was not systemic. Characteristics of the isolates such as physical properties, sucrose density gradient centrifugation of purified preparations, electron microscopy, serology, and effect of CMV on yield of pyrethrum plants, are included. (CIAT)

0909

* BOCK, K.R. 1971. Notes on East African plant virus diseases. 1. Cowpea mosaic virus. East African Agricultural and Forestry Journal 37(1): 60-62.

The identification and distribution of the cowpea mosaic virus in East Africa are reported. The virus was isolated in 1967-68 in the coastal districts of Kenya, whereas it has not been detected in Uganda or Tanzania. The plants tested were cultivated in insect-free glasshouses at 20-25°C and

inoculations were manual. In Phaseolus vulgaris, var. Prince showed local necrotic lesions and infection was confined to the leaves. In vitro properties, purification, electron microscopy, serology, and virus transmission are described. (CIAT)

0910

BUMPUS, E.D. 1957. Legume nodulation in Kenya. East African Agricultural and Forestry Journal 23:91-99.

0911

* CHUI, J.N.; NADAR, H.M. 1984. Effect of spatial arrangements on the yield and other agronomic characters of maize and legume intercrops. [Abstract] Symposium on Dryland Farming Research: the Kenyan Experience, Nairobi, Kenya, 1983. Phaseolus Beans Newsletter for Eastern Africa no.2:47-48.

Different spatial arrangements of maize and 2 legumes, soybean and bean, were studied at the National Dryland Farming Research Station, Kenya, and at the Iowa State U., USA, during 1980-81 to improve the yield of a legume intercrop, determine the contribution of a legume to an intercropped cereal crop and assess the yield advantages of an intercropping system compared with monocropping, with or without applied N fertilizer. The investigations were carried out on the Oxic Paleustalf soil type in Kenya and Nicollet sandy clay loam soil in the USA. Maize and beans were planted in the same hole, in alternate holes on the same row, or in alternate rows. Data included plant growth and development, yield and yield components, and LER. Beans in alternate rows reduced maize yield by 33%, mainly due to a decrease in ear wt. of 29%. Intercropping maize and beans in the same and in alternate holes on the same row without applied N increased maize yield by 27 and 7%, resp. Intercropping reduced bean yields by 67%, mainly because of reduced plant growth and pod set. Intercropping systems resulted in greater LERs than monocropping. Planting maize and beans in the same hole gave the largest LER of 1.65 whereas over the 2 seasons, the largest LER in maize-soybean intercrops averaged 1.19 in a 70 x 90 cm spatial arrangement. Intercrops applied with N fertilizer had lower LERs than those without applied N. (AS)

0912

* CHUI, J.N.; NADAR, H.M. 1984. Evaluation of effects of Rhizobium phaseoli strains on nodulation, dry matter and grain yield of two bean (Phaseolus vulgaris) varieties. [Abstract] Symposium on Dryland Farming Research: the Kenyan Experience, Nairobi, Kenya, 1983. Phaseolus Beans Newsletter for Eastern Africa no.2:51-52.

A greenhouse study was carried out to investigate the effectiveness of native Rhizobium phaseoli in a National Dryland Farming Research Station (Katumani, Kenya), field soil (Oxic Paleustalf) in comparison with inoculation with known inoculant strains. Effective strains of R. phaseoli (NU 405 and NU 439) supplied by the U. of Nairobi were used singly and as a mixture (2-NU) on Mwezi Moja and Zebra beans. A 3-strain inoculant mixture (3-NS) obtained from the NifTAL Project, Hawaii, was also included for comparison. Parameters measured were nodule no., nodule dry wt., plant DM, and seed yield. Results showed that there were effective native R. phaseoli in the soil. However, some rhizobia strains proved superior to the native rhizobia at different growth stages of the plant in terms of nodulation, DM production, and seed yield. Bean var. showed some preference for R. phaseoli. Mwezi Moja responded much better to NU 439 and Zebra beans to 3-NS, in pod dry wt., total DM, and seed yield. These greenhouse results indicate that, although there were effective native rhizobia in the soil

examined, some of the introduced rhizobium strains that proved superior to the indigenous rhizobia could be selected for further testing under field conditions. This would determine those which could be used for bean inoculation under the natural environment to improve production. (AS)

0913

CULLEN, G. 1981. Grow improved beans. Kenya Farmer. September 1981:39.

0914

* DE PURY, J.M.S. 1968. Stem and shoot-boring flies and seed eaters. In _____. Crop pests of East Africa. Nairobi, Kenya, Oxford University Press. pp.90-92.

The biology, host plants, plant damage, and control of the bean fly (Ophiomyia [Melanagromyza] phaseoli) are briefly described. A diagram illustrating the movement of the insect on the plant is included. (CIAT)

0915

* FAUGHT, W.A.; NADAR, H.; WAWERU, S. 1984. Verification trials: a means of measuring applicability and economic feasibility of experimental results. [Abstract] Symposium on Dryland Farming Research: the Kenyan Experience, Nairobi, Kenya, 1983. Phaseolus Beans Newsletter for Eastern Africa no.2:52-53.

A series of on-farm trials were initiated in 1981 in the Machakos District of Kenya to verify some of the more promising recommendations of the Dryland Cropping Systems Research Project. Twelve farmers (3 in each of 4 clusters) cooperated. Researchers presented recommendations to the farmers, assisted in making the fertilizer applications and collected information on labor inputs and yields. All other activities were carried out by the farmers in accordance with their normal schedules. Extremely dry weather during the 1st season and unforeseen events during the 2nd restricted the usefulness of the data for evaluating the approach or establishing the relationship of exptl. and farm based findings. However, successful trials were completed in the 3rd season. Findings indicated similar although lower responses to fertilizer as found in the expt. and clearly showed that such treatments were economically feasible if the operator has access to the required capital. Use of improved breeder seed increased yields and net returns. An alternative rate and pattern of planting a maize/bean intercrop was found to provide both substantially higher yields and net returns than the method normally followed by farmers. Verification trials on farms appear to be a clearly viable approach for testing the applicability of exptl. results. In areas of highly variable climatic conditions such as the semiarid areas of Kenya, the trials may have to be conducted for several seasons to obtain reasonably reliable results. (AS)

0916

* FLOOR, J. 1984. Effect of soil acidity on dry bean yields in western Kenya. Thika, Kenya, National Horticultural Research Station. Grain Legume Project. 2p.

Fertilizer expt. were carried out in farmers' fields in the Kisii and Kakamega Districts of western Kenya over 4 wet seasons to find out if soil acidity affected dry bean production. Although the soil conditions in both districts differed from each other, the av. soil pH values were the same, and correlated significantly with the amount of available nutrients and the amount of exchangeable acidity in the soils. However, the av. amount of a

nutrient was always higher in Kisii than in Kakamega District. This was generally found to be the case for the soil OM content as well. Av. yields in Kisii were 350 kg/ha higher than those in Kakamega District. (CIAT)

0917

* FLOOR, J.; STOETZER, H.A.I.; OKONGO, A.O. 1984. Increased tolerance of dry beans to bean fly as a result of fertilizer application. Thika, Kenya, National Horticultural Research Station. Grain Legume Project. 2p.

In a fertilizer trial at Kissi, Nyanza Province, Kenya, var. GLP-2, susceptible to the bean fly (Ophiomyia phaseoli), was planted. No significant differences in plant stand were initially observed, but at flowering bean fly attack caused heavy plant losses, especially in the unfertilized beans. An av. yield of 370 kg/ha with 132,000 affected plants was obtained in the check treatment in comparison with 751 and 870 kg/ha and 71,000 and 77,000 affected plants for the treatments with 160 and 240 kg single superphosphate and triple superphosphate/ha, resp. Differences in the no. of affected plants between fertilized and unfertilized beans amounted to 30-50%, confirmed by visual scores. (CIAT)

0918

* FLOOR-DREES, E.M. 1984. The influence of drought stress on flowering and abscission of Phaseolus vulgaris L. Thika, Kenya, National Horticultural Research Station. Grain Legume Project. 2p.

In 2 field expt. carried out during the 1982 and 1982-83 seasons in Kenya, the effect of drought stress on the no. of pods/plant and the abscission of flowers and pods was studied in 8 bean cv. (GLP-2, GLP-1004, GLP-288, GLP-x.1124, GLP-x.1127a, GLP-x.92, GLP-x.806, and GLP-x.1131). In the 1st expt. treatments were continuous irrigation (high level) and irrigation discontinued 3 wk. after planting (low level). In the 2nd expt. a low and high level of irrigation was established as from 42 days after planting. The total no. of flowers and pods were recorded for 4 randomly chosen plants, and the % abscission/plant calculated. The results showed that drought stress influenced the flowering and abscission of beans, and that cv. differed in their sensitivity to it. The actual effect of the stress, however, depended on its timing. (CIAT)

0919

* FLOOR-DREES, E.M. 1984. Number of stomata on the adaxial and abaxial leaf surface of Phaseolus vulgaris L. and Phaseolus acutifolius A. Gray. Thika, Kenya, National Horticultural Research Station. Grain Legume Project. 2p.

Top leaflets were taken from well-watered beans in the pod-filling stage, grown in the field during the 1982 and 1982-83 seasons in Thika, Kenya. The no. of stomata on small areas of the adaxial and abaxial leaf surfaces were counted under the microscope. In 1982, 10 observations were made on 4 leaves of 15 Phaseolus vulgaris cv. and 1 P. acutifolius cv. In 1982-83, 24 observations were made on 6 leaves of 5 Phaseolus vulgaris cv. Although there were significant differences in the no. of adaxial and abaxial stomata between the cv. of P. vulgaris, P. acutifolius had a larger no. of adaxial stomata than any of these cv. However, its no. of abaxial stomata was in the same range as that of P. vulgaris. (CIAT)

0920

* FLOOR-DREES, E.M.; RHEENEN, H.A. VAN 1983. Shortening the breeding cycle of beans. The influence of drought stress, leaf removal and harvest date. Michigan Dry Bean Digest 8(1):14-15.

The effectiveness of 3 factors (drought stress, leaf removal, and harvest date) in shortening the growth cycle of beans was studied in a pot trial. Pods of cv. GLP-2, a determinate Rose Coco type with a growth cycle of about 85 days, and GLP-24, an indeterminate, Canadian Wonder type with a growth cycle of about 95 days, were harvested at maturity or 5-6 days before. Treatments were: adequate water (twice a day), water deficit from expansion of 1st trifoliate leaf, and no water application from early pod setting; removal of further flowers after the 1st 5 were formed until 5 pods had well developed; and as before but trimming the plant after 5 pods had developed to 1-2 cm length, leaving only the corresponding leaves. The use of large-size pots (height 33 cm, diameter 15 cm), withholding water from 20 days after the onset of flowering, and harvesting pods 6 days before maturity were found to be effective and reduced the growth cycle about 10%, with only a small decrease in yield. A water deficit from expansion of the 1st trifoliate leaf and leaf removal increased the growth cycle slightly and reduced the yield considerably. (AS)

0921

* FLOOR-DREES, E.M. 1982. Draft report on a field experiment to screen promising bean cultivars for drought resistance. Thika, Kenya, National Horticultural Research Station. Grain Legume Project. Internal Report. 47p.

A field trial was carried out in Thika, Kenya, during the July-Oct. dry season, 1982, to study yield, yield reduction, development rate, and growth characteristics of 15 Phaseolus vulgaris cv. and 1 P. acutifolius cv. under 2 irrigation treatments: (1) no stress (weekly irrigation) and (2) moisture stress (no irrigation from 4 wk. after planting onwards). A split plot design was used. Results indicated that cv. GLP-X.806, GLP-288, GLP-X.1127(a), GLP-2, and GLP-X.92 performed relatively well under dry conditions, while P. acutifolius, GLP-X.1130, GLP-X.1126, and GLP-77 performed relatively poor. In general, large-seeded var. had better yields. The influence of stress on yield components and characteristics was not clear due to the large variation between cv. These significant cv. differences also occurred for the no. of stomata on the adaxial and abaxial sides of the leaves. (CIAT)

0922

GATHURU, E.M.; MUKUNYA, D.M. 1983. Diseases associated with beans (Phaseolus vulgaris) in dry areas of Machakos and Kitui districts. Improvement of beans in semi-arid regions of Kenya. Bean/Cowpea/ Collaborative Research Support Program. pp.38-46.

0923

* GUPTA, V.K.; OKIROR, M.A.; BREUKELEN, E.W.M. VAN 1981. Electrophoretic studies of two isogenic bean lines differing in their resistance to bean anthracnose. Kenya Journal of Science and Technology 2(2):85-90. [Dept. of Crop Science, Univ. of Nairobi, P.O. Box 30197, Nairobi, Kenya]

Two isogenic bean lines, P_7 and P_{13}, susceptible and resistant, resp., to bean anthracnose (Colletotrichum lindemuthianum), were compared in an electrophoretic study to determine possible genetic and biochemical variations between them. These lines differ in peroxidase isozymes and

activity, depending on the stage of development. Specific isozyme bands were present in susceptible lines only at certain stages of development. These bands, C_2 and C_4, thus can be used as genetic/biochemical markers for screening the populations for resistance to bean anthracnose. The total peroxidase activity, especially in the primary leaves, did not show constant differences between resistant and susceptible lines. The trifoliate leaves showed that the susceptible lines had higher peroxidase activity. However, no definite conclusions can be drawn based on the peroxidase activity alone, but the electrophoretic variation can be used for screening purposes at a very early stage of development. (AS)

0924

* HASSELBACH, O.E.; NYANGIRI, E.N. 1978. Intercropping maize and beans: the effect of cultivar, planting date and fertilizers of beans at Kisii, Kenya. Thika, Kenya, National Horticultural Research Station. Grain Legume Project. 7p.

The effects of planting beans 12 days before or simultaneously with maize and the use of bean cv. with short growth cycles (Rose Coco K74 and Mwezi Moja) were studied in a mixed cropping trial at Kisii, Kenya, to determine if competition influences the no. of bean pods and consequently, yields. Extra fertilizer (40 kg P/ha) was included for beans in one of the treatments and pure stands of beans and maize were planted at different densities to meet the requirements of having pure stands represented at their approx. optimum density. A 40% increase in no. of pods was obtained by planting beans 12 days before maize compared with simultaneous planting of beans and maize. The treatment failed to have a clear impact on LER, possibly due to a negative effect on maize yields. Higher seed wt. at more prolonged competition, possibly due to shade, partly offset lower yields due to fewer pods. Blight incidence was significantly less in mixed than in pure stands. A significant cv. effect was observed, but was regarded with mistrust, since cv. were obtained from different sources. (AS)

0925

HASSELBACH, O.E. 1977. Competitive effects of maize on beans. Thika, Kenya, National Horticultural Research Station. Grain Legume Project. Internal Report.

0926

* HOEKSTRA, D.A. 1983. Leucaena leucocephala hedge rows intercropped with maize and beans: an ex ante economic analysis of a candidate agroforestry land use system for the semiarid areas in Machakos District, Kenya. Nairobi, Kenya, International Council for Research in Agroforestry. Working Papers no.3. 7p.

Printouts of a microcomputer program (MULBUD) for the analysis of agroforestry land use systems are analyzed and described. The traditional system of maize and bean intercropping twice a year and the system which introduces a leucaena hedgerow within the maize and bean field are compared. A 2-m spacing between rows was assumed for this analysis; a hedgerow width of 1 m was used to account for the increased competition for moisture between annual crops and the hedgerows in semiarid areas. Initial leucaena harvest is expected to take place at 18 mo. after transplanting the seedlings and would correspond to the 2nd maize/bean mixture in the 2nd yr. Leucaena hedges are lopped every 6 mo. until year 10, when it is assumed that they have lost their vigor and have to be replaced by new rows or by a newly developed technology. Beans may also benefit from the organic

P obtained from the leucanea mulch. Land, labor, and animal power are all used more efficiently in the leucaena hedgerow system than in the traditional maize/bean intercropping system. However, seedlings were priced at a very low level and therefore real costs could be much higher. A possible increase in bird, rodent, termite and/or insect populations could occur in bean and maize production due to mulch. (CIAT)

0927

* HOLLIS, J.P. 1962. A survey of plant parasitic nematodes and their control in Kenya. FAO Plant Protection Bulletin 10(5):97-106.

The significance of plant parasitic nematodes to agricultural crop production on the Kenyan Highlands is reported and characterized on the basis of previous work and a survey of plant parasitic nematodes other than Meloidogyne species and soil fumigation trials for nematode control. Nematode genera found in beans over 8 sites were Scutellonema, Rotylenchus (diagonal-tail), Meloidogyne (larvae), Trichodorus, Criconemoides, Xiphinema, Pratylenchus, Rotylenchus (larvae, immature females and males), and Tylenchorhynchus. The common occurrence of root knot nematodes (Meloidogyne spp.) in soils of high clay content is apparently due to the loam-like texture of such soils resulting from the aggregation of clay by Fe and Al oxides. Aggregation of soils also influences the effectiveness of soil fumigation for nematode control. Mulching is needed to prevent loss of low vapor pressure fumigants from surface layers. High vapor pressure fumigants are recommended for highly aggregated soils where rapid surface drying cannot be controlled. Dry season fallow plowing is recommended for partial control of nematodes. (CIAT)

0928

HUBBELING, N.; DIJKE, H.D. VAN 1979. Genetics of anthracnose resistance in Phaseolus beans. 3p.
Paper presented at the Grain Legume Improvement Symposium, Nairobi, Kenya, 1979.

0929

JULIUS, Y.K.; NKWIINE, Z. C. 1982. The effect of ash, calcium carbonate and inoculation on nitrogen fixation and yield of beans (Phaseolus vulgaris) variety K20. In Qureshi, J.N., ed. Soil management under intensive cultivation. Nairobi, Kenya, Soil Science Society of East Africa. pp.46-55.

0930

KENYA. MINISTRY OF AGRICULTURE. 1982. Grain Legume Project. Thika, National Horticultural Research Station. Interim Report no.20.

0931

* KENYA. MINISTRY OF AGRICULTURE. 1981. Grain Legume Project. Thika, National Horticultural Research Station. Interim Report no.19. Long Rains 1981. 113p.

Results of the Long Rains 1981 program of the Grain Legume Project (Thika, Kenya) are presented. In fertilizer trials, diammonium phosphate gave better results than other single P-fertilizers on a dry bean yield wt. basis in Katumani, Embu, and Thika, but not in Kisii and Kakamega. Yield responses to rates, times, and methods of FYM application were not conclusive. Results of chemical weed control trials were not encouraging.

At Thika, Embu, and Kisii, bean yields were clearly affected by maize remaining in the field longer than 6 wk. Major diseases were angular leaf spot (Isariopsis griseola) at most locations, BCMV in Kakamega, and halo blight (Pseudomonas phaseolicola) in Kisii. However, the screening of halo blight resistant material from USA at Kisii was successful. Only simple, not labor intensive, disease scoring methods were feasible. Cv. GLP-X.92, GLP-X.380, and possibly GLP-X.806 have been considered for release. Out of 86 different red haricot var., 16 were identified as superior in performance and as potential candidates for a national red haricot performance trial. (CIAT)

0932

KENYA. MINISTRY OF AGRICULTURE. 1980. Grain Legume Project. Thika, National Horticultural Research Station. Interim Report no.17.

0933

KENYA. MINISTRY OF AGRICULTURE. 1978. Grain Legume Project. Thika, National Horticultural Research Station. Interim Report no.13.

0934

* KENYA. MINISTRY OF AGRICULTURE. 1978. Grain Legume Project. Thika, National Horticultural Research Station. Interim Report no.12. Short Rains 1977/78. 55p.

Activities in agronomy, breeding, and selection during the short rains season of 1977-78 in Kenya are reported. Encouraging results were obtained with diammonium phosphate and FYM. In mixed cropping trials at Thika and Embu, low nutritional status of the soils could not support the high mixed cropping plant populations. At Thika, bean yields were 68% higher with Katumani composite maize than with hybrid maize. In density trials, cv. GLP-2 and GLP-24 had a similar performance, compared with Rose Coco K 74, and 2 rows of beans between the maize rows showed a clear advantage. The critical period for weed competition in mixed cropping seems to be shorter than in pure stands of beans. GLP-2 confirmed its outstanding yield potential in the wetter areas and GLP-24 in the medium rainfall zones, although its yields were disappointing in Embu and Thika. Local cv. Mwezi Moja performed well at Katumani. A statistically significant interaction was observed between cropping system and cv. at the 3 locations. Protein contents showed significant location, cv., cropping system, and location x cv. effects. These effects were not significant for oil content. Bean/maize crops scored lower in disease symptoms than monocrops. The germplasm collection was expanded to 995 accessions. Crosses were made to improve halo blight (Pseudomonas phaseolicola) resistance of local material. A sublethal combination of 2 dominant factors caused severe stunting, leaf curling, and necrosis in F_1, F_2, and backcross generations of GLP-12 x GLP-3. (CIAT)

0935

* KENYA. MINISTRY OF AGRICULTURE. 1978. Grain Legume Project. Progress report May, 1975-July, 1977. Thika, National Horticultural Research Station. 27p.

A report of the 1975-77 research activities carried out by the National Horticultural Research Station in Thika (Kenya) is presented. A section is reserved to summarize the main results of the project's 1st phase which covered the agronomy, breeding, quality, yield, and plant protection programs. The main purpose of the project 2nd phase was to contribute to

the improvement of the food bean production in Kenya. Personnel situation, main results of the research programs, cooperation with other institutions, and suggestions for future research priorities are described. The extent of the nematode problem in beans is also analyzed. Reports prepared by the project during 1975-77 are listed. (CIAT)

0936

* KENYA. MINISTRY OF AGRICULTURE. 1978. Long term (5-years). Research Programme Grain Legume Project. In _____. Grain Legume Project. Progress report May, 1975-July, 1977. Thika, National Horticultural Research Station. 6p.

Results of research carried out for 5 yr by the Grain Legume Project in Thika, Kenya, are briefly analyzed. In beans, trials were conducted on planting density and time, P and K fertilization, weed control methods, intercropping, expansion and evaluation of germplasm collection, breeding for disease resistance and for combination of desirable characters, cv. testing, multiplication of promising material, and economic evaluation of diseases and pests and their control. (CIAT)

0937

* KENYA. MINISTRY OF AGRICULTURE. 1978. Nematodes in beans. In _____. Grain Legume Project. Progress report May, 1975-July, 1977. Thika, National Horticultural Research Station. 3p.

The extent of the nematode problem in Kenya is briefly assessed in order to establish the collaborative responsibilities of the Grain Legume Project (GLP). Reported bean yield reductions vary from 50 to 100%; however, a representative damage % for Kenya is not known. Control measures such as nematicides, sources of resistance/tolerance, and crop rotation are briefly mentioned. The possibility of a joint program between the Kenyan Agricultural Research Institute (KARI) and the Grain Legume Project, with Swedish assistance, is stated. (CIAT)

0938

KENYA. MINISTRY OF AGRICULTURE. 1978. Report of research results of National Grain Research Programme 1977/78. ARI, Ilonga.

0939

KENYA. MINISTRY OF AGRICULTURE. 1977. Grain Legume Project. Thika, National Horticultural Research Station. Interim Report no.11.

0940

KENYA. MINISTRY OF AGRICULTURE. 1976. Grain Legume Project. Thika, National Horticultural Research Station. Interim Report no.10.

0941

* KENYA. MINISTRY OF AGRICULTURE. 1975. Bean production. Bean Research Project. Thika, Crop Advisory Leaflet no.2. 5p.

Recommendations are given on bean cultivation in Kenya and include the following aspects: locations; cv.; land preparation; planting time, depth, and density; amount of seed and seed treatment; fertilizers; weed and disease control; harvesting; threshing; and marketing. Large-scale production costs of Mexican 142 beans are compared (in table form) with those of wheat in marginal wheat areas. (CIAT)

0942

* KENYA. MINISTRY OF AGRICULTURE. 1970. Bean Research Project. Advisory leaflet for growing Mexican 142 beans. Thika. 2p.

Recommendations are given on the cultivation of Mexican 142 beans in Kenya and include the following aspects: locations; land preparation; planting time, density, and depth; amount of seed and seed treatment; fertilizers; weed control; pests and diseases; harvesting; threshing; marketing; and yield. (CIAT)

0943

KULKARNI, H.Y. 1972. Survey of viruses affecting East African major food crops. Thesis. Kenya, University of Nairobi. 105p.

0944

LE PELLEY, R.H. 1959. Agricultural insects of East Africa. Nairobi, East African High Commission. 307p.

0945

* LIMA, C.P.F. DE 1976. Beans. Bean aphid. Aphis fabae Scopoli (Hemiptera: Aphididae). In _____. A guide to the biology and control of the pests of field crops and stored produce in Kenya. Kenya, Ministry of Agriculture. National Agricultural Laboratories. 2p. (I.B.1.1.).

Symptoms of attack, pest status, life history, natural enemies, alternative hosts, and control of the bean aphid (Aphis fabae) are briefly described. A list of insecticides with dosages and spraying times to control the pest is included. (CIAT)

0946

* LIMA, C.P.F. DE 1976. Beans. Bean fly. Melanagromyza phaseoli (Tryon) (Diptera:Agromyzidae). In _____. A guide to the biology and control of the pests of field crops and stored produce in Kenya. Kenya, Ministry of Agriculture. National Agricultural Laboratories. 2p. (I.B.1.2.).

Symptoms of attack, life history, natural enemies, alternative hosts, cultural and chemical control of the bean fly (Ophiomyia [Melanagromyza] phaseoli) are briefly described. A list of insecticides and dosages to control the bean fly is presented. (CIAT)

0947

* LIMA, C.P.F. DE 1976. Dried bean beetle. Acanthoscelides obtectus (Say) (Coleoptera:Bruchidae). In _____. A guide to the biology and control of the pests of field crops and stored produce in Kenya. Kenya, Ministry of Agriculture. National Agricultural Laboratories. p.II:5.

Symptoms of attack, pest status, biology, and life history of the bean bruchid (Acanthoscelides obtectus) are briefly described. Treatment with 0.1% lindane at 100 g/90 kg beans is recommended. (CIAT)

0948

McFARLANE, J.A. 1967. Bean bruchid research, Nov. 1965-Nov. 1967. Nairobi, Kenya, National Agricultural Laboratories. Entomology Section.

0949

* MAGOYA, J.K.; RHEENEN, H.A. VAN; PERE, W.M. 198? Don't let weevils spoil your beans. Thika, Kenya, National Horticultural Research Station. 3p.

A simple method to control bruchids (Acanthoscelides obtectus) is briefly described. Stored beans will receive good protection if treated with only 2 cm^3 sunflower oil/kg of seed. Bruchid control with malathion or ashes is mentioned. (CIAT)

0950

* MASUMBA, B.A.N. 1984. Physiological measurements for ranking bean cultivars with respect to relative drought and heat resistance. [Abstract] Symposium on Dryland Farming Research: the Kenyan Experience, Nairobi, Kenya, 1983. Phaseolus Beans Newsletter for Eastern Africa no. 2:43-44.

Stomatal conductance, transpiration rate, leaf water potential, and leaf-air temp. differential in Tepary bean and in Pinto and Mwezi Moja beans during the reproductive growth period from early flowering to pod filling were studied at Kiboko National Range Research Station, Kenya. Three levels of irrigation were established using a sprinkler line source. Application totalled 169, 266 and 348 mm during the growing season. These figures include actual rainfall of 138 mm + variable amounts of irrigation applied weekly through the measurement period. Measurements of the specified parameters were made at 7-day intervals, 1 day preceding each irrigation. Measurements were carried out over a 5-wk. period, and all were made between 1100 and 1400 h. At all irrigation levels Tepary bean produced the highest grain yield; Mwezi Moja bean had a lower yield and Pinto bean the lowest. The measurements, through comparison with actual yields, were used as indicators of relative drought and heat resistance of the 3 cv. Stomatal conductance and transpiration rate can be used as indicators of relative resistance, but only when the measurements from different cv. differ considerably as was the case for Tepary bean, but not Pinto and Mwezi Moja beans. Leaf water potential was not found to be a useful indicator for the cv. studied. Although the comparative leaf-air temp. differentials did occur in the same order as grain yields, the differences between cv. were too small to serve as an index of drought and heat resistance. (AS)

0951

* MUGAH, J.O.; LENGA, F.K.; STEWART, J.I. 1984. Lysimeter measurements of bean water requirements versus estimates based on climatic parameters. [Abstract]. Symposium on Dryland Farming Research: the Kenyan Experience, Nairobi, Kenya, 1983. Phaseolus Beans Newsletter for Eastern Africa no.2:43.

Water requirements, ETm, of Mwezi Moja bean averaged over successive 10-day intervals from planting to harvesting were calculated from 3 predictive formulae: the modified Penman formula, the radiation formula, and the pan evaporation formula. The capability of each of the 3 formulae in estimating ETm was examined by using ETm determined from lysimetric measurements as a check. The 3 predictive formulae all approximated the lysimetric method reasonably closely, with the pan evaporation formula coming closest. The ETm for the season was 407, 379, 358, and 362 mm, resp., as determined by the Penman, radiation, pan evaporation, and lysimetric methods. (AS)

0952

* MUIGAI, S.G.S.; NJUGUNA, S.K.; MUKUNYA, D.M.; NGUGI, D.N. 1983. Current bean research programme in Kenya. Thika, Kenya, National Horticultural Research Station. 19p.
Paper presented at the Workshop to Develop a Collaborative Project for Bean Research in Eastern Africa, Cali, Colombia, 1983.

The current situation of the bean research program in Kenya is reported. Its main objective is to increase protein production and consumption through improvement of Phaseolus vulgaris, Vigna unguiculata, and Cajanus cajan. Research objectives for beans are analyzed in detail for the areas of: agronomy; soil fertility; symbiotic dinitrogen fixation; farming systems economy and extension; resistance to drought, diseases [BCMV, anthracnose (Colletotrichum lindemuthianum), halo blight (Pseudomonas phaseolicola), angular leaf spot (Isariopsis griseola), and rust (Uromyces phaseoli)]; the bean fly (Ophiomyia phaseoli); production of disease-free seed and seed treatments. Future outlook on bean research in Kenya includes: (1) continuation of research activities to provide recommendations for the small farmer; (2) breeding and selection programs; (3) assistance from collaborators in Bean/Cowpea Collaborative Research Support Program; (4) obtainment of improved lines in collaboration with CIAT and other bean research organizations; and (5) training of local scientists. (CIAT)

0953

MUKUNYA, D.M.; GATHURU, E.M.; ITULYUA, P.M.; COULSON, C.L. 1982. Improvement of beans in semi-arid regions of Kenya. Kenya, University of Nairobi. 153p.

0954

MUKUNYA, D.M., ed. 1980. Plant Protection Programme; third report, 1980. Kenya, University of Nairobi.

0955

MUKUNYA, D.M.; KEYA, S.O. 1979. The influence of seed-borne anthracnose and halo blight inocula on yield and disease development in a Canadian Wonder bean selection at Kabete. Kenya, University of Nairobi.
Paper presented at Symposium on Grain Legume Improvement in Eastern Africa, Nairobi, Kenya, 1979.

0956

MUKUNYA, D.M. 1975. Development of disease resistance to bean anthracnose and other bean diseases of economic importance in Kenya. Kenya, University of Nairobi. 11p.

0957

MUKUNYA, D.M. 1975. Second progress report on bean research project to the Deans' Committee. Kenya, University of Nairobi.

0958

* NADAR, H.M.; FAUGHT, W.A. 1984. Effect of legumes on the yields of associated and subsequent maize in intercropping and rotation systems without nitrogen fertilizer. [Abstract] Symposium on Dryland Farming Research: the Kenyan Experience, Nairobi, Kenya, 1983. Phaseolus Beans Newsletter for Eastern Africa no.2:50-51.

The possibility of using the grain legumes, beans, cowpeas, tepary beans, and pigeon peas in either rotation or intercrop systems with maize, as alternatives to commercial N fertilizers, was studied. Sixteen maize-legume cropping systems were compared with continuous sole-crop maize and with each other on a typical Oxic Paleustalf soil in Machakos District (Kenya). Results from the long rains of 1982 were generally influenced by the late start and early end of the rainy season, resulting in intercrop maize yields lower than that of continuous sole crop of maize. Yields of maize following cowpeas and beans were significantly higher than that of continuous sole crop. Legume contributions to the rotation systems were estimated to be equal to 12.5 kg N/ha for cowpeas and 80 kg N/ha for beans. If there was any beneficial effect to the associated legumes in the intercropping systems, it was confounded by the rainfall conditions. When rainfall conditions were more favorable during the short rains of 1982/83, LERs and gross values of all cropping systems were higher than those of continuous sole crop of maize, except in the case of sole crop of beans, which was 4% lower. Legume contributions to sole crop rotation systems were found to average between 8 kg N/ha for tepary beans and 44 kg N/ha for beans. In the intercrop systems, pigeon peas were the highest contributors (15 kg N/ha). The legumes studied have a favorable effect on yields and returns of both associated and subsequent maize under favorable rainfall conditions. Under less-than-adequate rainfall, the beneficial effect of legumes can only be observed in the sole crop maize-legume rotation systems. To improve maize production as well as total crop production under the rainfall conditions of the study area, it is recommended to use a maize-bean sole crop rotation system. This system was found, under the exptl. conditions, to increase maize yields by 98% and total 3-season gross returns by 102% without N fertilizer application. (AS)

0959

* NADAR, H.M. 1984. Effect of relay planting on maize yield as influenced by cropping systems, row spacings, and populations. [Abstract] Symposium on Dryland Farming Research: the Kenyan Experience, Nairobi, Kenya, 1983. Phaseolus Beans Newsletter for Eastern Africa no.2:46-47.

The maize yield response to relay planting and conventional planting as affected by population, row spacings, and cropping systems was studied during the long rains of 1978 on a typical Oxic Paleustalf soil, Machakos area, Kenya. Results indicated that maize response to planting methods was influenced by row spacing and cropping systems. While yields of relay planted crops were lower than those of conventionally planted crops in the sole crop systems, they were mostly higher in the intercrop systems. Under both planting systems, row spacing, as did population, had significant effect on maize yields with 75-cm row spacings producing the highest yields. Although intercropping beans with maize caused a decrease in maize yields, total yields were generally higher. On the av., the yield reduction caused by relay-planting was minimal (4%) as compared with the yield reduction which might be caused by delaying planting until after harvest of the short rains crops. Relay planting can be considered a feasible agronomic practice to be employed to meet the recommended planting dates, when the previous season's crop is not yet ready for harvest. If the previous season's crop is already harvested, before the recommended planting date, conventional planting would be expected to result in higher yields. Studies on planting dates for the long rains season are needed to quantify the relative advantages of the 2 planting methods. (AS)

0960

* NADAR, H.M. 1984. Intercropping and intercrop component interactions under varying rainfall conditions in Eastern Kenya: 1. Maize/bean intercrop.

[Abstract] Symposium on Dryland Farming Research: the Kenyan Experience, Nairobi, Kenya, 1983. Phaseolus Beans Newsletter for Eastern Africa no.2: 49-50.

The performance of both maize and beans in sole crop and intercrop systems at different populations, spatial arrangements, and fertility levels as influenced by the varying rainfall conditions prevalent in the Katumani area, Kenya, was studied during the short rains season of 1978/79. Results indicate that the rate of intracrop competition was much higher than that of intercrop. Increasing the population by intercropping resulted in competition levels 10% lower than that caused by higher maize populations. Intercropping in the same row was superior to intercropping in alternate rows, perhaps due to better spatial arrangements or to the proximity of the maize and beans roots in the same-row arrangement which resulted in the maize plants benefiting from the N fixed by the beans. It was possible to detect this beneficial effect which was found to be positively correlated to the proximity of the roots of the 2 intercrop components to each other. LER of intercrop expt. under adequate rainfall conditions were always more than unity, which indicated the superiority of intercropping under those conditions. On the other hand, under drought conditions LER values were lower than unity, probably because of the competition between the intercrop components for the available moisture. Because of the maize/bean price relationship, the intercrop would be more economical than sole crop of maize under drought condition, while sole crop of beans would be more economical than either sole crop of maize or maize/bean intercrop. It was also found that within a certain range of population levels bean plants do not significantly respond to changes in population and can counteract the change in population by an opposite change in the no. of pods produced per plant. This keeps the potential bean yields at relatively constant values if no other environmental factors are limiting. Results clearly indicate that under unpredictable rainfall conditions, as in the Machakos area, maize and bean intercropping would not be the best practice. It would be to the farmers' advantage to grow maize and beans as sole crops. (AS)

0961

NATTRASS, R.M. 1961. Host lists of Kenya fungi and bacteria. Kew, England, Commonwealth Mycological Institute. Mycological Papers no.81.

0962

OCHETIM, S.; BOGERE, C. 1983. Trypsin inhibitors and phytohaemagglutinin activities in raw and autoclaved beans and peas consumed in Kenya. East African Agricultural and Forestry Journal 44(4):352-354.

0963

OLUOCH, P.O.; GASTEL, A.J.G. VAN 1981. Dry beans 1980: report on the national performance trials. Thika, Kenya, National Horticultural Research Station. Grain Legume Project. External Report no.61. 52p.

The data collected in the trials conducted over the long rains of 1980 and the short rains of 1980-81 in Kenya are presented. Six sites representing major bean growing areas (Lanet, Thika, Embu, Kakamega, Kisii, and Katumani) were selected. These sites represent areas of medium, high, and marginal agricultural potentials. Technical data are included for 11 potential var. tested (S.T. 33, S.T. 49, S.T. 92, S.T. 102, S.T. 302, F.S. 23, F.S. 44, F.S. 176, F.S. 438, F.S. 442, and F.S. 520) and for the

standard var. GLP 2, GLP 24, and GLP 1004. A split plot design with 4 replications was used in both expt. General remarks on the sites are presented. Plant characters such as vegetative vigor, days to 50% flowering, days to maturity, diseases, pod clearance, pods/plant, no. of seeds/pod, plant count, seed yield, hundred-seed wt., and % of CP and crude oil are discussed and are given in table form for the different areas and var. tested. (CIAT)

0964

* OLUOCH, P.O.; GASTEL, A.J.G. VAN; MORRENHOF, J. 1980. Dry beans: morphological descriptions. Nakuru, Kenya, National Seed Quality Control Service. 21p.

The characteristics and scales used by the National Seed Quality Control Service in Kenya to give a morphological description of different bean var. are listed. A description is included for var. ST 33, ST 49, ST 102, ST 352, FS 23, FS 44, FS 176, FS 438, FS 442, FS 520, GLP x 92, GLP 24, GLP 2, and GLP 1004 for the following parameters: (1) plant — growth type, density of foliage, central leaflet size, leaf color, flower color, days to 50% flowering; (2) pod — length, degree of curvature, tip, length and shape of beak, constrictions, ground color, and degree of mottling; (3) seed — size, shape, color, and color of corona. A diagram is also presented in which the var. are schematically arranged according to some of the most conclusive characters. (CIAT)

0965

* OMUNYIN, M.E.; STOETZER, H.A.I.; KIMAMIRA, J.N. 1984. Field infection of beans with bean rust. Bean Improvement Cooperative. Annual Report 27:94-95. [Grain Legume Project, National Horticultural Research Station, P.O. Box 220, Thika, Kenya]

Bean cv. Nirda, Cesar, R-225, Morgane, Morbel, Aiguillon, Belna, Vernadon, Royalnel, and Garonel were screened for resistance or tolerance to rust (Uromyces appendiculatus) under field conditions at the National Horticultural Research Station in Thika, Kenya. These cv. along with the cv. Monel, GLP-24, and GLP-69 as standards were tested using spreader rows during the long rains of 1983. A 0-5 scale (0 = no visible symptoms; 5 = large pustules) and % of plants killed were used as evaluation parameters. All cv. were heavily attacked by rust at the secondary leaf stage, followed by wilting and eventually death. This implies the absence of seedling stage resistance. (CIAT)

0966

ONDIEKI, J.J. 1973. Host lists of Kenya fungi and bacteria (a ten-year supplement 1961-1970). East African Agricultural and Forestry Journal (Special issue) 38.

0967

* ONIM, J.F.M. 1983. Mutation breeding for disease resistance in food beans and cowpea in Kenya. In Research Co-ordination Meeting on the Induced Mutations for Disease Resistance in Crop Plants, 2nd., Denmark, 1981. Proceedings. Vienna, FAO/IAEA Division of Isotope and Radiation Applications of Atomic Energy for Food and Agricultural Development. pp.193-199. [Dept. of Crop Science, Univ. of Nairobi, Nairobi, Kenya]

Ionizing radiation was used to obtain more disease-resistant variants of bean, cowpea, and pigeon pea. Seed from M_1 bean plants of cv. Canadian Wonder was bulk harvested and the M_2 generation was planted at the

U. Farm at Kabete, Kenya. At flowering, the control and exptl. M_2 material were compared to establish frequencies of variants for certain characters such as flower color, dark-green leaves, and growth habit. In M_2 populations large genetic variation for morphological and physiological characters was observed as well as differences in resistance to anthracnose (Colletotrichum lindemuthianum), angular leaf spot (Phaeisariopsis griseola), and rust (Uromyces appendiculatus). Plants with purple stems and pods seem to have a good level of general disease resistance. Association between these characters and disease resistance will be tested again in the M_3 and M_4 generations. The no. of mutants in cowpea was smaller than in bean. (CIAT)

0968

PATHAK, R.S. 1979. The mutation breeding programme in grain legumes in Kenya. In Research Co-ordination Meeting on the Induced Mutation for Improvement of Grain Legume Production, Bangi, Africa, 1979. Vienna, International Atomic Energy Agency. pp.105-108.

0969

* RHEENEN, H.A. VAN; MUIGAI, S.G.S. 1984. Improvement of field beans by backcross breeding. Bean Improvement Cooperative. Annual Report 27:127-128. [Grain Legume Project, National Horticultural Research Station, P.O. Box 220, Thika, Kenya]

A backcross program, carried out in Thika, Kenya, with the assistance of the Research Institute for Plant Protection (Wageningen, Netherlands), uses an indeterminate pinto cv., GLP-X.92, as the recurrent parent, which is also resistant to halo blight (Pseudomonas phaseolicola), susceptible to BCMV and anthracnose (Colletotrichum lindemuthianum), and with intermediate resistance to rust (Uromyces phaseoli) and angular leaf spot (Isariopsis griseola). The donor parent is a determinate Mwezi Moja cv., GLP-X.1127, resistant to BCMV and anthracnose, and with intermediate resistance to rust, angular leaf spot, and halo blight. The backcross breeding scheme for the transfer of resistance to BCMV and anthracnose, and the character of determinate growth habit from GLP-X.1127 to GLP-X.92 is presented. Up-to-date crossing and segregation data are included. (CIAT)

0970

* RHEENEN, H.A. VAN; MUIGAI, S.G.S. 1984. Improvement of field beans by diversified bulk population breeding. Bean Improvement Cooperative. Annual Report 27:129-130. [Grain Legume Project, National Horticultural Research Station, P.O. Box 220, Thika, Kenya]

A diversified bulk population breeding program was carried out at the National Horticultural Research Station in Thika (Kenya), to cater for the variation in ecological conditions under which beans are grown and to develop a widely adapted bean var. Crosses were made between 17 breeding lines with resistance to BCMV and anthracnose (Colletotrichum lindemuthianum), and GLP-X.92, a local Mwitemania type or pinto bean with resistance to halo blight (Pseudomonas phaseolicola). F_1 was grown at Thika and seed lots were split over Kisii and Kakamega to obtain F_2; lots from F_2 plots were divided over 5 stations: Katumani, Thika, Embu, Kisii, and Kakamega. F_3 and F_4 were handled similarly. Seeds selected from F_4 were evaluated for drought stress, poor soil fertility, rust (Uromyces phaseoli) and angular leaf spot (Isariopsis griseola) infestations. The F_6 plants grown from the selected F_5's are expected to have resistance to BCMV, halo blight, anthracnose, rust, angular leaf spot, and other common diseases, and adaptation to drought and low fertility conditions. (CIAT)

0971

* RHEENEN, H.A. VAN 1984. Longevity of bean seed under different storage conditions. Bean Improvement Cooperative. Annual Report 27:83-84. [Grain Legume Project, National Horticultural Research Station, P.O. Box 220, Thika, Kenya]

An expt. was conducted at Thika, Kenya, to study the effect of different storage conditions on the longevity of seed of 6 Phaseolus vulgaris var. (GLP-3, GLP-8, GLP-21, GLP-22, GLP-238, and GLP-276). Seeds were kept for 8 yr under 3 storage conditions: (a) in paper bags in a room; (b) as (a), but the paper bags together with silica gel in a sealed plastic container; and (c) as (b), but in a refrigerator at about 5°C. Seed MC were determined and germination tests were conducted at different time intervals. Monthly means for max. and min. temp., and RH were recorded over 5 yr. It was noted that seed discoloration increased from (c) to (b) to (a), and (c) germinated more rapidly than (b). It was concluded that seeds exposed to room conditions remained viable for about 3 yr and that seeds stored in containers with silica gel kept in a room or refrigerator presented longevities of over 8 yr. (CIAT)

0972

* RHEENEN, H.A. VAN 1983. Progress Report no. 89 - September 1983. Thika, Kenya, National Horticultural Research Station. Grain Legume Project. 5p.

A general report is given of the situation at the National Horticultural Research Station, Thika, Kenya, where a grain legume project has been undertaken. The personnel involved in the project are named and both exptl. work and visits that were paid to and by the project are noted. In addition, published works and the allocation and expenditure of money are listed. Among the miscellaneous items is a description of the Second Tanzania/Collaborative Research Support Programme Bean Workshop, which was organized by the Dept. of Crop Science at the U. of Dar es Salaam, Morogoro, Tanzania. (CIAT)

0973

* RHEENEN, H.A. VAN; OMUNYIN, M.E.; MUIGAI, S.G.S. 1981. The leather leaf character of beans (Phaseolus vulgaris L.). Its inheritance and effect on hail damage. Thika, Kenya, National Horticultural Research Station. Grain Legume Project. 7p.

Dark green plants with shiny, thick, and wrinkled leaves were found in a field planted to bean var. GLP-2 at Mwea, Kenya, during 1978. The character, likely the result of a mutation, is controlled by 1 recessive gene and provides a measure of resistance to hail. It is proposed to assign the symbol ll to this leather leaf character. Its possible use in breeding programs is discussed. (AS)

0974

SCHMIDT, G. 1979. Maize and beans marketing in Kenya: the interaction and effectiveness of informal and formal marketing systems. Kenya, University of Nairobi, Institute for Development Studies. Occasional Paper no.31. 181p.

The functioning of the Kenyan domestic maize and beans marketing system is analyzed with special regard to the interaction of the formal and informal subsystems. The outcome suggests that the objectives of controls are not achieved and that the present controls contribute to marketing

inefficiency. It is therefore recommended that the controls be relaxed. (RTI)

0975

SCHMIDT, H.; SWOBODA, R. 1979. Labour requirement/availability and economics of mechanization. In Farm management handbook of Kenya. Vol.1.

0976

SEMU, E.; MSUMALI, G.P.; CHOWDHURY, M.S. 1982. Nodulation and yields of beans as affected by seed inoculation and nitrogen application. In Qureshi, J.N., ed. Soil management under intensive cultivation. Kenya, Soil Science Society of East Africa. pp.56-55.

0977

SIDERIUS, W.; MUCHENA, F.N. 1977. Soils and environmental conditions of agricultural research stations in Kenya. Nairobi. Miscellaneous Soil Paper. Kenya Soil Survey no.5. 132p.

0978

SMIT, J.J. 1984. CIAT proposes a regional project to increase bean production and consumption in Eastern Africa. Phaseolus Beans Newsletter for Eastern Africa no.2:28-37. [Grain Legume Project, National Horticultural Research Station, P.O. Box 220, Thika, Kenya]

Delegates and observers from several countries of East Africa met in Nov. 1983 at the CIAT headquarters in Cali, Colombia, to discuss a new bean proposal for a regional project to increase bean production and consumption, and to strengthen national bean research in the CDA countries (Consortium for Development in Africa) of Eastern Africa. These nations would sponsor the project, which could be executed by CIAT, primarily in Kenya, Uganda, Ethiopia, and Somalia. The project's objectives also include collaboration with established national programs with more relevant experience obtained recently or in the past, and with other bean projects such as Swiss-funded projects, the International Board for Plant Genetic Resources, FAO's Nitrogen Fixation Program (Rwanda and Burundi), the EEC-funded project in Uganda, and the Coordinate African Crops Development Programs of FAO. As proposed development strategies and operational methods, the CDA/CIAT Regional Project will seek to achieve its objectives through 3 main interrelated strategies: (1) introduction into national programs and distribution of improved germplasm from different sources and active crossbreeding and selection programs involving African bean var., (2) improvement of cropping systems in national programs by introducing improved var. to the farmers, and (3) development of research capacity in national programs through CIAT training programs. Other aspects of the project such as staffing, base locations, and project duration are also discussed. (CIAT)

0979

* SMIT, J.J.; STOETZER, H.A.I.; OMUNYIN, M.E. 1984. Improvement of bean production in Kenya. [Abstract] Tanzania Bean Workshop, 2nd., Morogoro, Tanzania, 1983. Phaseolus Beans Newsletter for Eastern Africa no.2:18-21.

0980

* SMIT, J.J.; STOETZER, H.A.I.; OMUNYIN, M.E. 1983. Improvement of dry bean production in Kenya. Thika, Kenya, National Horticultural Research Station. Grain Legume Project. 19p.
Paper presented at the Tanzania/CRSP Bean Workshop, 2nd., Morogoro, 1983.

Since 1971 the Kenyan Ministry of Agriculture, with financial and expert assistance from the Netherlands' Government, has operated a Grain Legume Project which coordinates most of the national bean research and aims at improving both the yield and the quality of Kenyan dry beans. Research has been carried out on fertilizers, symbiotic dinitrogen fixation, drought resistance, pests, and diseases. The latter problem, a major constraint in Kenyan bean production, is being overcome through breeding for resistance to 5 major diseases, namely, BCMV, halo blight (Pseudomonas phaseolicola), anthracnose (Colletotrichum lindemuthianum), rust (Uromyces phaseoli) and angular leaf spot (Isariopsis griseola), and through the production of disease-free seed and seed dressings. (CIAT)

0981

SSALI, H.; KEYA, S.O. 1983. The effect of phosphorus on nodulation, growth and dinitrogen fixation by beans. Biological Agriculture and Horticulture 1(2):135-144.

0982

* SSALI, H.; KEYA, S.O.; BALASUNDARAM, V.R. 1981. Influence of phosphorus application rates and placement on the nodulation, growth and yield of beans and soybeans grown at two nitrogen levels. Kenya Journal of Science and Technology 2(2):91-98. [Dept. of Soil Science, Univ. of Nairobi, P.O. Box 30197, Nairobi, Kenya]

An expt. was initiated to study the influence of P fertilizer application rates and placement into the soil (banding vs. broadcasting) on nodulation, P content of plant tissue, DM, and seed yield of beans and soybeans grown at 2 N levels on a Kikuyu red loam soil (Nitosol) in Kabete, Kenya. P treatments were: 50 kg/ha broadcast (P_1); 50 kg P/ha banded and covered with soil below the seed (P_2); 100 kg P/ha (P_3); 200 kg P/ha (P_4); 400 kg/ha (P_5). For treatments P_3, P_4 and P_5, 50 kg P/ha were banded as for P_2 and the rest broadcast. The 2 N levels were 0 kg/ha (N_1) and 100 kg/ha (N_2) as urea, in 2 split applications (50 kg N/ha) at planting and the rest at flowering. Both soybean and bean seeds were inoculated with their resp. effective rhizobia. First season results indicated virtually no response to applied N and no significant differences between banding and broadcasting P at the lowest rate used. There was a better response to P rate by both legumes where no N was applied. Bean nodule wt. and no. decreased at flowering. The residual effects of applied P are being studied in subsequent expt. (AS)

0983

* STEWART, J.I.; KASHASHA, D.A.R. 1984. Rainfall criteria to enable response farming through crop-based climate analysis. [Abstract] Symposium on Dryland Farming Research: the Kenyan Experience, Nairobi, Kenya, 1983. Phaseolus Beans Newsletter for Eastern Africa no.2:41-43.

Response farming, a concept developed in 1980 for the semiarid areas of Kenya, is based on the finding that expected effective rainfall for crop production is correlated with date of onset of the rains, and still more closely with early season rainfall. Expt. station trials to determine

optimal fertilizer rates and plant populations for 3 categories of rainfall season (good, fair, and poor) have been carried out. Farm trials, with operations carried out by the owners, taken place for 4 seasons. Both station and farm trials have verified the efficacy of the method in terms of more stable and improved crop yields. Meanwhile, the existence of the essential correlations has been firmly established on a sound statistical basis through extension of the analysis to 9 additional locations, encompassing an area of 13,000 km^2 in Machakos, Kitui, and Kajiado Districts. Five of these have much longer rainfall records, up to 55 yr or 110 seasons. Eight of the newly analyzed locations are drier than Katumani, and in some of these the high risk is presently thought to preclude maize production. The newly analyzed locations, some in close proximity and some isolated, show major differences in some cases, and considerable likeness in others. This has improved the understanding of distances over which a given set of rainfall criteria prevail. A potentially important finding is that onset windows are definable for any given crop for each location for one or both of the 2 rainfall seasons. (AS)

0984

* STEWART, J.I.; FAUGHT, W.A. 1984. Response farming of maize and beans at Katumani, Machakos District, Kenya: recommendations, yield expectations and economic benefits. [Abstract] Symposium on Dryland Farming Research: the Kenyan Experience, Nairobi, Kenya, 1983. Phaseolus Beans Newsletter for Eastern Africa no.2:44-46.

A simplified crop specific rainfall analysis based on gross rainfall has been developed, with the capability of correctly predicting 5 of 6 rainfall seasons as good, fair, or poor, in time to respond with field adjustments of plant populations and N fertilizer rates, found in research to be optimal for the expected range of rainfall. The new analysis does not require extensive additional research on crop water utilization and consequent yield response, yet provides valid farm level guidance. New crop water production functions, introduced for a maize/bean cropping system under 3 levels of farm management, incorporate research-based recommendations matching plant populations and fertilizer rates to effective rainfall expectations, which are required for absolute value predictions of yield, and for economic analyses of expected costs and returns. The new production functions are based on rigorous field research at both the expt. station and farm levels. The highest level of farm management was as productive as plots on expt. stations, although few farmers in the project area commanded the needed resources to farm at this level. The study for Katumani indicates that response farming is capable of satisfying the research program priority of yield stabilization, with particular regard to maize since beans require less water and seldom fail. Whereas 28 of the past 54 seasons should have produced maize yields from zero (8 seasons) on up to 80 kg/ha (20) meaning essential failure in half of all seasons under conventional management, response farming with medium level management could reduce this to 1 failure in 7 seasons, and with high level management, to 1 failure in 9 seasons. As to yield enhancement, the other principal program priority, response farming with medium management could boost maize and bean yields, resp., to 2.9 and 1.3 times the conventional level, while high level management should produce 5.7 and 2.2 times as much as conventional. Economic analysis indicated that the incremental costs of the above medium and high level management procedures averaged 144 and 669 Ksh/ha, resp., with corresponding incremental net returns of 602 and 1480 Ksh/ha, thus rates of return of 418% for medium level management and 221% for the high level. The much increased yields and high rates of return suggested from response farming make it appear desirable, both from the standpoint of national food supplies and farmers' welfare, to move toward adoption of the recommended practices as rapidly as

possible. Considering the ...

Guidelines to controlling plant diseases by field management techniques and/or chemicals are given. Several general principles and methods of disease control are highlighted. The following disease control practices are briefly analyzed: use of disease-free planting material, crop rotation, field sanitation, seed treatment, chemical control, and use of resistant or tolerant cv. (CIAT)

0991

* STOETZER, H.A.I.; RHEENEN, H.A. VAN; OMUNYIN, M.E. 1983. Resistance of dry beans (Phaseolus vulgaris) to diseases prevalent in semi-arid areas of Kenya. Thika, Kenya, National Horticultural Research Station. Grain Legume Project. 4p.
Paper presented at the Biennial Conference of the Bean Improvement Cooperative, Minneapolis, Minnesota, 1983.

The Grain Legume Project carried out trials on the tolerance of beans to diseases occurring in the semiarid zones of Kenya at the National Dryland Farming Research Station, Katumani, Nairobi, during 14 bean seasons during 7 consecutive years. Although av. disease scores and general rainfall characteristics were noted for the 1st 2 mo. of each season, the total amount of rainfall and its distribution within the season were very variable. Diseases reported were: halo blight (Pseudomonas phaseolicola), common blight (Xanthomonas campestris pv. phaseoli), anthracnose (Colletotrichum lindemuthianum), black node disease (Phoma exigua var. diversispora), scab (Elsinoe phaseoli), angular leaf spot (Phaeoisariopsis griseola), and rust (Uromyces appendiculatus). The incidence of these diseases and resistant var. were recorded. Observations showed that although predictions of outbreaks for any particular disease were difficult to make, there were lower disease incidences for nearly all the bean diseases in the drier seasons. (CIAT)

0992

* STOETZER, H.A.I.; ODHIAMBO, G.W.; RHEENEN, H.A. VAN 1983. A virulent strain of Pseudomonas syringae pv. phaseolicola from Kisii, Kenya. Thika, Kenya, National Horticultural Research Station. Grain Legume Project. 2p.
Paper presented at the Biennial Conference of the Bean Improvement Cooperative, Minneapolis, Minnesota, 1983.

Since 1975 the Grain Legume Project has carried out trials at the Nyanza Agricultural Research Station at Kisii, Kenya. Each season halo blight of beans (Pseudomonas syringae pv. phaseolicola) has been present, sometimes causing complete crop failure. During the long rains of 1981 and 1982 and the short rains of 1982-83 halo blight-resistant germplasm and 3 Kenyan standard cv. were tested under field conditions at the Kisii research station. Results were reasonably consistent over the 3 seasons. Most Great Northern var. were classified as susceptible with the exception of GN Nebraska no. 1 sel. 27 and GN Tara, which were resp. highly resistant and resistant. Other entries categorized as highly resistant were: GLP-X.92, OSU 10183, WIS HBR72, and 79-8625N(HLR). GLP-16, OSU 1604, and PI 150414 were resistant, although the latter 2 were susceptible during the 1981 long rains. (CIAT)

0993

* WAITE, B.H.; NYANGERI, J.B.; RAMOS, A.H.; SONGA, W.; SHAKOOR, A. 1984. Bean seed quality loss in Kenya due to yeast infection (Nematospo coryli) and its effect on yield. [Abstract] Symposium on Dryland Far Research: the Kenyan Experience, Nairobi, Kenya, 1983. Phaseolus Newsletter for Eastern Africa no.2:55.

Seed of common bean var. Mwezi Moja produced in Katumani (Easter Province, Kenya) was found to be infected by the yeast Nematospora coryli. Pathogenicity was confirmed by needle inoculations of cultured yeast cells and transmission by the pod sucking bugs Acanthomia tomentosicollis and Nezara viridula on developing seed pods. Seeds were graded into 3 categories based on severity of external symptoms. Emergence of heavily infected seeds and survival of seedlings was greatly reduced in greenhouse tests. In field trials, severity of seed infection was correlated with poor emergence and reduction in yield/plant. At Katumani, plants grown from the most severely affected seeds produced a proportionately larger no. of poor quality seeds while at National Agricultural Lab., Nairobi, plants grown from severely affected seeds did not produce proportionately larger no. of poor quality seed. This difference could be attributed to higher insect activity at Katumani as compared with that at National Agricultural Lab. Small farmers in Kenya can reduce losses in yield by planting only seeds free of disease symptoms. (AS)

0994

WAITE, B.H.; NYANGERI, J.B.; RAMOS, A.H.; SONGA, W.; SHAKOOR, A. 1982. Bean seed quality loss in Kenya due to yeast infection and its effect on yield.
Paper presented at the International Symposium on Seed Pathology, Copenhagen, Denmark.

0995

ZOEBL, D. 1984. An interview with Kenya's leading bean researcher. Phaseolus Beans Newsletter for Eastern Africa no.2:57-60. [Grain Legume Project, National Horticultural Research Station, P.O. Box 220, Thika, Kenya]

Different aspects of bean production in Kenya were discussed in an interview with Dr. D.M. Mukunya, one of Kenya's leading bean researchers working in the Dept. of Crop Science, U. of Nairobi: acreage and yield, future needs, production in the marginal semiarid regions of Eastern Kenya, constraints for yield improvement, overproduction of beans in the 1982-83 season, and relative contributions of each local institute or program as well as involvement of donor countries and aid programs. (CIAT)

0996

* ZOEBL, D. 1984. Multiplication ratio of beans and its implication for agronomy trials: Kenyan annotations 1. Bean Improvement Cooperative. Annual Report 27:181-182. [Grain Legume Project, National Horticultural Research Station, P.O. Box 220, Thika, Kenya]

The multiplication ratios (total yield of marketable product divided by the planting material wt.) of several important grain crops are given. The multiplication ratio for food beans is about 15 in Kenya for good farmers and only 5 for the av. farmer. The causes of low yield potentials of pulse crops are mentioned and the implication of low multiplication ratio for the analysis of agronomy and density trials is explained. (CIAT)

0997

LESOTHO. AGRICULTURAL RESEARCH DIVISION. 1983. Annual Report-July 1981-June 1982. Maseru, Ministry of Agriculture. 146p.

Field surveys showed that the pests requiring immediate attention were stalk borers on sorghum and maize, noctuids on maize, sorghum, wheat, sunflower, peas, beans, and tomatoes, beetles on beans, and Plutella xylostella L. on cabbage. (CIAT)

LYBIA

0998

AL-RUBEAI, M.A.F.; GODWARD, M.B.E. 1983. Development of primary leaves of Phaseolus vulgaris L. from seeds subjected to acute gamma irradiation. Environmental and Experimental Botany 23(4)197-301. [Dept. of Botany, Garyounis Benghazi Univ., Lybia]

Growth inhibition due to seed exposure to acute doses of gamma radiation was studied on primary leaves of bean cv. Cordon and Masterpiece. Exposures of 10 and 15 krad severely decreased area, fresh and dry wt. at 3 wk. No. of estimated chlorotic spots increased with increasing exposure; however, no other morphological abnormalities were observed. Resultant small spots in higher no. seem to be due to an advanced state of development and comparatively large no. of cells of embryonic leaves at the time of irradiation. Radiation treatments considerably reduce midrib size. Decrease in leaf thickness was inconsistent. (CIAT)

0999
DENARIE, J. 1968. Legume inoculation in Madagascar. Annales Agronomiques 19:473.

1000

* ALLEN, D.J. 1975. Additions to the fungi and plant diseases in Malawi. Society of Malawi Journal 28:35-44.

The annotated checklist of saprophytic macrofungi and plant diseases is based chiefly on material collected in Malawi from Oct. 1973 to May 1974. Root rot (Fusarium solani) in beans is mentioned. (CIAT)

1001

* ALLEN, D.J. 1973. Breeding for stable resistance to rust of beans (Phaseolus vulgaris L.). Lilongwe, Malawi, Bunda College of Agriculture. Research Bulletin no.3. p.33.

Research work carried out by the U. of Cambridge, England, on the identification of bean cv. resistant to rust (Uromyces appendiculatus) is briefly mentioned. Six cv. were selected and used as rust-resistant parents in 10 successful reciprocal crosses with 2 susceptible cv. Field performance was assessed in Malawi. (CIAT)

1002

AYOADE, J.A.; MAKHAMBERA, P.E.; BODZALEKANI, M.Z. 1983. Evaluation of crop residues as feeds for goats. 1. Voluntary intakes, digestibility and nitrogen utilization of groundnut and bean haulms. Suid-Afrikaanse Tydskrif vir Veekunde 13(1):12-13. [Bunda College of Agriculture, Univ. of Malawi, P.O. Box 219, Lilongwe, Malawi]

1003

* BEAN/COWPEA COLLABORATIVE RESEARCH SUPPORT PROGRAM. U.S.A. 1983. Genetic, agronomic and socio-cultural analysis of diversity among bean land-races in Malawi. In _____. 1983. Annual Report. East Lansing, Michigan State University. pp.91-99.
Also in Spanish.

Main objectives of a project on genetic, agronomic, and sociocultural analysis of diversity among bean landraces in Malawi are given: (1) secure baseline data on the proportion of various seed types appearing in farmers' fields in Malawi; (2) assess the frequency of heterozygosity in samples of the Malawian gene-pool; (3) compare hybrids and parents for ability to leave viable progeny in a competitive environment; (4) compare complex mixtures with monotypic var. for yield and yield stability; (5) determine the % of natural crossings; (6) estimate av. genetic distances within and between landraces of beans in Malawi; (7) determine the sociocultural factors that affect the variability in the Malawian gene-pool and which contribute to the acceptability of a specific cv. Training outputs, professional and organizational linkages established, institutional resources that contributed to the project, and constraints to the achievement of objectives are also described. There were 62 different color combinations; however, all sites presented monocolored and variegated seeds. Approx. 20,000 plants from 7 sites have been scored and the % of outcrossing has been estimated at 0-2.5% (uncorrected for differential flower production and non-overlap of flowering period). In addition to seed variability, some collections also showed variability in physiological and phenological parameters. For most of the trials results have not yet been obtained. Future research plans are included. (CIAT)

1004

* BROWN, C.P. 1971. Marketing of food crops in Blantyre, Malawi. African Social Research 12:111-128.

Results are given of a study of the marketing of food crops in and around Greater Blantyre, Malawi. During the dry season of 1969 and the 1969/70 growing season, over 1400 sellers were approached concerning the marketing functions they performed. Two seasonal surveys were used for the analysis of changes in marketing patterns between seasons—over half the respondents were farmers, the balance being primarily retailers. Few middlemen emerged, and few retailers were found in rural markets. Results suggest that the income of farmers selling food crops in Blantyre and rural towns is similar. The daily income of respondent farmers in rural areas was slightly higher than those selling in Blantyre, although they made fewer visits to market/yr. Farmer respondents regularly do some processing, while retailers do not. Retailers do not tend to compete with smallholders in rural markets in the dry season, but predominate in Blantyre itself. Data are presented on distances and routes. The distribution of food production for the Blantyre market is largely explained on economic and social grounds. (AS)

1005

* BUTTERWORTH, M.H.; CHINTSANYA, N.C.C.; PHIRI, K.M.J.; MITENGO-GAMA, P.W.S. 1984. Stall-feeding beef cattle with agricultural by-products in Malawi. Tropical Agriculture (Trinidad) 61(1):25-28. [International Livestock Center for Africa, P.O. Box 5689, Addis Ababa, Ethiopia]

The operation of the stall-feeding scheme for beef production in Malawi is described. Four trials were carried out to determine the effects of various rations of locally available agricultural by-products on the growth rate of cattle. In one of the trials, 12 animals were allocated to groups of 3 on the basis of wt. and breed and the groups received at random one of the following treatments: (1) chopped maize ad libitum + 2 kg bean haulms/head/day; (2) same as in (1) + 2 kg maize hominy feed (madeya); (3) same as (1) + 3.5 kg madeya; (4) as in (3) + 200 g meat-and-bone meal + 60 g bone meal. The trial lasted 110 days. Treatments 2, 3, and 4 were superior to treatment 1. The bean straw used in this trial contained 10.0% CP. The potential of bean haulms as a strategic supplement during the dry season is stressed. (CIAT)

1006

* EDJE, O.T. 1984. Effects of planting patterns on bean yield. Bean Improvement Cooperative. Annual Report 27:147-148. [Bunda College of Agriculture, P.O. Box 219, Lilongwe, Malawi]

Studies were carried out at Bunda College of Agriculture, Lilongwe, Malawi, to evaluate the effects of planting patterns on bean yields. The trial involved 4 determinate cv. (253/1, 1196, P692, and P402) and 3 planting patterns (single row, 2 rows, and hill planting). Seed yield, pooled over cv., was 1741, 1891, and 1727 kg/ha for 1 row, 2 rows, and hill planting, resp. The no. of pods/m^2 for the 3 planting patterns was 101.0, 107.1, and 101.0, resp. (CIAT)

1007

* EDJE, O.T. 1984. Effects of storing bean seeds with bean pod ash and other insecticides. Bean Improvement Cooperative. Annual Report 27:145-147. [Bunda College of Agriculture, P.O. Box 219, Lilongwe, Malawi]

A study was conducted at Bunda College of Agriculture, Lilongwe, Malawi, to compare the effect of storing bean seeds with groundnut oil, sunflower oil, tobacco dust, pirimiphos-methyl, and bean pod ash used as treatments. Four dry bean cv., 253/1 (tan), 336 (red), 499/5 (black), and P692 (speckled red), were used. Seeds were stored in metal tins with 3 kg/tin for a period of 3 mo. There were 3 tins/treatment and each treatment was replicated 3 times, in a randomized complete block design. Data on the no. of insects/kg seed, weevilled seeds (%), and seed germination were collected on 25% of the seed lot. Sunflower oil was the least effective in reducing bruchid attack. The % of unweevilled seeds with bean pod ash was 92 compared with 50 for the control. The germination % of seeds stored in bean pod ash was 88.7 compared with 50.7 and 34.7 for the control and sunflower oil, resp. (CIAT)

1008

* EDJE, O.T. 1984. Effects of trellis height on seed yield and quality of dry beans. Bean Improvement Cooperative. Annual Report 27:142-144. [Bunda College of Agriculture, P.O. Box 219, Lilongwe, Malawi]

A vigorous indeterminate dry bean cv., 499/5, was planted at Bunda College of Agriculture, Lilongwe, Malawi, during the 1982-83 crop season to evaluate the effect of trellis height on seed yield and quality. Trellis treatments were: control (plants trained among themselves on the ridge), and trellis 1, 2, 3, and 4 m tall. Canopy height, DM, LAI, leaf fall, yield and yield components, seed quality and seed germination were determined. Seed quality was assessed visually into 3 groups (high, medium, and low). Seedling evaluation was done according to the rules of International Seed Testing Association. Seed yield increased significantly with trellis height. The correlation coefficients between trellis height and seed yield and between pods/m^2 and seed yield were 0.91 and 0.96, resp., indicating that 82.8% of the difference in seed yield could be attributed to differences in trellis height. Seed quality also increased with trellis height due to the higher pod clearance above the ground and the more opened canopy. (CIAT)

1009

* EDJE, O.T. 1983. Background information on Malawi. Lilongwe, Malawi, Crop Production Department, Bunda College of Agriculture. 38p.
Paper presented at the Workshop to Develop a Collaborative Project for Bean Research in Eastern Africa, Cali, Colombia, 1983.

Results obtained and research in progress of the bean improvement program in Malawi are reported. Program objectives are to produce high yielding, commercially acceptable cv. and to provide recommendations for the production of bean under both rainfed and irrigated conditions on residual moisture as a short-seasoned rotational crop. In germplasm evaluation, a high yield potential was observed (more than 1500 kg/ha for 13 and 8% of the bush and climbing lines evaluated, resp.). Main characteristics of 4 bean var. released (Nasaka, Bwenzilawana, Sapelekedwa, and Kanzama) are given. The advantages of intercropping are discussed as well as the effect of plucking leaves before pod set on yield. The removal of 3 leaves once or twice reduced yield of bush beans by 21 and 40.8%, resp. Climbing beans were less affected. The addition of 15 and 20 t of fresh leucaena as green manure/ha yielded more than 250 kg/ha of a compound fertilizer. Var. trials carried out to produce beans on residual moisture following a rice crop showed that av. yields of 1691 kg/ha can be obtained; in other trials where beans were planted about mid-June, yields of 2100 kg/ha were obtained. Trials of seed inoculation with Rhizobium have not produced appreciable yield increases compared with N fertilization. Storage of beans with pod

ash gave effective protection. The objectives of the Bean/Cowpea Collaborative Research Support Program in Malawi are given. The activities of the project are listed and include the collection of bean germplasm, sociocultural surveys, and evaluation of selected germplasm. Research needs are analyzed. (CIAT)

1010

EDJE, O.T. 1983. Response of maize and beans to Leucaena prunings. Lilongwe, Malawi, Bunda College of Agriculture.
Paper presented at Agroforestry Workshop, Lilongwe, Malawi, 1983.

1011

EDJE, O.T. 1983. Response of Phaseolus beans to seed inoculation and nitrogen fertilizer. Lilongwe, Malawi, Bunda College of Agriculture.
Paper presented at MIRCEN Coordinating Board Meeting, Lilongwe, Malawi, 1983.

1012

EDJE, O.T. 1982. Agroforestry: an integrated landuse system for increasing agricultural productivity. In Conference on Development in Malawi in the 1980s. Progress and Prospects, Zomba, Malawi, 1982. Paper presented.

1013

EDJE, O.T. 1982. Agroforestry: preliminary results of interplanting Gmelina with beans, maize or groundnuts. LUSO: Journal of Science and Technology 3:29-32.

1014

EDJE, O.T. 1982. Growing beans on residual moisture after a rice crop. LUSO: Journal of Science and Technology 3:105-117.

1015

* EDJE, O.T.; MUGHOGHO, L.K. 1979. Response of indeterminate dry beans to trellis height. Malawi Journal of Science 3:24-29.

1016

* EDJE, O.T.; AYONOADU, U.W.U.; MUGHOGHO, L.K. 1971. Bean variety trial under rain-fed and irrigated conditions. Lilongwe, Malawi, Bunda College of Agriculture. Research Bulletin no.2. pp.15-19.

Yield potential of bean cv. planted in var. trials conducted at Bunda and Makanga (Malawi), under rainfed and irrigated conditions, resp., was determined as part of a bean improvement project. Of the 98 cv. planted at Bunda, 23 yielded over 1000 kg/ha, 39 between 800-999 kg/ha, 27 between 600-779 kg/ha, and only 7 yielded below 600 kg/ha. Yields at Makanga ranged between 1600-2500 kg/ha. Diseases such as anthracnose (Colletotrichum lindemuthianum), angular leaf spot (Isariopsis griseola), Fusarium root rot (Fusarium solani), and common bacterial blight (Xanthomonas phaseoli), and pod borers caused considerable reduction in yield at Bunda. (AS)

1017

* EDJE, O.T.; AYONOADU, U.W.U.; MUGHOGHO, L.K. 1971. Effects of fertilizer on the yield of beans under rain-fed and irrigated conditions. Lilongwe, Malawi, Bunda College of Agriculture. Research Bulletin no.2. pp.20-28.

Twenty-two determinate bean cv. were planted under rainfed conditions at Bunda, Malawi, and 4 cv. under irrigated conditions at Makanga to determine the effect of different levels of a compound fertilizer on yields. Fertilizer levels at Bunda were 0, 224.2, 448.4, and 672.6 kg of compound B (4-18-15)/ha and 0, 336.3, and 672.6 kg of a fertilizer mixture (7-19-15)/ha at Makanga. Generally, yield increased with increase in fertilizer level at both locations. Yield of the rainfed beans expressed as a % of the irrigated beans ranged from 27.5 to 61.8%, with a mean of 44.9%. The lower yield under rainfed conditions was attributed, among other factors, to the incidence of diseases and pests. Plant height, no. of pods/plant, and no. of seeds/pod also increased with increasing fertilizer levels. (AS)

1018

* EDJE, O.T.; MUGHOGHO, L.K.; AYONOADU, U.W.U. 1971. Effects of row width and plant spacing on the yield of canning beans. Lilongwe, Malawi, Bunda College of Agriculture. Research Bulletin no.2. pp.29-36.

Yield, agronomic characters, DM accumulation and distribution of canning bean cv. No. 1196 were studied at 3 row widths (30, 45, and 60 cm) and at 3 spacings (5, 10, and 15 cm) between plants in a trial carried out at Bunda, Malawi. Yield increased with decrease in row width and also with decrease in plant spacing. Plant height decreased with increased row width and plant spacing. However, the contrary was true for both the no. of pods/plant and the no. of seeds/pod. There was a highly significant interaction between row width and plant spacing. The narrowest row width and the closest plant spacing had the highest yield (997.9 kg/ha). Generally, DM increased with increase in row width and with time after planting, while the contrary was true for plant spacing. Yield was not maximized in this expt. due to disease and pest attack, mainly anthracnose (Colletotrichum lindemuthianum), rust (Uromyces appendiculatus), and angular leaf spot (Isariopsis griseola). (AS)

1019

FREEMAN, A. 1974. A preliminary investigation of dimba cultivation in the Lower Shire Valley, 1973. Malawi, Shire Valley Agricultural Development Project. 21p.

Within the Lower Shire Valley of Malawi there are vast areas of marshland (Dimba Land) which have a high water table that enables farmers to grow crops during the normally barren dry season. A sample survey was conducted to study the importance of dimba cultivation, the relative size of munda and dimba gardens, relative yield and variability of yield, and the importance of the production in dimba in the total food supply of households that practice dimba cultivation. According to the results, it appears that dimba land supplies an important part of food supplies; it also has the potential to supply cash income to farmers if attention is directed towards the production of vegetables for sale and improvement of the present transport and marketing systems. (CIAT)

1020

GORDON, J.G. 1971. A model for estimating future agricultural acreage and production in Malawi. Wye, Ashford, Wye College. Report no.4. 44p.

1021

KUBWALO, F.X.F. 1981. Effects of topping maize and intercrop planting with beans on yield and yield components. Lilongwe, Malawi, Bunda College of Agriculture. Project no.5.

1022

MALAWI. AGRICULTURAL RESEARCH DEPARTMENT. 1969. Annual Report. p.20.

1023

* MTIMUNI, J.P. 1972. Proximate analysis of local feedstuffs. Lilongwe, Malawi, Bunda College of Agriculture. Research Bulletin no.3. pp.68-69.

The results of chemical analyses of a no. of feedstuffs used in Malawi are given in table form. A relatively small no. of samples was chosen and variation can be expected. The av. total composition of field beans is the following: 87.0% DM, 19.1% CP, 1.1% ether extract, 5.6% crude fiber, 4.6% ash, and 56.6% N free extract. Other feedstuffs include pigeon pea, soybean seed, maize, rice husks, Leucaena leaves, and Stylosanthes gracilis. (CIAT)

1024

* MUGHOGHO, L.K. 1970. Phaseolus vulgaris beans improvement project. Lilongwe, Malawi, Bunda College of Agriculture. Research Bulletin no.1. pp.17-18.

The bean improvement program in Malawi began in 1969 to produce suitable dwarf and climbing bean var. for pure stands and intercropping with maize, resp. The 4 phases of the project are described: (a) collection, purification, multiplication, testing, and screening of bean types and imported var. for yield, quality, and disease resistance; (b) agronomic evaluation of selected types or strains through fertilizer, plant populations, and storage trials, and growth studies; (c) investigations on pest and disease control; (d) breeding to improve yield, quality, and disease resistance of selected var. A total of 8486 and 2769 climbing and dwarf bean types, resp., were entered into the collection. The following diseases were recorded in the field: anthracnose (Colletotrichum lindemuthianum), halo blight (Pseudomonas phaseolicola), rust (Uromyces appendiculatus), angular leaf spot (Phaeoisariopsis griseola), BCMV, BYMV, and dry root rot (Fusarium solani). Anthracnose was recorded on 7% of the samples of dwarf beans. (CIAT)

1025

NATIONAL STATISTICS OFFICE. 1970. National sample survey of agriculture. Zomba, Malawi.

1026

* NGWIRA, L.K.M.; EDJE, O.T. 1973. Effects of plant population on growth and yield of beans. Lilongwe, Malawi, Bunda College of Agriculture. Research Bulletin no.3. pp.8-20.

The optimum plant population for max. bean yield was determined as well as various physiological yield determinants of Phaseolus beans which could be used for screening purposes were evaluated in a trial at Bunda College Farm (Malawi). Determinate bean cv. Bunda 334/2 was planted at 3 plant populations (111,000, 222,000, and 444,000 plants/ha) in a randomized block design. Yield (kg/ha) was not significantly affected by plant population.

Low plant populations increased yield/plant, no. of pods/plant, no. of seeds/pod, no. of branches/plant, and produced shorter plants that lodged less. DM accumulation increased with time after planting and increasing plant populations and was highest in leaflets (64%) and lowest in roots (6%) until after 37 days from planting. At physiological maturity DM was highest in pods (56%) and still lowest in roots (2%). LAI also increased with increasing plant populations but was highest at full flowering (37 days after planting). LAI was positively correlated with DM of leaves and stems and yield (kg/ha) at all sampling periods. No. of seeds/pod, shelling %, and seed size were positively correlated with yield while correlation coefficients between yield (kg/ha) and yield (g/plant), no. of pods/plant, and pod length were negative. (AS)

1027

NGWIRA, P. 1981. Growing maize, beans and pumpkins in monoculture and in association. Lilongwe, Malawi, Bunda College of Agriculture. Project no.5.

1028

OMAR, G.G.; KEYA, S.O. 1980. Field Rhizobium phaseoli testing. MIRCEN Newsletter 3:2.

1029

* PALMER, C.M. 1972. A study of the internal marketing system for certain produce in the Lilongwe District of Malawi. Lilongwe, Malawi, Bunda College of Agriculture. Research Bulletin no.3. pp.55-62.

Between Feb. 1971-Jan. 1972 a marketing study was carried out of selected vegetable produce, which include beans, in the Lilongwe city market and 9 rural markets in the Lilongwe District of Malawi. A large proportion of this produce was grown in the Lilongwe District, most of it in the 4 main areas of Chiseka, Chadza, Mazengera, and Kalumba. The city market was dominated by some 30-40 middlemen who obtained most of their produce from certain rural markets which acted as collection centers. Most of the produce offered for sale in the rural markets was brought there by the farmers themselves. It seems that the city market is the focal point of a complex and relatively integrated marketing system extending throughout the Lilongwe District and into much of the Central Region of Malawi. (AS)

1030

* RAO, Y.P.; MUGHOGHO, L.K.; EDJE, O.T.; MSUKU, W.A.B. 1977. Disease filtration in beans. Bean Improvement Cooperative. Annual Report no.20:54-57.

The production of disease-free seed under irrigation (disease filtration) is discussed. Three seed lots of bean cv. 253/1 showing different degrees of infection (apparently healthy, apparently infected, and heavily infected) were grown at the Bunda College Farm (Malawi) during the dry season (Aug.-Oct. 1975) in a 20 x 15 m plot with 91 x 10 cm spacing; basal fertilization and flood irrigation were applied. The seeds produced from these original lots (filtered seeds) were planted on Dec. 10th, 1975. The plants in all 6 treatments were free from infection up to 2 wk. from planting. However, by the 3rd wk., nearly all plants in the apparently infected and heavily infected plots showed halo blight (Pseudomonas phaseolicola) infection, with only traces of infection in the apparently healthy plot and virtually no infection in all plots planted with filtered seed. Disease filtration could be one method for production of disease-free bean seed for commercial purposes. (CIAT)

1031

FAGOONEE, I.; TOORY, V. 1983. Preliminary investigations of host selection mechanisms by the leafminer Liriomyza trifolii. Insect Science and its Application 4(4):337-341. [School of Agriculture, Mauritius Univ., Reduit, Mauritius]

Expt. were carried out in Mauritius on the differential susceptibility of bean and potato to provide information on factors affecting food plant selection by the leafminer (Liriomyza trifolii). Distribution and density of leaf trichomes, as well as the nutritional status of the food plants, were found to be important in selection. High trichome density acted as a physical deterrent to Liriomyza flies, and senescing primary bean leaves induced nonacceptability. Flies prefer bean to potato leaf discs when given a choice, although the latter possessed less trichomes. Factors such as chemical attractants and some nutrient components might also be involved in the complex selection behavior of L. trifolii. (CIAT)

1032

PILLAY, A.R.; MAMET, J.R. 1972. Rhizobium. 1. Preliminary field studies on groundnuts (Arachis hypogea) and dwarf beans (Phaseolus vulgaris) in Mauritius. Revue Agricole et Sucriere de l'Ile Maurice 51:242-248.

1033

BAILEY, A.G. 1966. A checklist of plant diseases in Nigeria. Lagos, Nigeria, Federal Department of Agricultural Research Memorandum no.96.

1034

BAKER, E.F.I. 1974. Research into intercropping aspects of farming systems in Nigeria. Mixed cropping with cereals: a system for improvement. In Farming Systems Workshop, Hyderabad, India, 1974. Proceedings. Hyderabad, International Crops Research Institute for the Semi-Arid Tropics. pp.287-301.

1035

* EGWUATU, R.I.; TAYLOR, T.A. 1977. Studies on the biology of Acanthomia tomentosicollis (Stal) (Hemiptera: Coreidae) in the field and insectary. Bulletin of Entomological Research 67:249-257.

Studies on the biology of Acanthomia tomentosicollis at Ibadan, Nigeria, showed that the periods of development in the field and the insectary averaged 17 and 18 days, resp. The hemispherical hexagonally sculptured eggs were laid in batches of 2-99 (mean = 7 eggs/batch in the insectary and 20 in the field). Preoviposition periods were 11-22 days in unmated and 6-9 days in mated females. The mean no. of eggs deposited by mated females (202) was significantly higher than that deposited by unmated females (135), although the av. oviposition period of 16 wk. in unmated females was 3 wk. longer than in mated females. Unmated males and females were longer-lived than their mated counterparts, and females generally lived longer than males. These results and other observations on the biology of A. tomentosicollis are discussed in the context of its seasonal biology and the pattern of infestation of pigeon pea, its main host plant. (AS)

1036

EGWUATU, R.I. 1975. Studies on the bionomics of Acanthomia tomentosicollis Stal (Hemiptera:Coreidae) and its egg-parasite Gryon gnidus Nixon (Hymenoptera:Scelionidae). Ph.D. Thesis. Nigeria, University of Ibadan.

1037

FOOD AND AGRICULTURAL ORGANIZATION OF THE UNITED NATIONS. 1966. Agricultural development in Nigeria, 1965-1980. Rome. 512p.

1038

GOLDING, F.D. 1946. The insect pests of Nigerian crops and stock. Nigeria Agricultural Department. Special Bulletin no.4. 48p.

1039

GUSTEN, R. 1968. Studies in the staple food economy of western Nigeria. Munchen, Institut fur Wirtschaftsforschung. Afrika-Studienstelle. Afrika-Studien no.30. 310p.

1040

* IHEAGWAM, E.U. 1982. Effects of host plants (legumes) on life and population parameters of Clavigralla tomentosicollis (Hemiptera, Coreidae). Revue de Zoologie Africaine 96(4):912-920. [Dept. of Zoology, Univ. of Nigeria, Nsukka, Nigeria]

The effects of 3 food plants, Cajanus cajan, Vigna unguiculata, and Phaseolus vulgaris, on the life and population parameters of Clavigralla tomentosicollis were investigated in the lab. in Nigeria at 25°C. Populations declined by 50% in 13 wk. on pigeon pea and 11 wk. on cowpea and bean. On the 3 food plants, resp., the preoviposition period averaged 5.8, 11.0, and 19.3 days. The max. age-specific fecundity rate (m_x) was reached much earlier in adult life when the coreid fed on pigeon pea or cowpea than on bean. The intrinsic rate of increase (r_m) ranged from 0.049 on bean to 0.095 on pigeon pea. (AS)

1041

NORMAN, D.W. 1973. Crop mixtures under indigenous conditions in northern part of Nigeria. In Ofori, I.M., ed. International Conference on Factors of Agricultural Growth in West Africa, Legon, Accra, 1971. Proceedings. Ghana, Institute of Statistical, Social and Economic Research. pp.130-144.

1042

NORMAN, D.W. 1973. Economic analysis of agricultural production and labour utilization among the Hausa in the north of Nigeria. East Lansing, African Rural Employment Paper, Department of Agricultural Economics, Michigan State University, no.4. 48p.

1043

NORMAN, D.W. 1968. Why practice intercropping? Samaru Agricultural Newsletter 10:107-116.

1044

* OKIGBO, B.N. 1983. Plants and agroforestry in land use systems of West Africa. In Huxley, P.A., ed. Plant research and agroforestry; proceedings of a Consultative Meeting. Nairobi, Kenya, International Council for Research in Agroforestry. pp.25-41. [IITA, Oyo Road, P.M.B. 5320, Ibadan, Nigeria]

The characteristics of the farming systems found in West Africa are briefly outlined and the shortcomings of current land development strategies noted. These include inadequate emphasis on food production research resulting in a continuing expansion of the area under cultivation at the expense of forest resources which are, themselves, increasingly needed for timber and especially, fuel wood. A solution is to develop integrated land use systems which involve both woody perennials and herbaceous crops and/or grasses. Some suggestions are made on how existing land use systems can be improved in this way. (AS)

1045

OKIGBO, B.N. 1975. Erosion hazard and farming systems in West Africa. In Soil Conservation and Management Workshop, Ibadan, Nigeria, 1975. Ibadan, International Institute of Tropical Agriculture.

1046

OYENUGA, V.A. 1968. Nigeria's foods and feeding stuffs: their chemistry and nutritive value. Nigeria, Ibadan University Press. p.II.

1047

* STANTON, W.R. 1963. A note on work in progress in Northern Nigeria with special reference to grain legumes. Genetica Agraria (Italia) 18:279-286.

As a result of recent changes in demand for foodstuffs in northern Nigeria breeding efforts aim at conserving the indigenous cv. and acquiring all possible information on their social and biological environments and at developing a research program which will be able to cope with any further changes in demand. Conservation projects have concerned the main staple crops such as maize, sorghum, and millet, and more recently grain legumes such as Phaseolus vulgaris. A survey on grain legumes is currently carried out using standard punch card form, devised for making entries at the sampling site, and providing a picture of variation from province to province of individual legumes, their importance, and the agronomic practices associated with them. A sample punch card is presented, its characteristics being discussed in detail. (AS)

1048

TAYLOR, T.A. 1975. Gryon gnidus, a scelionid egg-parasite of Acanthomia tomentosicollis (Hemiptera:Coreidae) in Nigeria. Entomophaga 20:129-134.

1049

TAYLOR, T.A.; OMONIYI, O. 1970. Variation in number of micropyles in eggs of Acanthomia tomentosicollis Stal (Hemiptera,Coreidae). Nigerian Entomologist Magazine 2:70-73.

1050

TAYLOR, T.A. 1967. Leguminous crops. In Gerard, B.M., ed. Conference of the Entomological Society of Nigeria, Ibadan, 1967. Fifty years of applied entomology in Nigeria. Proceedings. Ibadan. pp.20-24.

1051

VERINUMBE, I. 1981. Economic evaluation of some zero tillage systems of land management for small-scale farmers in South Western Nigeria. Ph.D. Thesis. Nigeria, University of Ibadan.

1052

HOPKINS, J.C.F. 1933. Rhizoctonia lamellifera Smah: a distinct species of the Rhizoctonia bataticola group of fungi. Proceedings and Transactions of the Rhodesia Scientific Association (Bulawayo) 32:65-79.

1053

JONES, E.P. 1937. The egg parasites of the cotton boll worm, Heliothis armigera Hubn. (obsoleta, Fabr.) in Southern Rhodesia. Britain and South Africa 6:37-106.

1054

STAPLES, R.R.; MURRAY, C.A. 1951. Farming systems in Southern Rhodesia. Rhodesia Agricultural Journal 48:413-427.

1055

YUDELMAN, M. 1964. Africans on the land; economic problems of African agricultural development in Southern, Central, and East Africa, with special reference to Southern Rhodesia. Cambridge, Harvard University Press. 288p.

1056

* BERTI, F. 1984. Synthese des travaux realises sur Phaseolus dans les stations du Zaire, Rwanda et Burundi depuis 1962: Rwanda. In _____. Synthèse des travaux réalisés sur Phaseolus aux Zaire, Rwanda et Burundi de 1945 a nos jours. Gembloux, Belgique, Faculté des Sciences Agronomiques de l'Etat. pp.40-54.

Work on Phaseolus is an important part of the food crop research program at the Institut des Sciences Agronomiques du Rwanda. Var. selection is aimed at obtaining well accepted var. for different ecological zones, with a min. yield under the most unfavorable conditions. Criteria for var. acceptability are outlined and new research goals are identified. Results of trials carried out at Rubona, Karama, and Rwerere are reported: var. and genealogical selection, comparative trials, var. mixtures, fertilization trials on different soil types, inoculation, planting distance and dates, and intercropping. Between 1962-81, outstanding var. at Rubona were Wulma, Mixed Mexico, Bayo, Cuarentino, var. 49, var. 1/2, and var. 54, and at Rwerere, Cajamarca 59, Gisenyi 3, and Uruugumba 1. Var. Batsaf, Mélange Jaune 1, Emma, Tostado, Saxa, var. 1/2, Ingumba, C 10, Urunyumba 3, Gisenyi 2, Cajamarca, Gisenyi 6, Urungumba 12, and var. 54 were chosen for multiplication in 1981. (CIAT)

1057

* INSTITUT DES SCIENCES AGRONOMIQUES DU RWANDA. 1983. Les cultures associees. In _____. Compte rendu des travaux du Département Production Végétale en 1982. Rubona. pp.160-175.

Results of yield trials with different intercrops carried out in 3 regions of Rwanda (A, Central-South region; B, Bugesera; and C, .he high alt. region) are given. In A, highest yields were obtained by sowing maize at the beginning of Sept., followed by dwarf bean in mid-Sept. and sweet potato at the beginning of Oct. Intercropping a single row of each crop (maize, climbing beans, soybean, and sweet potatoes) had an advantage over 2-3 rows of each crop, but not over the monocrops. In B, beans monocropped at 30 x 20 cm yielded 1067 kg/ha and sorghum yields were 1848 kg/ha vs. 1818 kg/ha in monoculture when intercropped with beans (289 kg/ha). All bean var. were economically favored when intercropped with maize var. Katumani, in relation to monocropped beans. Bean cv. Munyu seemed to be the best adapted. Best spacings were 30 cm between bean plants and 55 cm between bean-maize rows, and 20 cm between bean plants and 70 cm between bean-maize rows; maize yields were 2167 and 2021 kg/ha and bean yields, 833 and 908 kg/ha, resp. In C, yields were higher in sweet potato-bean-maize intercropping (LER = 2.9). In a comparative var. trial under irrigation, the 10 bean var. tested did not differ significantly from the control (Bayo 158); yields were close to 3500 kg/ha in the 1st season of 1982. Highest yields in the 2nd cropping season were for var. 6887, 7095, and Yosephina (4662, 4192, and 3877 kg/ha, resp.). A table on seed production and release is included. (CIAT)

1058

* INSTITUT DES SCIENCES AGRONOMIQUES DU RWANDA. 1983. Légumineuses: haricot (Phaseolus vulgaris L.) In _____. Compte rendu des travaux du Département Production Végétale en 1982. Rubona. pp.1-2.

Results of research on plant production at Rubona, Rwerere, and Karama, Rwanda, during 1982 are presented. In germplasm evaluation, 68 climbing, 20

semiclimbing, and 38 dwarf bean var. will pass to general selection trials in 1983. Most of CIAT's var. (75) were disease resistant but showed hypersensibility to local strains of black root rot (Thielaviopsis basicola). In breeding trials, 34 crosses were made for screening for BCMV and anthracnose (Colletotrichum lindemuthianum) resistance. In screening trials, the best dwarf bean var. showed intermediate reaction to BCMV and high tolerance to anthracnose. At Rubona, Nsuzumirurushako outyielded other semiclimbing bean var.; hypersensibility to viroses was observed in the best climbing bean var. Comparative trials showed that Rubona 5, Var. 11, Mutiki 2, Tostado, and Bataaf had higher tolerance to BCMV and anthracnose. Semiclimbing var. Caru 27 and Ikinimba Blanc outyielded other var. over the 2 seasons. Results of International Bean Yield and Adaptation Nursery trials carried out in collaboration with CIAT are presented as well as others on seed density and tutoring, crop protection and on-farm activities, and seed multiplication. (CIAT)

1059

* INSTITUT DES SCIENCES AGRONOMIQUES DU RWANDA. 1983. Vulgarisation agricole. In _____. Compte rendu des travaux du Département Production Végétale en 1982. Rubona. pp.150-159.

Agricultural development in Gatovu, Mont-Rubona, Geranium, Kirwa, Kinazi, and Muhero (Rwanda) is reported. During the 1st cropping season bean var. Tostado, Var. 11, Mutiki, Bataaf, Emma, Wulma, Kicaro, Mélange Jaune, and C 10 were released at Gatovu and at Mont-Rubona, Bataaf yielded 1129 kg/ha and Kicaro, 511 kg/ha. At Gitovu (low terrains), var. Bataaf, Emma, Kicaro, and Mélange Jaune yielded 900, 1400, 1050, and 400 kg/ha, resp. Selected bean seeds were given out. Bean Var. 11 outyielded the control (Bataaf) in a local adaptation trial at Gatovu (1247 vs. 1198 kg/ha), during the 1st season. (CIAT)

1060

* NTEZILYAYO, A. 1983. Problems of agricultural development at the national level. In Chang, J., ed. Agricultural research in Rwanda: assessment and perspectives, Kigali, Rwanda, 1983. Report of a seminar. The Hague, Netherlands, International Service for National Agricultural Research. pp.21-52. [Ministry of Agriculture & Livestock, Kigali, Rwanda]

The historic development of the agricultural sector in Rwanda is reviewed through successive national plans. Problems related to agricultural development are discussed: insufficient production, rapid population growth, weak financial capacity, and the country's lack of access to the sea. The 1950-60 Ten-Year Plan for the Economic and Social Development of Rwanda-Urundi included plant production (beans, 205,200 t; expected production, 246,000 t), silviculture, animal production, fishing, and fish farming. The Interim Emergency Plan of First Five-Year Economic and Social Development was intended to prepare the nation for economic independence, accomodate a growing population, and ensure improved social welfare at a time (1966-70) when everything needed priority. The Second Five-Year Economic, Social and Cultural Development Plan (1977-81) was devoted to reorganizing all sectors of national life. Bean production growth rate during these years was 3.0%. Low yields of beans (750 kg/ha) have restricted total output, in a country where food crops are predominantly starches and the diet is deficient in proteins and lipids. (CIAT)

1061

* NYABYENDA, P.; NDAMAGE, G. 1980. Resultats de recherches sur haricot au Rwanda durant les 10 dernieres annees. Rubona, Institut des Sciences Agronomiques du Rwanda. 34p.

Research data and results are presented for var. selection (introduction, screening and selection, comparative trials, and release), genealogical selection, and selection by induced mutation at the Institut des Sciences Agronomiques du Rwanda. Bean var. Wulma and C 10 had outstanding performance at Rubona; var. 1/2, No. 11, Bayo 158, and var. 54 confirmed their superiority at Karama, and Urunyumba 12 and Gisenyi 6 were the best var. at Rwerere. Dark teguments caused some var. to be rejected. The mutation of the dark tegument of var. Wulma was possible using ethyl methanesulphonate. Cultural trials reported included planting distance and seed density for both dwarf and climbing beans, tutoring, irrigation, and effects of intercropping on harvest yields and incidence of anthracnose (Colletotrichum lindemuthianum). Higher productivities of nonamended beans were obtained during the 1st season at Rubona (2340 kg/ha) and at Rwerere (3950 kg/ha), and during the 2nd season at Karama (3790 kg/ha). Guidelines of a future bean research program are presented. (CIAT)

1062

CHARREAU, C. 1974. Systems of cropping in the dry tropical zone of west Africa with special reference to Senegal. In Farming Systems Workshop, Hyderabad, India. Proceedings. Hyderabad. International Crops Research Institute for the Semi-Arid Tropics. pp.443-468.

1063

SPENCER, D.S.C. 1976. African women in agricultural development: a case study in Sierra Leone. Washington, American Council on Education. OLC, Paper 9.

1064

LIEBENBERG, A.J. 1982. Die invloed van uitdun op verskillende groeistadiums op die bron-stoor verhoudings van droëbone. [The influence of thinning at different growth stages on the source-sink relationships of dry beans]. Crop Production 11:175-177. [Instituut vir Graangewasse, Potchefstroom 2500, South Africa]

Dry bean cv. Teebus was grown at 6, 9, 12, or 18 plants/m^2 in field trials during 1970-80 and plants were thinned (a) after emergence; (b) at flower initiation; (c) flowering; (d) seed filling. Av. DM, no. of pods, and seed wt./plant at harvest decreased with increasing delay in thinning. Plants responded to thinning intensity by increased DM, pod and seed production with decreasing effect as thinning was delayed and no effect at (d). Thinning level had no effect on no. of seeds/pod, seed wt., or HI. Thinning at (b) resulted in more seeds/pod, larger seeds, and higher HI than at (c). The effect of population stress on yield was greater at the vegetative stage and least during seed filling. (CIAT)

1065

LOURENS, F.C.; WITT, J. DE 1982. 'N vergelyking van kaliumnitraat- en kaliumsulfaat-gebaseerde bemestingsprogramme op die opbrengs van aartappels en groenbone. [A comparison of potassium nitrate and potassium sulphate based fertilizer programmes on the yield of potatoes and green beans]. Crop Production 11:140-143. [Triomf Kunsmis (EDMS) Bpk., Somerset-Wes, K.P., South Africa]

In an expt. in 1980-81, green bean cv. Provider yield increased in the range 11.0-13.8 t/ha as % of N applied (nitrate) increased from 13.5 to 69.5%. With K applied as nitrate yields were also higher than when applied as sulphate. Differences were ascribed to limited nitrification and associated low N uptake, toxic effects of excess ammonium ion and possibly better uptake of K in nitrate form. (CIAT)

1066

* PHELPS, R.J. 1956. Investigation on the biology of Piezotrachelus varium (Wagner) and Apion (Conapion) chirindanum Wagner (Coleoptera:Apioninae). Journal of the Entomological Society of Southern Africa 19(1):86-99.

Results of studies on the habits of Piezotrachelus varium and Apion (Conapion) chirindanum in the field are reported; these included observations on host plants (which included Phaseolus vulgaris), nature of the injury caused, overwintering, development of internal genitalia of adults, and oviposition. In addition, the duration of the developmental cycle on P. varium in the field and under controlled conditions of temp. and humidity was investigated. Under field conditions, the life history is completed in 24 to 32 days. Under lab. conditions, temp. exerts a profound influence on the length of the life cycle, while humidity of the air surrounding the pod appears to be unimportant. Descriptions of the various instars of this destructive species are given. Apparently this species is able to breed in green cowpea pods only, while Apion chirindanum will breed in cowpea buds only. Observations were made on parasitic Hymenoptera, representatives of the Pteromalidae and Eulophidae being recorded. These attack larval and pupal instars of both species of these injurious cowpea snout beetles. (AS)

1067

* SKAIFE, S.H. 1918. Pea and bean weevils. South Africa, Department of Agriculture. 32p.

Several aspects of the weevils that attack peas and beans in South Africa are discussed: distribution, development stages (adult, egg, larva, pupa), damage and natural enemies. Questions on their effects are answered and control measures are described. The common bean weevil [Bruchus (Acanthoscelides) obtectus] is probably the most destructive and infests French or kidney bean, Phaseolus multiflorus, and Vigna catjang. Its attack may begin in the field or in storage, causing severe losses in all bean var. In a test to determine weevil preference, Canadian Wonder showed the highest % of infestation among 15 kinds of beans (30.5). Bruchus petechialis and Pediculoides ventricosus are mentioned as natural enemies of the bean weevil. The Mexican bean weevil (Spermophagus pectoralis) infests common beans but has not been reported in South Africa. A mixture of boiling water (2 parts) and one part at summer air temp. for soaking seed for 5 min gives good weevil control and is recommended for farmers. Fumigation with carbon bisulphide is generally the best remedial treatment and detailed instructions are given on its application. (CIAT)

1068

* VERMEULEN, W.J. 1984. Kamberg. A new small white bean for South Africa. Bean Improvement Cooperative. Annual Report 27:202. [Oil & Protein Seeds Centre, Private Bag X1251, 2520 Potchefstroom, Republic of South Africa]

Overall results of the 1982-83 summer season trials conducted in the major bean producing areas of South Africa are briefly reported. A new small white bean var., Kamberg, was released after the results became available. The new var. is compared with NEP 2 and Swan Valley. Kamberg is the result of selection (pedigree method) from the cross NEP 2 x PC43-CI and is resistant to shattering and rust (Uromyces appendiculatus). Yields obtained were 1983, 1475, and 1685 kg/ha for the var. Kamberg, NEP 2, and Swan Valley, resp. (CIAT)

1069

* VILLIERS, V. DE; NEL, P.C.; HAMMES, P.S. 1974. Die invloed van temperatuur op die groei en ontwikkeling van droebone (Phaseolus spp.). (The effect of temperature on the development and reproduction of dry beans). Crop Production 3:7-11.

The effects of day/night temp. (35/25, 30/20, and 25/15°C) on the germination, development, and reproduction to 11 bean cv., were studied under controlled environmental conditions. Cv. with small seeds germinated more rapidly than those with large- and medium-sized seeds; germination rate increased in all cv. with increasing temp. No. of leaves, total leaf area, and dry root wt./plant were greatest at 30/20°C. High temp. (35/25°C) during the early growth stages affected root growth, but during flowering, top growth was more seriously affected than root growth. The sugar bean (Phaseolus lunatus) cv. proved to be the most sensitive. Flowering began earlier at low temp. and the no. of flowers/plant and % pod set were generally highest at 30/20°C. (CIAT)

1070

* AGEEB, O.A.A. 1981. Fieldbeans plant spacing experiment. In Ed-Damer, Sudan. Hudeiba Research Station. Annual Report 1975-1976. Ed-Damer. pp.10-11.

Three interrow spacings (20, 40, and 60 cm), 3 intrarow spacings (5, 10, and 20 cm), and 1 or 2 plants/hill were compared in a randomized block design with 3 replicates. Var. H.72 was used. At harvest, plant stand decreased by 74% due to wilt. The factors tested had no significant effect on yield. A negative correlation existed between grain yield and plant population ($r = -0.57$). All factors tested and their interactions significantly affected the no. of pods/plant. The effect of row spacing and no. of plants/hill on HI was highly significant. Large variations in plant population had little effect on grain yield of beans due to the compensatory nature of components of yield. (CIAT)

1071

ED-DAMER, SUDAN. HUDEIBA RESEARCH STATION. Annual Report 1977-1978. Ed-Damer. 128p.

1072

EL-FAHAL, E.M. 1983. Horticulture. In Ed-Damer, Sudan. Hudeiba and Shendi Research Stations. Annual Report 1978-1979. Ed-Damer. pp.157-162.

1073

EL-HASSAN, H.S. 1983. Horticulture. Seven trials conducted at Hudeiba, Sudan. In Ed-Damer, Sudan. Hudeiba and Shendi Research Stations. Annual Report 1978-1979. Ed-Damer. pp.103-121.

1074

FREIGOUN, S.O. 1983. Plant pathology. In Ed-Damer, Sudan. Hudeiba and Shendi Research Stations. Annual Report 1978-1979. Ed-Damer. pp.163-172.

1075

FREIGOUN, S.O. 1982. Botany and plant pathology. In Ed-Damer, Sudan. Hudeiba Research Station. Annual Report 1977-1978. Ed-Damer. pp.1-8.

1076

HUSSEIN, M.M. 1983. Botany and plant pathology. In Ed-Damer, Sudan. Hudeiba and Shendi Research Stations. Annual Report 1978-1979. Ed-Damer. pp.7-17.

1077

HUSSEIN, M.M. 1982. Botany and plant pathology. In Ed-Damer, Sudan. Hudeiba Research Station. Annual Report 1977-1978. Ed-Damer. pp.9-11.

1078

JOHNSTON, H.B. 1930. A note on certain minor crop pests hitherto unrecorded from the Gezira district of the Sudan. (Report of the Government Entomologist). Entomology Section. Bulletin no.31.

1079

MOHAMED, A.K. 1983. Horticulture. In Ed-Damer, Sudan. Hudeiba and Shendi Research Stations. Annual Report 1978-1979. Ed-Damer. pp.146-156.

1080

MOHAMEDALI, G.H. 1983. Horticulture. In Ed-Damer, Sudan. Hudeiba and Shendi Research Stations. Annual Report 1978-1979. Ed-Damer. pp.122-145.

1081

SALIH, F.A. 1983. Breeding. In Ed-Damer, Sudan. Hudeiba and Shendi Research Stations. Annual Report 1978-1979. Ed-Damer. pp.49-58.

1082

SALIH, F.A. 1982. Plant breeding. In Ed-Damer, Sudan. Hudeiba Research Station. Annual Report 1977-1978. Ed-Damer. pp.21-73.

1083

MBABANE. CENTRAL STATISTICAL OFFICE. 1972. Sample census of agriculture 1971. 1. Swazi Nation Land. Swaziland. 73p.

A Regional Census of Agriculture was carried out in Swaziland during Jan.-June 1971. The strategy used and the results obtained are described. Agricultural holdings and a crop cutting survey are included in the 1st vol., while the farm area survey is covered in the second vol. Ten homesteads were chosen from each of 102 enumeration areas. Information on holding, land use, cultivation areas, inputs, livestock and poultry, agricultural machinery and implements, farm population and employment was obtained from the interviews conducted by the enumerators. Samples of fields in the selected holdings growing maize, sorghum, and groundnuts were used for the crop cutting expt. (CIAT)

1084

MBABANE. CENTRAL STATISTICAL OFFICE. 1971. Census of individual tenure farms. Swaziland. 19p.

Since 1969 the total area under cultivation in Swaziland (market-oriented farms) has increased by 20%. Tenure farms accounted for only 8.5% of the total cultivated area of the country. Field crops account for 6.8%; orchards 0.6%, and fodder crops 0.4%. Livestock production is the most important with 71.4% of the total area under permanent pasture. Sugarcane accounts for about 48% of the total value of crop sales, occupying 2/5 of the available crop land. Cotton is next in order of importance and citrus fruits follow sugarcane in importance as a cash crop. (CIAT)

1085

ALLEN, D.J. 1979. Beans in Tanzania: a trip report. Ibadan, Nigeria, International Institute of Tropical Agriculture. 23p.

1086

ANANDAJAYASEKERAM, P.; SHAYO, S.A. 1981. Performance of food and cash crop sector, Morogoro Region, 1968/69-1978/79.
Paper presented at the Annual Conference of the Tanzanian Agricultural Economic Society, Morogoro, Tanzania, 1981.

1087

ANDERS, G.D. 1974. Beans responses to fertilizers on Mt. Kilimanjaro in relation to soil and climatic conditions. East African Agricultural Journal 39:272-286.

1088

* BEAN/COWPEA COLLABORATIVE RESEARCH SUPPORT PROGRAM. U.S.A. 1983. Breeding beans for disease and insect resistance and determination of economic impact on smallholder farm families. In _____. 1983. Annual Report. East Lansing, Michigan State University. pp.130-138.
Also in Spanish.

Objectives of a project between the U. of Dar es Salaam (Tanzania) and Washington State U. (USA) are given: (1) develop through a breeding program high yielding, widely adapted bean cv. for small farmers which are also resistant to BCMV, rust (Uromyces phaseoli), angular leaf spot (Isariopsis griseola), and insects such as the bean fly (Ophiomyia phaseoli), pod borers (Epinotia opposita), and bruchids (Acanthoscelides obtectus); (2) determine the economic viability of the new cv. and the impact of the role played by women in the production, consumption, and marketing process. Cv. Kabanmina had the highest yields at cool, high elevation sites. Growing mixed beans reduces rust and angular leaf spot incidence and severity and increases yields by 24%. Cleaning seed lots reduces seed transmission of diseases and increases yields by 17%. Seed treatment with oil reduces bruchid attack during storage; natural plant extracts (neem, pepper) may be efficient alternatives to controlling the pod borer. Local cv. were tested with breeding lines from CIAT and Prosser and the best of these will be included in yield trials carried out at a national level in 1984 together with the best performing lines at Morogoro and Uyole. Results of training programs are also mentioned (3 people received training at CIAT for 3 mo.) in addition to professional linkages and institutional resources that contributed to the project, constraints to achieving objectives and progress towards them, and future research plans. (CIAT)

1089

CHIPUNGAHELO, G.S.E. 1980. Insect pest complex of common beans, Phaseolus vulgaris L. and their control. Morogoro, Tanzania, University of Dar es Salaam. Special Project. 61p.

1090

CLINTON, P.K.S. 1961. Field recognition of plant diseases in Tanganyika. Dar es Salaam, Tanzania, Ministry of Agriculture. Bulletin no.8.

1091

COLLINSON, M.P.; BARTLETT, C.D.; MANDAY, E.A. 1977. Demonstration of an interdisciplinary farming systems analysis to planning an adaptive agricultural research program, Department of Rural Economy, University of Dar es Salaam, and Ministry of Agriculture, Tanzania in collaboration with CIMMYT, Nairobi.

1092

* DUE, J.M.; ANANDAJAYASEKERAM, P.; MDOE, N.S.; WHITE, M. 1984. Beans in the farming systems in Langali and Kibaoni villages, Mgeta area, Morogoro region, Tanzania: a report. Tanzania, University of Dar es Salaam. Department of Rural Economy. Technical Report no.2. 58p. [Univ. of Illinois at Urbana-Champaign, 305 Mumford Hall, 1301 West Gregory Drive, Urbana-IL 61801, USA]

Farming systems in the villages of Kibaoni and Langali, Tanzania, were studied to evaluate the economic impact of new higher yielding bean var., resistant to drought and diseases found in Tanzania, on small-scale family farms. A sample of 60 farm families was drawn from each of 2 major bean growing areas of the Mgeta division and socioeconomic data collected from the sample of families selected. The implications of the data found are analyzed. Families farmed, on the av., 4 separate parcels of land (shambas), predominantly on steep and undulating hillsides. In both villages beans and maize were grown by all families sampled, being commonly intercropped. The 1st bean crop is intercropped with maize in Nov./Dec. whereas the 2nd is monocropped in April/May. Intercropping was reportedly practiced to reduce risk and uncertainty in production, to minimize the effects of land shortages, to increase production/unit of land to enable family members to attend to both crops at the same time, as a means of soil erosion control and to improve soil nutrient content. A cut in current bean prices by 1/2 would cause all 58 families who responded to maintain current levels of bean hectarages so as to meet family food requirements, although the sample data indicates that 66% of bean production was sold. Data also were collected for the value and quantity of total production, consumption, and family income in the Mgeta sample area. Total crop production was slightly higher in Langali both in terms of amount and value. Beans provided 21% of income from sale of crops in Kibaoni while the corresponding figure for Langali was 27%. For the av. family, bean consumption as a % of total bean production amounted to 47 and 24% in Kibaoni and Langali, resp. Beans accounted for 14% of total value of crop production in Kibaoni and 15% in Langali. For the area as a whole, 33% of beans produced was consumed at home and the remaining 67% sold. Regressions were computed to determine those factors which contributed most to variations in value of total crop production (VTP) in each area. From those regressions it was found that total labor equivalents exerted a statistically significant effect on VTP in Kibaoni (R^2 = 0.14) but not in Langali. When the total labor equivalents were disaggregated by sex neither male nor female labor equivalents had any significant effect on VTP in Kibaoni but female labor equivalents were significant in Langali. Farm operating costs and total hectarage had a significant and positive effect on VTP in Kibaoni and Langali, resp. Food consumption as a variable affecting VTP was positive and significant in both villages. Other variables, including no. of years farming and years of formal education, had no significant effect on VTP in either of the sampled areas. Major problems with respect to bean cultivation in the Mgeta area were insect damage and drought. The most preferred bean var. were Kabwebwe (yield and storage) and Kenya (palatability and marketability). In the majority of cases, husbands and wives together decide on types of seeds to be planted, so that if new var. are introduced, it is of vital importance that both be informed of their characteristics and performances. More detailed

information on resource use patterns, especially labor utilization by sex and utilization of the end-use patterns of the household, is needed as well as on-farm trial data. (AS)

1093

* DUE, J.M.; MANDAY, E.; WHITE, M.; ROCKE, T. 1984. Beans (Phaseolus vulgaris) in the farming systems in Arusha Region, Tanzania, 1982. Morogoro, Tanzania, University of Dar es Salaam. Department of Rural Economy. Technical Report no.3. 64p. [Univ. of Illinois at Urbana-Champaign, 305 Mumford Hall, 1301 West Gregory Drive, Urbana-IL 61801, USA]

The farming systems of 85 farm households (7.8 ac. av.; 22% allocated to beans) located in Hanang and Arumeru (mono- and bimodal rainfall patterns, resp.), Tanzania, were studied to provide socioeconomic and agricultural background data necessary to develop higher yielding, drought-, disease-, and pest-resistant var. and new technologies. Beans were found to be grown by 98% of the families sampled, and to provide 21% of gross value of crop production; 39 and 30% of the bean crop was sold in Hanang and Arumeru, resp. Insect damage was the main factor affecting bean yields in Hanang and excess rainfall in Arumeru. In terms of yields, var. Red Colored, Masai Red, and Canadian Wonder are preferred. Information is given on the most desired traits for bean var., storage, losses, harvesting, consumption (leaves, green beans, dried beans), preparation, and reaction of respondents to changing prices and to yield increases. (CIAT)

1094

DUE, J.M. 1983. Costs, returns and repayment experience of Ujamaa villages in Tanzania, 1973-1976, University Press of America, Washington, D.C.: 1980 and update on financing of smallholders in Zimbabwe, Zambia, and Tanzania. Illinois Agricultural Economics Staff Paper, 83 E-261. 26p.

1095

* DUE, J.M.; MANDAY, E.A. 1982. Beans in the farming systems in Hanang and Arumeru Districts, Arusha Region, Tanzania. Morogoro, Tanzania, University of Dar es Salaam. 63p. [Univ. of Illinois at Urbana-Champaign, 305 Mumford Hall, 1301 West Gregory Drive, Urbana-IL 61801, USA]

Farming systems in 2 bean producing districts in Arusha Region in Tanzania, namely Hanang and Arumeru, are discussed. Characteristics of these farming systems regarding major crops grown, labor utilization by crop, capital investment, farm operating costs, off-farm earnings, and family living expenditures are discussed. Problems farmers faced in the 1982 cropping season are also discussed. Farmers' preference for bean var. grown in the region is indicated. From the reported findings, it appears important for policy makers and bean research collaborators to plan their research to meet the expressed needs of farmers (recommendations on pest and disease control, improved seed, more palatable var., and improved storage). A farming systems approach to the development of bean production in the region and other ecologically similar zones is considered possible. (AS)

1096

* DUE, J.M.; ANANDAJAYASEKERAM, P. 1982. Two contrasting farming systems in Morogoro region, Tanzania: a report. Urbana, University of Illinois at Urbana-Champaign. Department of Agricultural Economics. 87p. [Univ. of

Illinois at Urbana-Champaign, 305 Mumford Hall, 1301 West Gregory Drive, Urbana-IL 61801, USA]

The farming systems in the Kilosa and Mgeta areas of Morogoro region (Tanzania) were studied as part of an interdisciplinary attempt to develop new higher yielding bean var. Data and results are presented for samples of 60 families drawn from each of these areas. In Kilosa, beans accounted for 8% of total value of production (65% consumed and 35% sold). Acreage planted to beans would change with changing prices. Highest gross return/ac came from rice, followed by beans. Sex differences in labor distribution were reported; women put in more labor in beans and rice. In Mgeta, beans (av. acreage 1.4) were grown by every family sampled, except one. On the av. 47% of the beans were consumed and 46%, sold. Differences between villages, production data, yields, and sales are given. Av. value of total production (VTP) was almost identical for the 2 areas. Beans contributed 15% of total value of production and 15% of total consumption/family. Regressions were computed to determine those factors contributing most to variation in value of total production in each area. (CIAT)

1097

* EBBELS, D.L.; ALLEN, D.J. 1979. A supplementary and annotated list of plant diseases, pathogens and associated fungi in Tanzania. Kew, Surrey, England, Commonwealth Mycological Institute. Phytopathological Paper no.22. 89p.

An updated checklist of plant diseases caused by fungi, viruses, bacteria, algae, and nematodes found in Tanzania is given. Information on disease symptoms, distribution, alt. range, and seasonal occurrence is provided as well as lists of known collections. Relevant literature is indicated where possible. Included in this list are the diseases that attack Phaseolus vulgaris: angular leaf spot (Isariopsis griseola), leaf spot (Alternaria sp.), common bacterial blight (Xanthomonas phaseoli), fuscous blight (X. phaseoli var. fuscans), root rot (Corticium rolfsii), BCMV, white leaf spot (Mycovellosiella phaseoli), and wilt (Fusarium oxysporum). (CIAT)

1098

EBBELS, D.L. 1974. A second supplementary checklist of Tanzanian plant diseases. Ukiriguru, Tanzania, Research and Training Institute. Progress Report no.18. 16p.

1099

EBBELS, D.L. 1973. A preliminary supplementary checklist of Tanzanian plant diseases. Ukiriguru, Tanzania, Research and Training Institute. Progress Report no.17. 40p.

1100

* GONDWE, M. 1984. Progress report on plant protection in beans at Lyamungu. [Abstract] Tanzania Bean Workshop, 2nd., Morogoro, Tanzania, 1983. Phaseolus Beans Newsletter for Eastern Africa no.2:10.

Plant protection expt. are carried out at higher alt. and chemical disease control trials are conducted with a view to advise farmers who grow beans as a cash crop. (AS)

1101

* HONGO, H.; KAREL, A.K. 1984. The effect of some plant extracts on insect pests of common beans. [Abstract] Tanzania Bean Workshop, 2nd.,

Morogoro, Tanzania, 1983. Phaseolus Beans Newsletter for Eastern Africa no.2:13.

The effectiveness of 4 plant extracts, neem kernels, neem leaves, tomato leaves, and hot pepper fruits, in protecting bean plants from important insect pests such as foliar beetles (Ootheca bennigseni), flower thrips (Taeniothrips sjostedti), and pod borers (Maruca testulalis and Heliothis armigera), was tested. Comparison was made with an insecticide treatment with gamma-HCH applied at the rate of 600 g a.i. in 400 l water/ha and an untreated control. Neem kernel and hot pepper fruit extracts were found to be as effective as gamma-HCH in protecting beans against insects, but they may have a repellent rather than an insecticidal effect as they do not kill Ootheca beetles and showed some antifeedant effect on pod borer larvae. Of all plant extracts tested neem kernel and hot pepper fruit extracts showed higher repellency to insect pests, much more than leaf extracts of neem and tomato. Neem kernels and hot peppers, being products of plants indigenous in Tanzania, seem to have good potential of becoming safe and cheap crop protectants for small farmers. (AS)

1102

* HONGO, H.; KAREL, A.K. 1983. The effect of some plant extracts on insect pests of common beans. Morogoro, Tanzania, University of Dar es Salaam. 12p.
Paper presented at the Tanzanian Bean Researchers Meeting, Morogoro, 1983.

The effectiveness of 4 plant extracts [neem (Azadirachta indica) kernel, neem leaves, tomato leaves, and hot pepper fruits] in protecting bean plants from insect pests was studied at the Faculty of Agriculture, Forestry, and Veterinary Science, Morogoro, Tanzania. Neem kernel and hot pepper fruits extracts were found to be as effective as gamma-HCH in giving good protection of beans. Sprays from plant extracts had repellent effects on insect pests. Neem kernel extract sprays also showed some antifeedant effect on the larvae of pod borers. Both neem kernel and hot pepper fruits extracts have potential in giving good protection of beans from insect pests; they are indigenous, safe, and readily available to farmers in Tanzania. (AS)

1103

* ISHABAIRU, T.R.; TERI, J.M. 1984. The effect of bean cultivar mixtures on disease severity and yield. [Abstract] Tanzania Bean Workshop, 2nd., Morogoro, Tanzania, 1983. Phaseolus Beans Newsletter for Eastern Africa no.2:16-17.

The value of bean cv. mixtures in disease management was studied in a field expt. conducted at the Morogoro U. Farm (Tanzania) during the April-July 1983 cropping season. Pure lines of beans used were: cv. TMO-125 (Selian Wonder) and TMO-101 susceptible to rust (Uromyces phaseoli); cv. TMO-42 (Kainja) susceptible to both rust and BCMV; TMO-8 (Mrasiri) susceptible to angular leaf spot (Isariopsis griseola) and cv. TMO-82, resistant or tolerant to all 3 diseases. These were planted in pure stands as well as in mixtures in which the 5 cv. were distributed in varying proportions (20% of each cv., or, in alternating order, 7, 13, 20, 27, and 33% of each). Pure lines, cv. mixtures and one natural mixture of landraces were compared as to disease incidence and severity as well as to yield and yield components (pods/plant, seeds/pod, 100-seed wt.). When comparing means for groups of pure lines and cv. mixtures, disease severity was found to be less in mixtures (the landrace mixture being least infected) than in pure line stands. Also, by the same comparison of means, mixtures yielded 24% more

than pure lines and the landrace mixture yielded 5% more than the mean yield of the other group of mixtures. It is suggested that there is a barrier effect from interplanted resistant cv. in mixtures to wind-blown spores of rust and angular leaf spot. Also, physiological races that developed on infected plants may not affect other susceptible plants to the same degree in mixed plots. For developing countries the use of cv. mixtures is thought more advisable than the use of multilines. (AS)

1104

JAKOBSEN, H. 1980. Bean production. A paper presented at the Research Extension Seminar, Mbeya.

1105

KAPUYA, J.A.; HOZA, J.T. 1983. Fine structure of the abscission layer in Phaseolus flowers under water stress conditions. Acta Botanica Neerlandica 32(4):307-311. [Dept. of Botany, Univ. of Dar es Salaam Morogoro, Tanzania]

1106

* KAREL, A.K. 1984. The effect of insecticides and plant population on insect pests and yield of common bean (Phaseolus vulgaris L.) [Abstract] Tanzania Bean Workshop, 2nd., Morogoro, Tanzania, 1983. Phaseolus Beans Newsletter for Eastern Africa no.2:11-12.

A split plot expt. carried out at Morogoro, Tanzania, using the indeterminate bean var. Selian Wonder (Canadian Wonder type), is reported. Bean pests such as foliar beetles (Ootheca bennigseni), flower thrips (Taeniothrips sjostedti), and pod borers (Maruca testulalis and Heliothis armigera) were controlled by spraying gamma-HCH insecticide at the rate of 600 g a.i. in 400 l water/ha at 10, 30, 45, and 60 days after planting as the main treatment. In the subplots beans were planted in rows 50 cm apart and 4 different plant populations (P_1, P_2, P_3, P_4, = 100, 200, 300, 400 x 10^3 plants/ha), obtained by resp. intrarow distances of 20, 10, 6.6, and 5 cm between plants, were the subtreatments. Although complete control of any one insect pest was not achieved in the sprayed plots, the incidence of or the damage caused by the different insect species was significantly reduced. The extent of leaf damage by Ootheca and flower infestation by thrips was not influenced by plant density. Flower and pod damage by Maruca and Heliothis was lower, but not always significantly lower, at plant densities of 200 x 10^3 plants/ha (P_2) than at other densities. Seed yield, pod yield, no. of pods/plant, and seed wt. were significantly higher in sprayed plots than in unsprayed ones. At population density P_2 the highest seed yield (1238 kg/ha) was obtained with significant increases in pods/plant, seeds/pod, and seed size. Yield decreases beyond P_2 are explained by competition for nutrients, moisture, light, and other factors at higher densities entailing lower flower and pod production. A positive correlation between seed yield and pods/plant (r=+0.56), seeds/pod (r=+0.73), and seed size (r=+0.25) were found, indicating that an increase in these yield components also increases the seed yield. Moreover, a negative correlation coefficient was found between the seed yield and flower damage (r=-0.84) and pod damage (r=-0.80), indicating that the higher the flower and pod damage by pod borers, the lower will be the seed yield. The highest recorded flower damage by Maruca and Heliothis was 28% at 40 days after planting whereas pod damage at 50 days after planting was 0.7 and 6.5%, resp. (AS)

1107

* KAREL, A.K. 1984. Incidence and control of pod borers on common beans (Phaseolus vulgaris L.). Bean Improvement Cooperative. Annual Report 27:189-190. [Dept. of Crop Science, Univ. of Dar es Salaam, Box 3005, Morogoro, Tanzania]

An expt. was carried out at the Faculty of Agriculture of the U. of Dar es Salaam, Morogoro, Tanzania, to study the incidence and control of the pod borer Maruca testulalis and the American bollworm (Heliothis armigera). A randomized block design was used with 4 replications and 7 treatments (endosulfan 35 EC, gamma HCH, DDT 25%, fenitrothion, dimethoate, carbaryl, and a control). A higher no. of larvae of M. testulalis was counted than of H. armigera in all treatments. Bean yield was significantly higher for all treatments sprayed with insecticides. The highest yield (1447 kg dry seed/ha) was recorded in plots treated with gamma HCH. (CIAT)

1108

* KAREL, A.K. 1984. Integrated pest control on beans (Phaseolus vulgaris L.) in Tanzania. [Abstract] Tanzania Bean Workshop, 2nd., Morogoro, Tanzania, 1983. Phaseolus Beans Newsletter for Eastern Africa no.2:12-13.

Expt. on pest control in beans testing a commercial w.p. formulation of Bacillus thuringiensis and gamma-HCH sprays, singly or in combination, are reported. Two applications of B. thuringiensis during the postflowering period controlled pod borer larvae of Maruca testulalis and Heliothis armigera more effectively than 2 HCH sprays given during the same period. The 2 treatments might be combined or given in succession during the season as a method of integrated pest control. A definite setback would be that the bacterial formulation is more expensive than gamma-HCH and much less easily available in Tanzania. (AS)

1109

* KAREL, A.K. 1984. Yield losses from and control of bean pod borers, Maruca testulalis (Geyer) and Heliothis armigera (Hb) in Tanzania. [Abstract] Tanzania Bean Workshop, 2nd., Morogoro, Tanzania, 1983. Phaseolus Beans Newsletter for Eastern Africa no.2:13-14.

A trial was carried out at Morogoro (Tanzania) on the control of bean pod borers, Maruca testulalis and Heliothis armigera, known to infest bean flowers and pods, and, to a lesser extent, also bean leaves, and causing a decrease of seed yield between 20-50% in some local bean var. Six different insecticide treatments in combination with a control check (no insecticide) were used. The following insecticides were applied at the rates (in g a.i./400 l/ha) indicated: endosulfan 35 EC, 500 g; gamma HCH 20%, 600 g; DDT 25% M.O., 1000 g; fenitrothion 50 EC, 800 g; dimethoate 40 EC, 800 g; and carbaryl 85 S, 1000 g. Each insecticide was applied 4 times at 10 day-intervals starting at the onset of flowering (35 days after planting). In this trial Maruca larvae largely outnumbered Heliothis larvae on flowers and pods where most larvae were found. In the control checks, flower damage of larvae of both species at 61 days after planting had reached 31%, seed damage was 17.5%, whereas pod damage by Maruca (32.5%) was found to be much more serious than that by Heliothis (12.5%). Some insecticides significantly reduced the no. of pod borer larvae on flowers and pods and subsequently the damage to flowers, pods and seeds, resulting in significant increases of seed yield. Taking into account the current prices in Tanzania for the different insecticides the net monetary gain obtained after applying gamma-HCH, carbaryl, endosulfan, and fenitrothion were all

substantial, with gamma-HCH as the most economical insecticide. DDT and dimethoate were much less economical at the rate applied. (AS)

1110

* KAREL, A.K.; RWEYEMAMU, C.L. 1984. Yield losses in field beans following foliar damage by Ootheca bennigseni (Coleoptera:Chrysomelidae). Journal of Economic Entomology 77(3):762-765. [Univ. of Dar es Salaam, Dept. of Crop Science, Box 3005, Morogoro, Tanzania]

The effects of the foliar beetle (Ootheca bennigseni) infestation on seed yield of several bean cv. were studied. In the absence of insecticide protection during preflowering growth stage, cv. Selian Wonder and Masonga suffered high yield losses and were considered susceptible to O. bennigseni. Cv. T8 and Mexican 142 had comparatively lower damage ratings of 1.31 and 1.38, resp., compared with 2.26 and 2.56 for Selian Wonder and Masonga on a 0-5 damage scale, and were considered resistant. Nonpreference and tolerance were the mechanisms of resistance. Bean seed yield losses from 18 to 31% resulted from foliar damage by O. bennigseni. Although the yields in T8 and Mexican 142 were significantly higher than those in susceptible cv., there was an increase in the yield when these cv. were sprayed with insecticides because of their resistance to O. bennigseni. These data suggest that for resistant cv., 1 or 2 sprays can appreciably reduce foliar damage by O. bennigseni and increase seed yields. (AS)

1111

KAREL, A.K. 1983. Evaluation of bean varieties for resistance to beanfly, Ophiomyia phaseoli, Tryon. Morogoro, Tanzania, University of Dar es Salaam. Department of Crop Science.
Paper presented at the Tanzanian Bean Researchers Meeting, Morogoro, 1983.

1112

KAREL, A.K. 1983. Integrated pest management in beans in East Africa. Morogoro, Tanzania, University of Dar es Salaam. Department of Crop Science.
Paper presented at the International Workshop in Integrated Pest Control of Grain Legumes, Gisania, Brazil, 1983.

1113

* KAREL, A.K.; QUENTIN, M.E. 1983. Potentials of integrated pest management in agriculture. Morogoro, Tanzania, University of Dar es Salaam, Department of Crop Science. 27p. [Dept. of Crop Science, Univ. of Dar es Salaam, P.O. Box 3005, Morogoro, Tanzania]
Paper presented at a Workshop on Resource-Efficient Farming Methods for Tanzania, Morogoro, 1983.

A detailed literature review on the need to incorporate an integrated pest management program into cultivated areas is presented. The following aspects were highlighted: definition, justification, operation, tools used (host plant resistance; biological, cultural, physical, mechanical and chemical control), the achievements and obstacles to integrated pest management programs. Governmental support is fundamental for this program implementation, as well as the development of an information system and adequate coordination at a national and regional level. (CIAT)

1114

KAREL, A.K. 1983. Yield losses from and control of bean pod borers, Maruca testulalis (Geyer) and Heliothis armigera (Hb.) in Tanzania. Morogoro, Tanzania, University of Agriculture. Department of Crop Science.

1115

* KAREL, A.K. 1982. The effect of insecticide and plant populations on the insect pests and yield of common bean (Phaseolus vulgaris L.). Morogoro, Tanzania, University of Dar es Salaam. Department of Crop Science. 16p.

An expt. was conducted to study the effect of plant populations, with and without insecticide application, on the insect pests and yield of common beans in Tanzania. A split plot design was used with sprayed and unsprayed plots as the main treatment and 4 plant populations (100,000, 200,000, 300,000, and 400,000 plants/ha as P1, P2, P3, and P4, resp.) as subtreatments. Incidence of and damage caused by Ootheca bennigseni were significantly higher in unsprayed than in sprayed plots. Folier damage was less at P2 than at P1, P4, and P3. Flower thrips (Taeniothrips sjostedti) counts were low in sprayed plots as compared with unsprayed ones. However, these counts were not significantly different at different plant populations although the insect counts increased with increasing plant populations. Unsprayed plots had more flower and pod damage caused by pod borers Maruca testulalis and Heliothis armigera. P2 and P3 had comparatively less flower and pod damage by larvae of the 2 pod borer species. Insecticide applications effectively controlled the insect pests in the sprayed plots. Seed yield was significantly higher in sprayed plots than in unsprayed ones. Av. seed yield in sprayed plots was 1275 kg/ha. Seed yield was low at P1, increased with P2, and then decreased with P3 and P4. P2 had the highest seed yield (1238 kg/ha), no. of pods/plant, no. of seeds/pod, and seed size. Possible reasons for reduced seed yield beyond population P2 are discussed. Positive correlations between seed yield and no. of pods/plant ($r = 0.56$), no. of seeds/pod ($r = 0.73$), and seed size ($r = 0.25$) were found, indicating that an increase in these yield components also increases seed yield. Moreover, a negative correlation coefficient was found between seed yield and flower damage ($r = -0.843$), and pod damage ($r = -0.804$), indicating that the higher the flower and pod damage by pod borers, the lower the seed yield. (AS)

1116

* KAREL, A.K. 1982. Effect of insecticide applications on insect pests and yield of common beans, Phaseolus vulgaris L., in Tanzania. Morogoro, Tanzania, University of Dar es Salaam. Department of Crop Science. 5p. Paper presented at the Tanzanian Bean Researchers Meeting, Morogoro, 1982.

During the 1981 cropping season the effect of DDT (800 g a.i./500 l of water/ha), applied at different growth stages of bean plants, was studied at the Faculty of Agriculture Crop Museum, Morogoro, Tanzania. Var. Selian Wonder was used in a randomized block design with 4 replications and 6 treatments: 2, 3, 4, 5, and 6 applications at 20, 40; 15, 30, 45; 15, 30, 45, 60; 15, 30, 40, 50, 60; and 15, 25, 35, 45, 55, 65 days after planting, resp., and a check. Damage by Ootheca bennigseni was as high in plots with 2 or 3 applications as that of the check. Plant damage by the bean fly Ophiomyia phaseoli was more or less the same in all plots. Thrip (Taeniothrips sjostedti) counts were low in plots treated more than 3 times and pod damage by Maruca testulalis was also low in plots treated with 6 applications. It was concluded that 5 applications of an effective

insecticide at 15, 30, 40, 50, and 60 days after planting could effectively control bean pests and therefore increase seed yield. (CIAT)

1117

* KAREL, A.K. 1982. Evaluation of bean varieties from CIAT for yield and adaptability in Tanzania. Morogoro, Tanzania, University of Dar es Salaam. Department of Crop Science. 3p.
Paper presented at the Bean Research Meeting, Morogoro, 1982.

A trial was conducted at the Faculty of Agriculture Crop Museum, Morogoro, Tanzania, to evaluate the yield and adaptation of 6 CIAT cv. (BAT 1230, BAT 1296, BAT 1297, Linea 22, Linea 23, and Linea 24) together with 2 local var. (Selian Wonder and Masonga). A randomized complete block design with 3 replications was used. Leaf damage by Ootheca bennigseni, on a visual scale of 0-5, and pod damage by pod borers Maruca testulalis and Heliothis armigera were assessed. The leaf damage by Ootheca was moderate to high. Cv. BAT 1296, BAT 1297, and var. Selian Wonder showed less leaf damage. The % of pod damage by pod borers was moderate to high in most cv. with the exception of Linea 22 and BAT 1297. CIAT's Linea 22 gave the highest seed yield (1501 kg/ha). CIAT cv. gave av. yields of 800 kg/ha. The lowest yield was obtained with local var. Masonga (574 kg/ha). (CIAT)

1118

* KAREL, A.K. 1982. Insect pest complex of common beans Phaseolus vulgaris L. in Tanzania. Morogoro, Tanzania, University of Dar es Salaam. Department of Crop Science. 4p.
Paper presented at the Tanzanian Bean Researchers Meeting, Morogoro, 1982.

Insects were surveyed and collected from unsprayed plots in various bean producing areas of Tanzania to determine major insect pests. Incidence and duration of their peak activity on var. Canadian Wonder and Selian Wonder were recorded. A total of 43 insect species were recorded feeding on beans in different parts of Tanzania during the 1980-82 cropping seasons. Of these pests, the following 8 are economically important: bean fly (Ophiomyia phaseoli), aphids (Aphis fabae), flower thrips (Taeniothrips sjostedti), pod borers (Maruca testulalis and Heliothis armigera), bruchids (Acanthoscelides obtectus), Ootheca bennigseni, and Acanthomia horrida. A table on time of occurrence and peak activity of these pests is included as well as a list of all of the insect pests of beans in Tanzania. (CIAT)

1119

KAREL, A.K. 1982. Insect pests of beans (Phaseolus vulgaris L.) in Tanzania and their control. Morogoro, Tanzania, University of Dar es Salaam. Department of Crop Science.
Paper presented at the Tanzanian Bean Researchers Meeting, Morogoro, 1982.

1120

KAREL, A.K. 1982. Investigation on the control of African army worm (Spodoptera exempta Walk) using Bacillus thuringiensis and insecticides. Morogoro, Tanzania, University of Dar es Salaam. Department of Crop Science.
Paper presented at the International Conference on the Control of Army Worm and Other Migrant Pests in Eastern Africa, Arusha, Tanzania, 1982.

1121

KAREL, A.K. 1982. Investigations on the biology and control of pod borers of common beans (Phaseolus vulgaris) in Tanzania. Bulletin of Entomological Research. (In press)

1122

* KAREL, A.K. 1982. Investigations on the effect of time of planting on insect pests and yield of common beans, Phaseolus vulgaris L. Morogoro, Tanzania, University of Dar es Salaam. Department of Crop Science. 4p. Paper presented at the Tanzanian Bean Researchers Meeting, Morogoro, 1982.

An expt. was carried out at the Faculty of Agriculture Crop Museum, Morogoro, Tanzania, to determine the optimum time of planting of beans. Var. Selian Wonder was used in a randomized block design with 4 replications. Planting was done on 6 different dates at weekly intervals starting April 7, 1982. Damage by Ootheca bennigseni, thrips (Taeniothrips sjostedti), and pod borers (Maruca testulalis and Heliothis armigera) was assessed. Damage to leaves by Ootheca was heavier in beans planted on the 1st dates compared with those planted on later dates. Infestation by flower thrips was moderate during the 1st 2 plantings; however, in later planted beans infestation was high. Damage to pods by pod borers was low in early planted beans but higher in later planted beans, reducing pod and seed yields. Pod and seed yields for the 1st 2 planting dates were good (754 and 826 kg seed/ha and 1061 and 1174 kg pods/ha, resp.). Seeds yields of beans planted on later dates were drastically reduced. In general, the best time for planting beans should be within 15 days from the onset of rains. (CIAT)

1123

KAREL, A.K. 1982. A method for screening of Phaseolus beans for resistance to foliar beetle, Ootheca bennigseni Sahlb. Journal of Economic Entomology. (In press). [Dept. of Crop Science, Univ. of Agriculture, P.O. Box 3042, Morogoro, Tanzania]

1124

* KAREL, A.K. 1981. Integrated pest control in beans, Phaseolus vulgaris, in Tanzania. In International Congress of Plant Protection, 10th., Brighton, England, 1983. Proceedings of a conference; plant protection for human welfare. London, British Crop Protection Council. v.3,p.955. [Dept. of Crop Science, Univ. of Dar es Salaam, P.O. Box 3005, Morogoro, Tanzania]

In an attempt to reduce the use of insecticides and to minimize the long-term effect of their continual use on beans, an expt. was carried out at the U. of Dar es Salaam, Morogoro (Tanzania) in 1982, using cv. Kabanima, moderately resistant to the bean fly Ophiomyia phaseoli and to the foliar beetle Ootheca bennigseni. A randomized block design was used with 4 replications and 6 treatments (several applications of insecticides and/or several applications of Bacillus thuringiensis commercial w.p. formulation at 16 x 10^6 I.U.) and a control. The foliar beetle caused a high level of damage in treatments in which no control measures were taken during the preflowering stage. Two applications of insecticide produced significantly lower Ootheca damage. Five applications of insecticide gave best control of flower thrips (Taeniothrips sjostedti), although counts were not significantly different from other treatments. Flower and pod damage by Maruca testulalis was higher in the control. B. thuringiensis was effective in controlling pod borer larvae. Three applications of

insecticides + 2 applications of B. thuringiensis produced highest yields (1308 kg dry seed/ha). (CIAT)

1125

KASHULIZA, A. 1981. Farming systems research in selected villages in Kilosa District with special reference to the bean crop. B.Sc. Thesis. Morogoro, Tanzania, University of Dar es Salaam.

1126

* KOINANGE, E. 1984. Progress report on bean breeding at Lyamungu. [Abstract] Tanzania Bean Workshop, 2nd., Morogoro, Tanzania, 1983. Phaseolus Beans Newsletter for Eastern Africa no.2:7.

Bean breeding trials carried out at Lyamungu, Tanzania, are reported. Research planned at Lyamungu is on resistance to anthracnose (Colletotrichum lindemuthianum), rust (Uromyces phaseoli), and viruses, whereas the agronomy program consists of trials on time of planting, spacing and density, relative time of interplanting beans in maize. (AS)

1127

MACARTNEY, J.C.; WATSON, D.R.W. 1966. Beans. Dar es Salaam, Tanzania, Ministry of Agriculture. Tengeru Report no.89. pp.1-28.

1128

* MADATA, C.S. 1984. Phaseolus Beans Improvement Project at UAC, Mbeya. Breeding Programme, Progress Report for the 1982/83 season. [Abstract] Tanzania Bean Workshop, 2nd., Morogoro, Tanzania, 1983. Phaseolus Beans Newsletter for Eastern Africa no.2:6-7.

Several projects on Phaseolus bean improvement at Uyole Agricultural Centre, Mbeya, Tanzania, are briefly reported. The breeding program started in 1973 to identify and select cv. adapted to the Southern Highlands in terms of high yield, disease resistance, and acceptability. New materials, both local accessions and introductions, are currently observed and screened, mostly in monoculture, for yield performance, agronomic characters, and disease resistance, at Mbeya and at other sites such as Mbimba, Ismani, Nkundi, Ndengo, and Suluti. Yield performance data was presented for 2 trials at Mbeya and Mbimba. Best var. at Uyole Agricultural Centre yielded well over 2 t/ha, but the same yielded less than half of that amount at Mbimba, which could not be explained. The most consistently high yielding var. P.304 was outyielded during the 1982/83 season at Mbeya by EAI 2521 (3.7 t/ha), a cv. is recorded in the germplasm collection list of the Grain Legume Project as a black bean of Mexican origin. Both trials included var. YC-2 and T_3, earlier introductions from Kenya and known there as GLP-2 and GLP-3, resp. In the Southern Highlands of Tanzania, beans grown during the 1st long rains season are mostly intercropped with maize and harvested before the end of the rains. Disease-resistant bean var., the seeds of which do not germinate when still in the pod, are considered the most suitable for intercropping. A preliminary maize/bean intercropping trial undertaken at Uyole Agricultural Centre showed significant differences for beans with clear reduction in yield when intercropped. Performance trials carried out during 2 seasons at Mbeya, one with high rainfall and one with low rainfall, showed that whereas quite a no. of var. seem to be adapted to high rainfall conditions, some var. such as Selian Wonder, GO 5476, and C.G. 75-2 yield rather poorly with high rainfall. A start has been made with village bean var. demonstration trials to evaluate

performance of released var. under farmers conditions in comparison with their own var. and to introduce agronomical recommendations to the farmers. (AS)

1129

* MADATA, C.S.; MKUCHU, M.M. 1983. Phaseolus beans improvement programme. Progress report (1981/82) and proposed projects (1982/83). Mbeya, Tanzania, Uyole Agricultural Centre. 12p.
Report presented at the Bean Researchers Meeting, Morogoro, Tanzania, 1982.

Results of research carried out during the 1981-82 cropping season at the Uyole Agricultural Centre (UAC), Mbeye, Tanzania, are given. In the bean uniform cv. trial, the performance of 16 cv. was evaluated at 2 sites (UAC and Nkundi) regarding: yield; resistance to angular leaf spot (Isariopsis griseola), rust (Uromyces phaseoli), and anthracnose (Colletotrichum lindemuthianum); and consumer acceptability. Breeding lines P.304 and Kabanima yielded over 3 t/ha at UAC and local var. Masusu and Kablanketi had low yields. In the preliminary yield trial, the performance of 44 promising lines that were under observation was compared with that of 6 check var. Kabanima gave the highest yield (6 t/ha); CIAT GO 5746 and local line FB/GP 246-3 also gave high yields (4.0 and 4.8 t/ha, resp.). Agronomic characteristics, yield, and resistance to diseases of 69 lines from CIAT germplasm, more than 600 progenies of the UAC germplasm collection, and 2 checks were assessed in a single row trial. Several of the 69 CIAT lines gave higher yields than Kabanima and were also resistant to most of the diseases. In the trial to determine the most adequate planting times, cv. Canadian Wonder, T3, and Kabanima were evaluated for 4 planting times spaced at 2-wk. intervals. There were significant differences in yield among the 3 cv. and among the 4 planting times for Kabanima and T3. Cv. Canadian Wonder (early maturing) should be planted in March-Feb. and cv. Kabanima (late maturing) in Feb. The research projects proposed for the 1982-83 season are listed. (CIAT)

1130

* MADATA, C.S. 1983. Phaseolus beans improvement project at U.A.C. Breeding programme, progress report for 1982/1983 season. Mbeya, Tanzania, Uyole Agricultural Research Centre. 12p.

Results of trials carried out by the Phaseolus bean improvement program at the Uyole Agricultural Research Centre (UAC) in Tanzania during the 1982-83 season are briefly analyzed. In the bean uniform cv. trial, the performance of 16 lines was assessed at 6 localities (UAC, Ismani, Mbimba, Nkundi, Ndengo, and Suluti) to determine their yield potential. For the trials at UAC and Mbimba, significant differences were found in yield among lines and among sites. At UAC, breeding lines FB/GP 246-3 and P.304 gave the highest yields. In the preliminary yield trial, the yield, agronomic characteristics, and reaction to diseases of 30 promising bean lines were evaluated at 3 sites (UAC, Ismani, and Mbimba). At UAC, line EAI 2521 gave the highest yield (3727 kg/ha), followed by P.304 (2781 kg/ha); at Mbimba, line P.304 gave the highest yield (1127 kg/ha). Av. yield for both sites was 1860 and 788 kg/ha, resp. The performance of 20 bean lines, mainly from CIAT, was evaluated regarding yield, agronomic characteristics, and resistance to rust (Uromyces phaseoli), angular leaf spot (Isariopsis griseola), anthracnose (Colletotrichum lindemuthianum), and viruses during 2 planting seasons. The performance of 6 bean var. planted in monoculture and in association with maize var. H6302 was also studied at UAC and significant differences were found among bean var. in monoculture and in association.

Yields of beans in monoculture and in association were 1856 and 1267 kg/ha, resp. The performance of released var. Kabanima and T3 was tested under field conditions with 2 local var., Masusu and Kablanketi, and 2 replications (with and without fertilizer). Differences were observed between var. and between replications. (CIAT)

1131

* MAGEHEMA, O.S.; NDUNGURU, B.J. 1984. Comparative growth studies of beans (Phaseolus vulgaris L.) under different fertilizer regimes. [Abstract] Tanzania Bean Workshop, 2nd., Morogoro, Tanzania, 1983. Phaseolus Beans Newsletter for Eastern Africa no.2:23-24.

1132

* MAGEHEMA, O.S.; NDUNGURU, B.J. 1983. Comparative growth studies of beans (Phaseolus vulgaris L.) under different fertilizer regimes. Morogoro, Tanzania, University of Dar es Salaam. Department of Crop Science. 21p.
Paper presented at the Tanzania Bean Workshop, 2nd., Morogoro, 1983.

An expt. was carried out at the Faculty of Agriculture, Forestry, and Veterinary Science, Morogoro, Tanzania, to determine the growth patterns of bean var. Selian Wonder and Kabanima. A split plot design was used with 4 replications; main plots corresponded to the var. and subplots to 4 fertilizer treatments (T_1 - check; T_2 - 60 kg each of N and P/ha, T_3 - 20 t FYM/ha; T_4 - a combination of 10 t FYM + 30 kg each of N and P/ha). Samples of 5 plants were taken from each subplot at weekly intervals beginning 14 days after planting. The following data were recorded for each sample: diameter of 1st internode of main stem, no. of primary branches, leaf area, and no. of pods/plant. N fixation activity was estimated by the acetylene reduction technique. During the initial stages of growth there were few significant differences between var. Differences in vegetative growth during pod production were sufficiently large to account for varietal differences in seed yield. Nodulation and N fixation are inhibited with the application of N in early stages of growth. The application of fertilizer significantly increased the diameter of the 1st internode, the no. of primary branches, plant wt., leaf area, total dry wt., and no. of pods/plant, but did not affect the no. of nodes in all var. For Morogoro conditions, fertilizer increases seed yield in Selian Wonder, but reduces it in Kabanima. (CIAT)

1133

* MANDAY, E.A.; DUE, J. 1984. The role of beans in Hanang and Arumeru Districts in Arusha Region. [Abstract] Tanzania Bean Workshop, 2nd., Morogoro, Tanzania, 1983. Phaseolus Beans Newsletter for Eastern Africa no.2:9-10.

Data collected on the role of beans in the farming systems economy of Hanang and Arumeru District villages of Arusha Region, Tanzania, are presented. In both districts 2 crops of beans are grown, one during the long rains, mostly intercropped with maize, and one as a monocrop during the short rains. Largely a subsistence crop, beans are mainly for household consumption in Arumeru, but in Hanang about equal amounts are sold on the market and consumed. Wastage and storage surplus % are much lower in Arumeru than in Hanang District, where each may reach 25% of the amount of bean produced. Small-scale farmers in Hanang would not feel inclined to change the acreage planted to beans if bean prices were halved or doubled. Green bean pods and leaves are consumed by farmers' households but not sold on the market. Var. preferences may differ depending on whether beans are

consumed as leaves, pods, or dry bean seeds. Yield characteristics, palatability, and storability for dry beans would be criteria for preferences. In both Arumeru and Hanang Districts the Red Variety (Masai Red) was the most preferred bean type because of high yield, closely followed by Canadian Wonder, with white-seeded and local var. much less favored. In Hanang, Red Variety and Canadian Wonder were considered equally palatable for leaves, pods, and seeds, and dry bean storability was much the same; however, in Arumeru the Canadian Wonders were largely preferred. Two other studies on farming systems conducted in different villages of the Morogoro Region (1982, 1983) are described. (AS)

1134

* MATEE, J.J.; KAREL, A.K. 1984. Investigation on chemical control of beanfly (Ophiomyia phaseoli Tryon). [Abstract] Tanzania Bean Workshop, 2nd., Morogoro, Tanzania, 1983. Phaseolus Beans Newsletter for Eastern Africa no.2:12.

Chemical control of bean fly (Ophiomyia phaseoli) on common beans is discussed. The effectiveness of 5 different insecticides (aldrin, gamma-HCH, endosulfan, pyrethrum, and DDT) applied singly as wet seed dressings, foliar sprays at 18, 25, 32, and 38 days after planting and combinations of seed dressing and sprays, was evaluated at Morogoro, Tanzania, using bean var. Kabanima. Of all the insecticide treatments tested, a wet seed dressing of aldrin, applied at the rate of 300 g/100 kg seed, resulted in the best bean fly control, only 7% infested vs. 42% in the untreated control. Combining initial aldrin seed dressing with foliar sprays of gamma-HCH at later times gave no better control. Highest seed yield was obtained when seeds were dressed with pyrethrum at the rate of 60 g/100 kg seed before planting. (AS)

1135

* MATEE, J.J.; KAREL, A.K. 1983. Investigation on chemical control of beanfly (Ophiomyia phaseoli Tryon) on common beans (Phaseolus vulgaris L.). Morogoro, Tanzania, University of Dar es Salaam. Department of Crop Science. 10p.
Paper presented at the Tanzanian Bean Researchers Meeting, Morogoro, 1983.

The effectiveness of 5 insecticides in the form of wet seed dressing, sprays, and combination of seed dressing and sprays for the control of bean fly (Ophiomyia phaseoli) on common beans was evaluated. Fourteen different treatments were used. Pyrethrum 6% at 60 g/100 seeds and DDT 85% at 300 g/100 kg seeds as wet seed dressings gave good control of O. phaseoli. Four foliar sprays with gamma-HCH and combination of seed dressing with aldrin and foliar sprays with gamma-HCH also resulted in significantly lower bean fly infestation. None of the insecticides used gave complete control of the bean fly. The plants in these treatments had more vigorous growth following bean fly infestation than other treatments. Seed yields in all the treatments were significantly higher than the control. However, seed yields in all treatments were not statistically and significantly ($P = 0.05$) different from each other. Treatment with pyrethrum seed dressing gave the highest seed yield (1696 kg/ha). (AS)

1136

MATERU, M.E.A. 1968. The biology and bionomics of Acanthomia tomentosicollis Stal and A. horrida Germ. (Coreidae, Hemiptera) in Arusha area of Tanzania. Ph.D. Thesis. Nairobi, University of East Africa. 241p.

1137

* MAYONA, C.M. 1982. Nitrogen and phosphorus fertilization in Phaseolus vulgaris L., in the Southern Highlands: a progress report. Mbeya, Tanzania, Uyole Agricultural Centre. 8p.
Report presented at Bean Researchers Meeting, Morogoro, Tanzania, 1982.

During the 1981-82 growing season, a fertilizer trial was conducted in 5 locations in Tanzania (Nkundi, Mbimba, Magamba NAFCO Maize Farm in Mbozi, Uyole, and Mitalula) to determine the effect of 3 dosages of N (0, 50, and 100 kg/ha) and 5 of P (0, 50, 100, 150, and 200 kg/ha) and their interaction in bean cv. Kabanima and T_3. A systematic design with 4 replications was used. Both fertilizers were broadcasted and then incorporated into the soil prior to planting. Bo, Cu, Zn, Mo, and Mg were also applied. At Mbozi and Uyole, combined N and P fertilization produced the highest responses in no. of pods and seed/ha compared with P or N alone. Data for the other sites are not included. Kabanima was more responsive to N and P fertilization than T_3. Higher responses to N and P were reported at Uyole and Mbozi, resp. (CIAT)

1138

* MAYONA, C.M. 1982. Weeding intensity in Phaseolus beans: progress report. Mbeya, Tanzania, Uyole Agricultural Centre. 6p.
Report presented at Bean Researchers Meeting, Morogoro, Tanzania, 1982.

In 1981-82 a study was initiated to determine the critical stage of weed competition in the Southern Highlands of Tanzania (Mbimba, Uyole, and Mitalula), as well as optimum and economical weeding schedules for higher bean yields. A split plot design was used, with 14 weeding regimes as main plots, 2 cv., Kabanima and T3, as subplots, and 3 replications. Partial data are given. Yield differences between treatments were marked. A single weeding at 30 days after emergence produced 260 and 320 kg seed/ha more than 3 weedings started from day 28 after emergence, for Kabanima and T3, resp. Early weeding from 7 to 14 days after emergence (at weekly intervals) gave the highest yields at Uyole: Kabanima yielded 2130 and 2400 and T3, 1960 and 1950 kg/ha, resp., for these 2 weeding treatments. Weeding after 30 days from emergence gave low yields irrespective of cv. and frequency. At Uyole, frequency of weeding is important for high yields provided it is done earlier than 21 days after emergence. (CIAT)

1139

MDOE, N.S.Y.S. 1982. Farming systems research in selected villages in Mgeta Area, Morogoro District, Tanzania, B.Sc. Thesis. Morogoro, Tanzania, University of Dar es Salaam.

1140

* MISANGU, R.N.; DOTO, A.L. 1984. Character associations among bean varieties. [Abstract] Tanzania Bean Workshop, 2nd., Morogoro, Tanzania, 1983. Phaseolus Beans Newsletter for Eastern Africa no.2:7-8.

Character associations among bean var. are reported, based on a trial comparing 50 local bean cv. on characters such as grain yield potential, disease and pest resistance as well as for other agronomic characters. Two spraying regimes and 2 planting dates were used at Morogoro, Tanzania. Seed size, pod length, and no. of pods/plant were each highly and positively associated with grain yield. Large-seeded bean types are preferred by farmers and pod length and pods/plants can adequately be estimated in the field. All 3 characters are useful selection criteria. The rather wide spacing used of 75 x 50 cm may have changed the effect of different factors

influencing individually growing plants rather than normal bean populations. (AS)

1141

* MISANGU, R.N. 1984. Integrated breeding procedure for bean improvement. [Abstract] Tanzania Bean Workshop, 2nd., Morogoro, Tanzania, 1983. Phaseolus Beans Newsletter for Eastern Africa no.2:5-6.

A breeding procedure is proposed for the Morogoro Bean Improvement Program Tanzania, which model is intended to serve as a guideline to all bean collaborators in their joint efforts to produce improved bean var. for Tanzania. Some materials from Uyole, Morogoro, Lyammgu, Prosser, and CIAT that are superior to Tanzanian standard var. such as Canadian Wonder and Selian Wonder have been identified and will be selected as parents for hybridization in all possible combinations for breeding for resistance to the most important diseases and insect pests for tolerance to drought, heat and cold, and for their ability of fixing atmospheric N. Plants resistant to the different diseases from the segregating populations in the F_2 will be identified after inoculation with the appropriate inoculum and intercrossed to obtain dihybrids with multiple disease resistance. Progeny testing of the F_3 will include identification of resistant lines and evaluation for grain quality and bruchid resistance. Promising lines will enter the next cycle in which widely adopted var. will be finally selected in multilocation preliminary trials at Morogoro, Uyole, and Lyamungu. Evaluation for nodulation, drought and heat tolerance will be carried out for progeny from F_5 seeds. The F_6 seeds from the most promising lines will be used for testing in multilocation national yield trials, with and without inputs. Elite bulks of the high yielding lines are used to produce breeders' seed of var. with wide genetic base. (AS)

1142

* MISANGU, R.N.; KESWANI, C.L. 1984. Screening of bean lines for disease resistance under Morogoro conditions. [Abstract] Tanzania Bean Workshop, 2nd., Morogoro, Tanzania, 1983. Phaseolus Beans Newsletter for Eastern Africa no.2:5.

Disease resistance screening at Morogoro, Tanzania, of 153 different F_2 lines that had resulted from a hybridization program at Prosser, USA, is described. Forty-five parent lines from different countries such as Tanzania, Uganda, USA, Puerto Rico, and Kenya (mostly Grain Legume Project var.) were used. Of the 146 F_2 lines that germinated only 17 showed infection by rust (Uromyces phaseoli) and 47 were found to be susceptible to angular leaf spot (Isariopsis griseola), but there was no infection by BCMV. However, disease escape might have occurred in the late planted 1983 trial under Morogoro conditions. (AS)

1143

* MISANGU, R.N. 1984. Yield potential of some selected bean varieties in Tanzania. [Abstract] Tanzania Bean Workshop, 2nd., Morogoro, Tanzania, 1983. Phaseolus Beans Newsletter for Eastern Africa no.2:24-25.

Yield potential of 14 selected bean var. were compared with the standard var. Selian Wonder and the promising var. Kabanima. Fertilizers were applied at the rate of 20 kg N and 50 kg P/ha, just before planting. Accession no. TMO-101 outyielded all other entries. For its brown seed color it may be preferred by consumers but it is highly susceptible to both angular leaf spot (Isariopsis griseola) and BCMV. Because of its high yield

TMO-101 may be considered a superior parent and by mass selection its susceptibility to diseases may be reduced. (AS)

1144

* MISANGU, R.N.; DOTO, A.L. 1982. Character association among bean varieties. Morogoro, Tanzania, University of Dar es Salaam. 10p.

Fifty local bean cv. were evaluated for grain yield potential, disease and pest resistance, and other agronomic characters under 2 spraying regimes and 2 planting dates at Morogoro, Tanzania. The data obtained was then subjected to both variance and covariance analyses. From the components of variance and covariance, phenotypic and genotypic correlation coefficients between pairs of characters were derived and subsequently path analysis was carried out using selected characters. Early planting and spraying increased no. of pods/plant, wt. of pods/plant, grain wt./plant, no. of pods/plot, and finally grain yield/unit area. Planting date x accession, spraying regime x accession as well as planting date x accession x spraying regime interactions were significant for some characters. Considerable variation was found among the accessions evaluated for all characters except for the no. of harvested plants/plot and no. of pods damaged by insects/plot. Thus, the material represents some valuable germplasm for future exploitation. Standard var. Selian Wonder was outperformed by a no. of accessions in various desirable characters but it was among the outstanding entries in seed size. Accession no. TMO 101 was outstanding in various attributes and it could therefore be considered for release as an improved var. after purification and further testing. Path analysis suggested that grain yield was more influenced by the no. of pods/plant, seed size, and pod length. Information emerging from correlation analysis further indicated that grain yield was positively correlated with most of the characters studied except with the no. of grains/pod, days to 50% flowering, plant height, and CP content. The results obtained are discussed in relation to bean improvement possibilities at Morogoro. (AS)

1145

* MOSHA, C.J.; MOLLEL, S.L.; SAMBAI, L.M. 1980. Weed control in beans (Phaseolus vulgaris L.) by herbicides. Arusha, Tanzania, Tropical Pesticides Research Institute. Miscellaneous Report no.985. 9p.

Three preemergence, 1 postemergence, and 1 preplant herbicides were applied to beans at the Tropical Pesticides Research Institute farm during the long rains of 1978 to assess their effect on weed density and crop yield. EPTC preplant incorporated at a rate of 2.0 and 4.0 kg a.i./ha gave the best performance in weed control. Both rates caused some stunting of the bean plants which recovered after some time. EPTC treatments, however, gave poor bean yields. Alachlor at 1.5 kg a.i./ha, pendimethalin at 1.0 kg a.i./ha, and dinitroamine at 0.6 kg a.i./ha gave fair performance in weed control. No herbicide controlled Argemone mexicana satisfactorily. (AS)

1146

* PUYZA, A.G.; KESWANI, C.L. 1984. Laboratory and greenhouse studies on the angular leaf spot disease of common beans, Phaseolus vulgaris L. [Abstract] Tanzania Bean Workshop, 2nd., Morogoro, Tanzania, 1983. Phaseolus Beans Newsletter for Eastern Africa no.2:17-18.

Results of a study on the reaction of 8 different bean var. to the causal organism of angular leaf spot (Phaeoisariopsis griseola) under controlled conditions are given. The pathogen, originating from infected plant material from exptl. stations and farmers' fields in the Mbeya, Arusha, and

Morogoro regions of Tanzania, was isolated and purified on 4 different media (corn meal, bean extract, honey-peptone, and VC-8 juice-agar) kept at 2 temp. ranges of 20-24°C and 28-30°C. Mycelia growth, conidia formation, and degree of sporulation were recorded in pure cultures with isolates exhibiting the general characteristics of the pathogen. Max. mycelial growth occurred on corn meal and bean extract. Conidia formation and degree of sporulation was abundant to very abundant in VC-8 juice, corn meal, and bean extract agar, at temp. ranging between 20-24°C. However, when used for inoculation, the isolates of the pathogen cultured from infected plant material did not produce severe symptoms and out of the 8 bean var. planted in the greenhouse only 2 var. (Kabanani and T8) were infected. (AS)

1147

RASHIDI, Z. 1981. Farming systems research in the western part of the Uluguru Mountains, Morogoro District, B.Sc. Thesis. Morogoro, Tanzania, University of Dar es Salaam.

1148

* REDHEAD, J.F.; MAGHEMBE, J.A.; NDUNGURU, B.J. 1983. The intercropping of grain legumes in agroforestry systems. In Huxley, P.A., ed. Plant research and agroforestry; proceedings of a Consultative Meeting. Nairobi, Kenya, International Council for Research in Agroforestry. pp.117-124. [Division of Forestry & Dept. of Crop Science, Univ. of Dar es Salaam, Morogoro, Tanzania]

Results of trials carried out in Morogoro, Tanzania, to try out grain/legume intercropping are examined. Potential legume species include bean, cowpea, groundnut, pigeon pea, and soybean among others. Trees species should have one or more of the following characteristics: fast growth, leaf shedding during the wet season, straight form and dominant leader growth, high value crop, use as fodder, and ability to fix N. Trials carried out in 1978 assessed the intercropping of Eucalyptus melliodora with maize, sorghum, and beans, and in 1980, E. camaldulensis, Acacia albida, and Leucaena leucocephala were each intercropped with maize and beans at different tree spacings. Future research proposals in this area are also presented. (CIAT)

1149

* RWAMUGIRA, W.P.; KAREL, A.K. 1984. Varietal evaluation of common beans for resistance to beanfly (Ophiomyia phaseoli Tryon). [Abstract] Tanzania Bean Workshop, 2nd., Morogoro, Tanzania, 1983. Phaseolus Beans Newsletter for Eastern Africa no.2:8-9.

Common bean var. were evaluated for resistance to natural infestation by the bean fly (Ophiomyia phaseoli). Of the 30 bean var. tested only 3 (TMO 117, TMO 75, TMO 91) were rated as moderately resistant, whereas the other var. showed little or no resistance. The 3 moderately resistant var. were found with many ovipunctures, caused by the egg laying female bean flies, but larval and pupal counts were relatively low, suggesting that development from the eggs was impeded by a yet unknown antibiosis mechanism. Because of their acceptable dark-red seed color, good seed size, determinate growth habit, and high yielding potential, 2 var., TMO 75 and TMO 91, were considered good genetic material for breeding bean fly resistant var. (AS)

1150

* RWAMUGIRA, W.P.; KAREL, A.K. 1983. Varietal evaluation of common beans to beanfly (Ophiomyia phaseoli Tryon). Morogoro, Tanzania, University of Dar es Salaam. Department of Crop Science. 10p.
Paper presented at the Tanzanian Bean Researchers Meeting, Morogoro, 1983.

Thirty common bean var. were evaluated for resistance to the bean fly Ophiomya phaseoli by subjecting them to natural infestation in the field at the Faculty of Agriculture, Forestry, and Veterinary Science, Morogoro, Tanzania. Although data on the no. of ovipunctures, larval-pupal counts, % of plants infested, and plant vigor were collected, the rating of resistance was based only on larval-pupal counts. Ovipuncture counts were made on all the leaves of 5 plants collected at random per plot. Var. TMO 117, TMO 75, and TMO 91 were rated as moderately resistant to bean fly attack. A low level of resistance to the bean fly was found in Kabanima, TMO 48, TMO 78, TMO 94, TMO 125, Sumbawanga B, Kablanketi, TMO 11B, TMO 134, CB 112, YC-2, and TMO 82. The mechanism of resistance in TMO 117, TMO 75, and TMO 91 appeared to be antibiosis. Seed yields were considerably high in resistant var. Larval-pupal counts were negatively correlated ($r = -0.15$) with seed yield, indicating that an increase in larval-pupal counts decreases seed yield. TMO 75 and TMO 91 are promising bean fly-resistant var. because of their acceptable seed color and size, growth habit, and above all, seed yield. (AS)

1151

* RWEYEMAU, C.C.; NDUNGURU, B.L. 1984. Effect of the use of organic manure and fertilizers on the yield of beans (Phaseolus vulgaris). [Abstract] Tanzania Bean Workshop, 2nd., Morogoro, Tanzania, 1983. Phaseolus Beans Newsletter for Eastern Africa no.2:23.

Results of a fertilizer expt. conducted at the U. Farm, Morogoro, Tanzania, are given. Well-rotted manure was used at rates of 7.5, 15.0, and 30.0 t/ha as well as a combination of manure (7.5 t/ha) and inorganic fertilizers (10 kg P + 25 kg N/ha as triple phosphate and sulfate of ammonia, resp.); a combination of 20 kg P + 50 kg N/ha; and Leucaena leaves (7.5 t/ha) to increase N content and OM of the soil. Bean var. Selian Wonder was used. Manure was applied 1 wk. before planting by mixing thoroughly with the soil. Triple phosphate was broadcasted 1 wk. before planting whereas sulphate of ammonia was applied in 2 splits, the 1st one at planting and the 2nd one 15 days after planting. Highest grain yields were obtained by using manure (7.5 t/ha) and inorganic fertilizers (10 kg P + 25 kg N/ha) in combination. Mean grain yields for fertilized plots ranged from 1081 to 1373 kg/ha, the control showing the lowest 100 seed wt. (28 vs. 42 g) and the lowest yield (1036 kg/ha). (AS)

1152

SARGENT, M. 1980. Agricultural and livestock production in Arusha Region: an agricultural economic perspective.
Paper prepared for AP/VDP (United States Agency for International Development).

1153

* SEENAPPA, M. 1984. Preferences and consumption of beans in selected villages in Kilosa District. [Abstract] Tanzania Bean Workshop, 2nd., Morogoro, Tanzania, 1983. Phaseolus Beans Newsletter for Eastern Africa no.2:10.

The importance of bean protein content and quality in the daily av. per capita uptake of 200 g dry beans, determined in 2 villages of Kilosa District (Kenya), is stressed. Bean protein, being deficient in S-containing amino acids, is poorly digestible and protein efficiency is reduced to nearly 20% whereas the presence of tannic and phytic acid, characteristic also of the dark red colored and most preferred beans seed types of Tanzania, further hinder protein utilization. Beans should be bred with higher and more digestible protein. (AS)

1154

* SEMOKA, J.M.R.; CHOWDHURY, M.S. 1984. Effects of boron, molybdenum, fertilizer N and rhizobial inoculation on nodulation, nitrogenase activity and yield of two varieties of kidney beans (Phaseolus vulgaris L.) [Abstract] Tanzania Bean Workshop, 2nd., Morogoro, Tanzania, 1983. Phaseolus Beans Newsletter for Eastern Africa no.2:21-22.

Tabulated results are presented of 2 field trials carried out in 1982 and 1983 on the effects of B, Mo, fertilizer N, and Rhizobium inoculation on nodulation, nitrogenase activity, and yield of 2 bean var., Canadian Wonder and Selian Wonder. P was applied uniformly in bands during planting at the rate of 50 kg/ha, at the same time as B and Mo (as sodium molybdate) both at rates of 1 and 2 kg Na/ha. Bean plants were widely spaced at 50 cm between rows and 20 cm within rows giving a population equivalent of 100,000 plants/ha. N was sidedressed at 3 wk. after planting. Plant samples were taken at 50% flowering and at midpod fill to assess nodulation, nitrogenase activity (expressed as moles/h/plant), and DM. At the end of the expt. grain yield was recorded. No statistical analysis was presented for the factors tested in a split plot design with the N sources (fertilizer N, Rhizobium inoculation) as the main plot treatments, the var. as the subplot treatments, and B and Mo levels as the sub-subplot treatments. Nitrogenase activity increased after inoculation. DM production and grain yield were higher when N was applied. The effects of B and Mo at the rates applied were variable and probably not significantly different. (AS)

1155

* SHAO, F.M. 1984. Progress report on bean pathology work at UAC, Mbeya. Research trials conducted during the 1982/83 season. [Abstract] Tanzania Bean Workshop, 2nd., Morogoro, Tanzania, 1983. Phaseolus Beans Newsletter for Eastern Africa no.2:14-16.

Bean pathology work carried out at Uyole Agricultural Centre, Mbeya, and substations in the Southern Highlands of Tanzania, is reported. Seed yield losses caused by 3 fungal diseases important in that area, anthracnose (Colletotrichum lindemuthianum), angular leaf spot (Isariopsis griseola), and rust (Uromyces phaseoli), and disease severity were determined during 2 successive seasons, one wet and one dry, using bean cv. each known to be susceptible to one disease in particular. The 6 cv. in the main plots were: T_8 and Sumbawanga C (susceptible to anthracnose), Selian Wonder and Kablanketi (susceptible to angular leaf spot), T_3 and Mexican 142 (susceptible to rust). Each main plot was subdivided in 2 subplots, in one of which disease was controlled by a fungicide, while in the other disease was allowed to build up from natural inoculum. Anthracnose and angular leaf spot were controlled by benomyl sprays (0.55 g/l) fortnightly, commencing 14 days after emergence to maturity. Rust was controlled by manzeb (3 kg/ha) sprays at weekly intervals during the same period. Mean yield losses of the disease-susceptible cv. in unsprayed subplots were 46% for anthracnose, 42% for angular leaf spot, and 37% for rust during the wet season. Yield losses were significantly correlated ($r = 0.8$) with the

severity of the diseases and to a reduction of 30% in the no. of pods/plant, 9% reduction in seed wt. and, to a lesser extent, poor seed quality. Yield losses caused by these diseases in the dry season were less important and were only statistically significant for anthracnose and rust. Another trial was carried out to determine the effects of proper seed selection by removing insect-damaged and disease-stained seeds from the seed lot as a means of controlling seed-borne diseases, such as anthracnose and angular leaf spot in the susceptible Canadian Wonder cv. Germination increased by 4% and yield by 17% on the av. for both cv. but these increases were not statistically significant. Seventeen isolates of C. lindemuthianum from bean pods, leaves, seeds, and stems collected from several villages in Mbeya, Mbozi, Sumbawanga, and Mbinga Districts, were differentiated and 10 out of these were each inoculated into differential cv. for race identification. Four isolates are thought to belong to race alpha of C. lindemuthianum, 1 to race beta, 1 to race kappa, 1 to race gamma, and 3 to the epsilon race, which would bring the no. of identified existing races of C. lindemuthianum in that part of Tanzania to 5. However, some anomalies occurred in the results of the 1st inoculation and repeated inoculations and purification of the isolates and differential cv. will have to be undertaken for more accurate identification. Beans are planted in the Southern Highlands of Tanzania from Nov.-April during which period considerable variations in weather conditions occur that also affect disease severity. To identify the peak season of highest disease pressure and the optimum time when beans can be planted to avoid diseases, 4 bean cv. (Selian Wonder, T_1, T_8, and Kabanima) were planted at 2 wk.-intervals from 1st Feb. to 15th April, 1983, at Mbeya and 4 substations. First results from Mbeya show that the severity of anthracnose, angular leaf spot, and rust was generally mild and there was no significant relationship between yields and disease severity. Highest yields were obtained and highest disease scores were taken from early planted beans. The low disease severity could possibly be explained by the occurrence of dry spells during the growing season. (AS)

1156

SHAO, F.M. 1981. Effect of anthracnose on bean yield in the southern highlands of Tanzania. M.Sc. Thesis. Tanzania, University of Dar es Salaam.

1157

* SHAO, F.M. 1981. Research on bean diseases in the Southern Highlands of Tanzania (a progress report). Mbeya, Tanzania, Bean Improvement Programme at Uyole. 8p.

Projects carried out by the Bean Improvement Program at Uyola, in collaboration with the plant protection dept., during the 1981-82 season in the Southern Highlands of Tanzania are reported. The 1st project aimed at measuring yield losses due to rust (Uromyces phaseoli), anthracnose (Colletotrichum lindemuthianum), and angular leaf spot (Isariopsis griseola). A split plot design was used with 4 replications. Main plots consisted of var. T_8 (highly susceptible to anthracnose), Sumbawanga C (moderately susceptible to anthracnose), and Mexican 142 (moderately susceptible to rust). In one of the subplots each disease was controlled while in the other it was allowed to develop. Seed yields of all 3 var. were higher in disease-controlled plots. The 2nd project was carried out to find a chemical capable of suppressing major bean leaf diseases during the rainy season. Four different chemicals were used, namely fentin acetate, captafol, carbendazim, and benomyl, in addition to a check, as well as 3 var. (T_8, T_1 susceptible to rust, and Canadian Wonder susceptible to angular leaf spot and to most foliar diseases) in a split

plot expt. with 4 replicates. Significant differences were observed in disease incidence and seed yield regarding the chemicals used. Benomyl efficiently controlled anthracnose. (CIAT)

1158

TANZANIA. FOOD AND NUTRITION CENTRE. 1980. Data report on the food and nutrition situation in Tanzania, 1973-74 to 1977-78. Dar es Salaam.

1159

* TANZANIA. MINISTRY OF AGRICULTURE. 1978. Beans (Phaseolus vulgaris). In _____, Grain Legume Improvement Report 1975-1978. Dar es Salaam. pp.62-75.

Results of grain legume improvement trials carried out in 1975-78 in Tanzania are presented. In French bean var. trials, severe attacks of Xanthomonas phaseoli were reported in 1975-76. Cv. Naz gave the highest yields (862 kg/ha) in 1976. Cv. maturity varied between 62-70 days. In the Tanzania Bean Var. Trial (1977), cv. Monroe gave the highest yield (1457 kg/ha). Most cv. were susceptible to at least one major disease. In preliminary field trials at Lyamungu moisture stress affected the expt. In International Bean Yield and Adaptation Nursery trials, cv. P-458, P-402, P-392, and P-755 outyielded local check Canadian Wonder. A total of 300 new germplasm lines from EAAFRO (currently the Kenyan Agricultural Research Institute-KARI) were evaluated at Ilonga and 746 lines from CIAT were evaluated at Ilonga, Mbeya, and Lyamungu. From these, 125 were selected for further testing in 1978. In the Uniform Cv. Trial (1978), P311-A-L had the highest yield at Lyamungu and Gairo (2818 and 2260 kg/ha, resp.). In the Preliminary Yield Trial, 50 outstanding lines were selected. Single plant selections from 60 bean crosses from CIAT were evaluated and promising ones are being multiplied. About 90 kg of purified Canadian Wonder seed has been given to Arusha Seed Farm for multiplication. Insect control and fertilizer trials are reported (1975-77). Tables with data on all trials conducted are included. (CIAT)

1160

* TESHA, A. 1984. Drought resistance in some bean varieties (Phaseolus vulgaris) grown in Tanzania. [Abstract] Tanzania Bean Workshop, 2nd., Morogoro, Tanzania, 1983. Phaseolus Beans Newsletter for Eastern Africa no.2:22-23.

Drought resistance was evaluated in 12 bean var. grown in Tanzania. Only the bean plants grown in the greenhouse could be analyzed, the field plants being destroyed by wild animals. Plant height at 24 days, water content (1, 13, 16 h after incubation of whole plants at 30°C and of leaves dried in the oven at 90°C), electrical conductivity of released cell material from leaf discs in distilled water, and the root/shoot dry wt. ratio after incubation at 90°C for 24 h were determined. Although the var. tested varied widely in height, no correlation was detected between plant height and water content. Plant var. differed significantly in their water retention capacity; TMO-107 retained twice as much water as TMO-86, and this character seems to be a useful criterion for drought resistance. Destruction of cell membranes under drought stress leads to leakage of cell contents in water, increasing the electric conductivity, which was shown to be negatively correlated (r=-0.81) with water retention. High root/shoot ratios might mean that the plant efficiently absorbs water relative to the transpiring surface, but the correlation found between water content and root/shoot ratio was very poor (r=-0.396). Also, the electrical conductivity and the root/shoot ratio are poorly correlated (r=-0.311).

Membrane integrity would seem a more important factor than a high root/shoot ratio, when drought is severe. Water retention and electrical conductivity could be good indications of drought resistance in beans. (AS)

1161

WALKER, P.T. 1961. Seed dressings for the control of the bean fly, Melanagromyza phaseoli Coq. in Tanganyika. Bulletin of Entomological Research 50:781-793.

1162

FISCHER, M. 1971. Zwei von Uganda nach Hawaii importierte Opius-Arten (Hymenoptera, Braconidae). [Two Opius species imported from Uganda into Hawaii (Hymenoptera, Braconidae)]. Anzeiger fur Schadlingskunde und Pflanzenschutz 44(1):10-12.

Following the importation of Opius melanagromyzae from Uganda into Hawaii (USA) for the control of Ophiomyia [Melanagromyza] phaseoli on leguminous crops, a consignment was sent in 1970 from Hawaii to Austria for taxonomic investigation and was found to contain 2 separate species. The 2nd one is described from the adults as Opius importatus sp. n. and appears to be more closely related to O. advenator than to O. melanagromyzae. (AS)

1163

* JIWANI, S.H.M. 1973. Agricultural statistics and rural development planning in Uganda. Eastern Africa Journal of Rural Development 6(1-2):179-188.

The need for and current stage of collection of various statistics relevant to agricultural planning in Uganda are discussed. These include population data, trade and marketing statistics, food consumption data, livestock and meat production data, information on agricultural inputs and environmental sources. (CIAT)

1164

* THE NATIONAL Bean Programe in Uganda. Uganda. 5p. 1983. Paper presented at the Workshop to Develop a Collaborative Project for Bean Research in Eastern Africa, Cali, Colombia, 1983.

Bean research needs in Uganda are briefly analyzed regarding the areas of breeding, agronomy, pathology, entomology, and nutrition. An inventory of research work carried out by the National Bean Program in Uganda is made. A table with data on no. of days to maturity, yield (kg/ha), and diseases recorded for the var. K_{130}, K_{113}, K_{112}, K_{119}, K_{121}, K_{116}, and K_{20} is included. A breeding program of haricot and dry beans for resistance to rust (Uromyces phaseoli) has been undertaken. The effect of N, P, and lime on beans in monoculture and in association with maize and cotton is being studied. Existing resources (personnel and infrastructure) are listed. A regional center for beans and cowpeas should be formed in Uganda to monitor the progress and achievements of national research programs. (CIAT)

1165

* NYIIRA, Z.M. 1978. Pests of grain legumes and their control in Uganda. In Singh, S.R.; Emden, H.F. Van; Taylor, T.A., eds. Pests of grain legumes: ecology and control. London, England, Academic Press. pp.117-121.

ZAIRE

1166

* BERTI, F. 1984. Synthèse des travaux réalisés sur Phaseolus dans les stations du Zaire, Rwanda et Burundi depuis 1962: Zaire. In _____. Synthèse des travaux réalisés sur Phaseolus aux Zaire, Rwanda et Burundi de 1945 á nos jours. Gembloux, Belgique, Faculté des Sciences Agronomiques de l'Etat. pp.29-31.

With the independence of Zaire in 1960, the Institut National pour l'Etude Agronomique du Congo Belge (INEAC) was replaced with the Institut National pour l'Etude et la Recherche Agronomiques (INERA), causing a noticeable lag in agricultural research. The stations at M'Vuazi and Mulungo were the only ones that continued with a bean screening program. Brief reports of research at INERA are included and the research work carried out at the 2 stations is mentioned. (CIAT)

1167

ANGUS, D.J. 1962-66. Plant pests and diseases in Zambia. Parts 1-7 and supplement. Zambia, Mt. Makula Research Station.

1168

DUE, J.M.; MUDENDA, T.; MILLER, P. 1984. How do rural women perceive development? A case study in Zambia. Michigan State University WID Series no.187.

1169

* DUE, J.M.; MUDENDA, T.; MILLER, P.; WHITE, M. 1984. Women's contributions made visible: of farm and market women to farming systems and household incomes in Zambia, 1982. Urbana, University of Illinois at Urbana-Champaign. Department of Agricultural Economics. Illinois Agricultural Economics Staff paper no.84E-285. 45p. [Univ. of Illinois at Urbana-Champaign, 305 Mumford Hall, 1301 West Gregory Drive, Urbana-IL 61801, USA]

Labor contributions of farm and market women in Zambia (1982) are documented. A sample of 112 farm and 30 market families was chosen in 3 areas, Mpika, Mazabuka, and Mumbwa, which differ in their level of agricultural development. Farm size ranged from 2 to 25 ac. Monogamous and female-headed households were selected. Socioeconomic characteristics of farm families were discussed in addition to allocation of labor inputs, crops grown, decision-making, operating expenses, off-farm income, living expenditures, savings and use of credit, income generation by sex, women's savings associations, and level of well-being. Av. bean production, consumption, and sales for the 3 areas were 61, 7, and 54 kg; 31, 31, and 0 kg; and 134, 80, and 54 kg, resp. Multiple and bivariate regressions were calculated. For market women, socioeconomic profiles, labor inputs, crops produced (beans cultivated on an av. 0.2 ac), earnings, decision-making, expenses, income, expenditures, and use of earnings and credit are discussed. Farm women spend 6.6 h/day in agriculture and men, 5.7 h/day. The major food staple, maize, was grown by all farm families, in addition to a variety of crops including beans. On the av. 41% of crop production is consumed and 59%, sold. Use of oxen and plows is expanding acreage. Recommendations are given for improving Zambian agricultural policies. (CIAT)

1170

DUE, J.M. 1979. Agricultural credit in Zambia by level of development. Rural Development Studies Bureau, University of Zambia. Occasional Paper.

1171

LOMBARD, C.S.; TWEEDIE, A.H.C. 1974. Agriculture in Zambia since independence. Lusaka, Zambia, Neczam. 113p.

ABBREVIATIONS AND ACRONYMS

A	Angstrom(s)
ABA	Abscisic acid
ac	Acre(s)
Afr.	Afrikaans
a.i.	Active ingredient
alt.	Altitude
AMV	Alfalfa mosaic virus
approx.	Approximate(ly)
atm.	Atmosphere
ATP	Adenosine 5'-triphosphate
av.	Average
BAP	6-Benzylaminopurine
BBMV	Broad bean mosaic virus
BCMV	Bean common mosaic virus
BGMV	Bean golden mosaic virus
BGYMV	Bean golden yellow mosaic virus
BOD	Biochemical oxigen demand
BPMV	Bean pod mottle virus
BRMV	Bean rugose mosaic virus
BSMV	Bean southern mosaic virus
BV	Biological value
BYMV	Bean yellow mosaic virus
°C	Degrees Celsius (centigrade)
ca.	About (circa)
CAMD	Cassava African mosaic disease
CAMV	Cassava African mosaic virus
CBB	Cassava bacterial blight
CBSD	Cassava brown streak disease
CEC	Cation exchange capacity
CER	CO_2 exchange rate
CF	Cassava flour
CGR	Crop growth rate
CLM	Cassava leaf meal
CLV	Cassava latent virus
CM	Cassava meal
cm	Centimeter(s)
COD	Chemical oxigen demand
concd.	Concentrated
concn.	Concentration
CP	Crude protein
CSL	Calcium stearyl lactylate
CSW	Cassava starch wastes
C.V.	Coefficient of variation
cv.	Cultivar(s)
2,4-D	2,4-dichlorophenoxyacetic acid
DM	Dry matter
DNA	Deoxyribonucleic acid
EC	Emulsifiable concentrate
EDTA	Ethylenediaminetetraacetic acid
EEC	European Economic Community
e.g.	For example
ELISA	Enzyme-linked immunosorbent assays
EMS	Ethyl methane sulfonate
Engl.	English
expt.	Experiment(s)
exptl.	Experimental
°F	Degrees Fahrenheit
Fr.	French
ft-ca	Foot candles (10.76 lux)
FYM	Farmyard manure
g	Gram(s)
G	Giga (10^9)
GA	Gibberellic acid
gal	Gallon(s)
GE	Gross energy
Germ.	German
GERs	Glucose entry rates
GLC	Gas-liquid chromatography
govt.	Government
govtl.	Governmental
h	Hour(s)
ha	Hectare(s)
HCN	Hydrocyanic acid
HDP	Hydroxypropyl distarch phosphate (modified cassava starch)
HI	Harvest index
IAA	Indoleacetic acid
IBA	Indolebutyric acid
Illus.	Illustrated
in.	Inches
Ital.	Italian
IU	International unit
J	Joule
Jap.	Japanese
kat	Katal(amount of enzymatic activity that converts 1 mole of substrate/s)
kcal	Kilocalorie(s)
kg	Kilogram(s)
Kj	Kilojoule
km	Kilometer(s)
KNap	Potassium naphthenate
kR	Kiloroentgen(s)
l	Liter(s)
LAD	Leaf area duration
LAI	Leaf area index
lat.	Latitude
lb	Pound(s)
LD_{50}	Mean lethal dose
LER	Land efficiency ratio
LPC	Leaf protein concentrate
lx	Lux
M	Mega
M	Molar
m	Meter(s)
Mal.	Malay
max.	Maximum

MC	Moisture content
ME	Metabolizable energy
meq	Milliequivalent(s)
met.	Methionine
mg	Milligram(s)
mho	Reciprocal ohm
min.	Minimum
min	Minute(s)
ml	Milliliter(s)
mm	Millimeter(s)
mo.	Month
mol.wt.	Molecular weight
m.p.	Melting point
NAA	Alpha-naphthalene acetic acid
NAD	Nicotinamide adenine dinucleotide
NADH	Nicotinamide adenine dinucleotide, reduced from
NAR	Net assimilation rate
NCE	Net CO_2 exchange
NE	Northeast
NER	Net energy ratio
nm	Nanometer(s) (10^{-9} m)
no.	Number(s)
NPFs	Negative production factors
NPR	Net protein ratio
NPU	Net protein utilization
NW	Northwest
OM	Organic matter
oz	Ounce(s)
P	Probability
Pa.	Pascal(s)
PAN	Peroxyacetic nitrate
PCNB	Pentachloronitrobenzene
PDA	Potato dextrose agar
PER	Protein efficiency ratio
pH	Hydrogen ion concentration
pphm	Parts per hundred million
PPI	Pre-planting incorporation
ppm	Parts per million
PSA	Potato sucrose agar
pv.	Pathovar.
Ref(s).	Reference(s)
resp.	Respective(ly)
Rf	Retardation factor-chromatography
RGR	Relative growth rate
RH	Relative humidity
RNA	Ribonucleic acid
Rom.	Romanian
Russ.	Russian
s	Second
SBM	Soybean meal
SCN	Thiocyanate
SCP	Single cell protein
SDS	Sodium dodecyl sulfate
Sk.	Slovak
sp.	Species
Span.	Spanish
spp.	Species
SSL	Sodium stearyl-2-lactylate
Sum.	Summary
t	Ton(s)
TDN	Total digestible nutrients
temp.	Temperature
TIA	Trypsin inhibitor activity
TIBA	2,3,5-Triiodobenzoic acid compound with N-methylmethanamine
TLC	Thin-layer chromatography
TMV	Tobbaco mosaic virus
TSH	Thyroid-stimulating hormone
UDPG	Uridine diphosphate glucose
UMS	Unmodified cassava starch
UV	Ultraviolet
var.	Variety(ies), varietal
VFA	Volatile fatty acids
vol.	Volume
VPD	Vapor pressure deficit
vpm	Volume per million
W	West
wk.	Week
WP	Wettable powder
wt.	Weight
YFEL	Youngest fully expanded leaves
yr	Year(s)
/	Per
%	percent(age)
>	More than, greater than
<	Less than
≤	Equal to or less than
≥	Equal to or greater than
±	Plus or minus

AUTHOR INDEX

TITLE ENTRY

SUBJECT INDEX

APPENDIX 1

BIBLIOGRAPHY ON BEAN RESEARCH IN AFRICA 1983 — AVAILABLE DOCUMENTS

The Bibliography on Bean Research in Africa, published in 1983 by the CIAT's Bean Information Center, included citations preceded by an asterisk (*), indicating that the complete documents are available at the Center. The following list updates this information by giving the numbers of those documents which were acquired during 1984.

0006	0221	0349	0516
0017	0222	0351	0517
0043	0223	0355	0518
0051	0231	0356	0519
0065	0242	0358	0520
0080	0245	0364	0521
0103	0248	0386	0522
0110	0249	0387	0527
0113	0250	0392	0528
0151	0256	0398	0529
0152	0257	0399	0539
0153	0264	0401	0540
0156	0291	0415	0622
0173	0305	0421	0634
0180	0307	0422	0639
0193	0308	0423	0646
0194	0310	0425	0659
0195	0311	0428	0666
0196	0312	0493	0667
0197	0314	0496	0673
0202	0316	0497	0691
0209	0320	0508	0715
0215	0322	0509	0720
0216	0326	0512	0807
0217	0338	0513	0809
0218	0341	0514	0810
0220	0342	0515	0813

APPENDIX 2

ABSTRACTS OF DOCUMENTS CITED IN THE 1983 ISSUE OF THE BIBLIOGRAPHY ON BEAN RESEARCH IN AFRICA

0002

* DECELLE, J. 1981. Bruchidae related to grain legumes in the Afro-tropical area. In Labeyrie, V., ed. International Symposium on the Ecology of Bruchids Attacking Legumes (Pulses), Tours, France, 1980. Proceedings. The Hague, Junk. Series Entomologica v.19,pp.193-197.

Fifteen Bruchidae species detrimental to grain legumes are mentioned that either originated from the Afrotropical area or colonized it after being introduced. Acanthoscelides obtectus is essentially distributed in the eastern mountainous areas of Uganda, Zaire, Rwanda, Burundi, Kenya, and Tanzania, South Africa, Angola, Zimbabwe, Madagascar, and La Reunion; its attack starts in the fields on almost dry pods of Phaseolus vulgaris and, it is carried on in stored seeds; Zabrotes subfasciatus is of neotropical origin and seems to have settled and spread considerably during the past 20-25 yr. It is detrimental to bean crops in Angola, Lower Zaire, and East Africa (Kenya, Uganda, Tanzania, Burundi, and Ethiopia) as well as in Madagascar and the Mascareigne Islands. A. obtectus and Z. subfasciatus are considered among the most harmful species. (CIAT)

0003

* DOUGHTY, J.; ORRACA-TETTEH, R. 1966. The contribution of legumes to African diets. In Stanton, W.R. Grain legumes in Africa. Rome, Food and Agriculture Organization of the United Nations. pp.9-32.

In relation to food and nutrition in Africa, 5 major factors must be considered: (1) seasonal food shortages; (2) nutritional deficiencies; (3) food storage and transport; (4) ignorance of nutrition; (5) effects of growing cash crops and of urbanization. The nutritive value of legumes, which lies primarily in their high protein content (20- 25%), is discussed. Legumes also make an important contribution of Fe, thiamine, and nicotinic acid to the diet. The nutritive values of some typical African legumes and other foods are given and African food patterns are described. The quantity of legumes consumed varies with agricultural practices, climate, season, and tribal custom. Results of surveys are given. The most widely eaten legume in Africa is cowpea. Phaseolus vulgaris, introduced from the Americas, has become increasingly popular. The distribution of food within the family and traditional eating beliefs are discussed as well as the preparation of legumes. Almost everywhere in Africa legumes are eaten as one of the ingredients in the thick soup accompanying the main dish. The problem of calorie and protein deficiency is outlined. Increased production of legumes would have a marked effect on solving these problems. Education of both producer and consumer is emphasized. (CIAT)

0006

* HUIGNARD, M.J. 1979. Les bruches des haricots: un danger capital pour les recoltes legumineuses alimentaires. (Bean bruchids: a capital danger for the harvesting of food legumes). Afrique Agriculture no.52:16-18.

The biology and growth conditions of 3 species of the Bruchidae family, widely distributed in Africa, are presented. Callosobruchus maculatus grows mainly in the grains of Vigna unguiculata; Acanthoscelides obtectus

and Zabrotes subfasciatus attack Phaseolus vulgaris. Damage is caused by the larval stage in all 3 species. Adults have a free life and can reproduce either in nature or in the stored grains. Studies on the reproductive cycle of A. obtectus indicate that the insect can be controlled in the field and different control measures are given. Increasing the storage temp. in warehouses can reduce the problem. Z. subfasciatus, originally from the tropics, has not been studied in detail. Further research is recommended. C. maculatus is a major economic problem in Africa. Two adult forms have been described: flying and nonflying states. In West Africa, in collaboration with the Institut de Biocénotique Expérimentale des Agrosystèmes, research has been undertaken on the behavior of C. maculatus for improved control measures. More collaboration among African institutes is suggested and it is concluded that control should be in field before harvesting. (CIAT)

0011

* RACHIE, K.O. 1973. Improvement of food legumes in tropical Africa. In Nutritional improvement of food legumes by breeding: based on proceedings of a sympsoium sponsored by PAG, held at the Food and Agriculture Organization, Rome Italy, 1972. New York, Protein Advisory Group of the United Nations. pp.83-92.

The improvement of food legumes as a practical and efficient means of solving the deficiency in production of more concentrated protein food for tropical Africa is discussed in detail. The leguminous species with the greatest potential for improvement for these regions of Africa include cowpea, groundnut, soybean, pigeon pea, and Phaseolus beans (the latter best adapted for intermediate elevations and favorable moisture conditions). A strategy for improvement is presented, highlighting those characteristics that species should have, namely, ability to grow in different environments, broad genetic base, and readily manipulated by breeding. Of the 5 legumes crops evaluated, Phaseolus beans rank 4th in order of importance for improvement. As yet, no species have been identified as good for adaptation to the very humid tropics and to high pest and/or disease pressures. (AS)

0015

* STEELE, W. 1966. Techniques for grain legume improvement. In Stanton, W.R. Grain legumes in Africa. Rome, Food and Agriculture Organization of the United Nations. pp.134-158.

Detailed descriptions are provided for grain legume improvement techniques in Africa. The following aspects of research are briefly analyzed: survey, agronomy, plant breeding, entomology (field and storage pests), pathology, and coordination of research. Practical techniques include the survey of existing legume crops using punched cards questionnaires and bags for seed sampling. Other sources of seed for collection are imported cv. and exotic species. A strict routine must be established for the acquisition, handling, storage, and maintenance of the collection which should include an accession book and a seed storage ledger. Conditions the store should have are listed. Techniques for field studies should consider: nursery, breeding system, site selection, plot layout, labels, field plan, planting, fertilizer application, statistical design of field trials, design choice, plot size and shape, discards to avoid edge effects, management of expt., field observations and record keeping. References books suitable for the design and analysis of replicated field trials are listed. Careful evaluation and maintenance of the identity of seed lines is stressed. (CIAT)

0017

* WILSON, J.H. 1967. A bio-assay of Tordon solutions. Rhodesia Zambia Malawi Journal of Agricultural Research 5(3):307-308.

In a single drop foliage test on Canadian Wonder bean seedlings at the unifoliate leaf stage, picloram (Tordon 22K) solutions between 1000 and 10 ppm induced pronounced stem curvature within 7 h of treatment. The longer term effects of solutions in the range tested (1000 to 0.1 ppm) were the inhibition or distortion of plumule growth or the death of the plant, but no calibration of effect by concn. was possible. The test failed to show the presence of picloram in water extracts prepared from woody plants previously killed with the arboricide. (AS)

0023

* DEVOS, P.; VAN DURME, J. 1982. Le haricot (Phaseolus vulgaris L.) au Burundi. (Beans in Burundi). Bujumbura, Institut des Sciences Agronomiques du Burundi. Departement de la Production Végétale. 10p. [Inst. des Sciences Agronomiques du Burundi, B.P. 795, Bujumbura, Burundi]

Information is given on the cultivation of beans in Burundi. Beans are preferably planted at alt. between 1000-1800 m, although they are sown in all lat. throughout the country. The crop's vegetative cycle varies with temp. from approx. 80 days at Imbo to 120 days at Kirozi. Nearly 150-200,000 t of beans are produced per annum over 3 seasons on ca. 300-400,000 ha; cropping surface can only be increased by alloting 130,000 ha of marshlands to beans. Beans are intercropped with maize, cassava, and peas. A high var. diversity exists as var. mixtures. Pests and diseases found include Aphis fabae, Melanagromyza phaseoli, Acanthoscelides obtectus, Isariopsis griseola, Ramularia phaseoli, Uromyces appendiculatus, Xanthomonas phaseoli, and Colletotrichum lindemuthianum. Research strategies for beans are described. The selection of high yielding var., of wide acceptability, is a main priority. (CIAT)

0051

* ABOU EL-FADL, M.M.; EL-SHERBENI, M.F.; FAHMY, M. 1959. An analysis of some factors affecting root-nodule formation in garden bean in Egypt. Agricultural Research Review (Egypt) 37(2):269-272.

A pure vigorous strain of Rhizobium phaseoli, obtained by serial isolations from successive plants of inoculated garden bean, proved to be suitable to all bean var. belonging to Phaseolus vulgaris, but failed to carry on a symbiotic life with the P. acutifolius var. White Tepary. Cultures of the new strain became available to growers under the name Okadine. Pot and field expt. at Dokky (Egypt) showed that the application of calcium nitrate at the rate of 50 kg/feddan (1 feddan = 0.42 ha) had a stimulating effect on nodule formation, but with heavier applications the nodules partially or completely disappeared. (AS)

0065

* ATWA, A.A.; EL-SHIEKH, T.M.A.; DESSOUKY, S.M. 1980. Some factors affecting green bean storage. 2. Under normal conditions. Agricultural Research Review (Egypt) 58(3):183-193.

Sorted pods of bean cv. Giza 3, grown at Bahteem Research Farm (Egypt) during the late summer seasons of 1976 and 1977, were sampled to test the effect of different chemical treatments and packing methods on shelf life. Chemical treatments were: dipping in IAA (500 ppm), coating with flavorseal alone or with thiabendazole, washing with tap water, in addition to

unwashed pods as control. Packing methods were comprised of nonperforated polyethylene sacks, perforated ones, or unpacked pods as control. All treatments were placed in carton boxes and were kept thereafter for 12 days under normal conditions (15-22°C and 50-80% RH in 1976, and 16-22.5°C and 50-75% RH in 1977). Inspection was done every 3 days. Results showed that coating with flavorseal wax or flavorseal + thiabendazole reduced the fresh wt. loss, but raised the decay % contrary to IAA which raised the fresh wt. loss and decreased the decay %. The lowest wt. loss % and highest chlorophyll concn. were obtained in nonperforated sacks. Packing in polyethylene sacks either perforated or nonperforated led to high decay. IAA and flavorseal delayed the destruction of chlorophyll. The highest total sugar and total carbohydrate contents were obtained by flavorseal wax + thiabendazole. However, with prolongation of storage, chlorophyll concn., total carbohydrates, and total sugars decreased. (AS)

0079

* EL-BANOBY, F.E.; RUDOLPH, K. 1981. Specific water-soaking of bean leaves by Pseudomonas phaseolicola, its role in bacterial multiplication and possible mechanisms involved in specificity. In Lozano, J.C., ed. International Conference on Plant Pathogenic Bacteria, 5th., Cali, Colombia. 1981. Proceedings. Cali, Centro Internacional de Agricultura Tropical. p.440.

The multiplication of Pseudomonas phaseolicola in susceptible and resistant tissues was studied concomitantly with observations on the stages of water-soaking. When the intercellular washing fluid of 15 different bean cv. was tested, a considerable degradation of extracellular polysaccharides was observed in the resistant but not in the susceptible cv. When intercellular washing fluid preparations of cv. Red Mexican 34 and Opal, which are resistant to race 1 and susceptible to race 2, were tested, extracellular polysaccharides from race 1 were much more degraded than those from race 2. (CIAT)

0110

* HABIB, F.G.K.; MAHRAN, G.H.; HILAL, S.H.; GABRIAL, G.N.; MORCOS, S.R. 1976. Phytochemical and nutritional studies on pigeon pea and kidney bean cultivated in Egypt. Zeitschrift fur Ernahrungwissenchaft 15(2):224-230.

Preliminary phytochemical screening of pigeon pea and kidney bean var. Guiza III established the presence of carbohydrates and/or glycosides, flavonoids, unsaturated sterols and/or triterpenes, saponins, trypsin inhibitors, and hemagglutinins. In addition, it established the absence of cardenolides, tannins, alkaloids, and oxidase enzyme. Certain pharmacopoeial constants, including moisture, ash, acid-insoluble ash, water-soluble ash, and crude fiber, were determined. The 2 legumes were subjected to successive extractions with different organic solvents such as petroleum ether (50-70°C), diethyl ether, chloroform, and ethyl alcohol. The successive yields of extractives were determined. Examination of the crude extracts showed that petroleum ether extract contained sterols and/or triterpenes, while ether, chloroform, and ethyl alcohol extracts contained reducing substances. General analysis of the 2 seeds for proteins, fats, carbohydrates, fiber and ash contents were carried out and the results were given in g/100 g dry seeds. The protein content of kidney bean was 23 g, while Ca and Fe contents were 134 and 8.02 mg, resp. Extractions of the proteins using different solvents such as cold water, hot water, saline buffer pH 7, and sodium hydroxide pH 11 showed that sodium hydroxide was the best extractant. The amino acid content of the 2 legumes, whether raw or cooked, showed that they were deficient in met., cystine, and

tryptophan. Other essential amino acids were present in amounts higher than that given by the FAO provisional pattern. Cooking the seeds by the popular methods used in the country resulted in an increase in the amounts of the amino acids, threonine, leucine, and isoleucine, while the other amino acids present remained unchanged or decreased. It was also observed that cooking the seeds destroyed the trypsin inhibitors and hemagglutinins found in the 2 legumes. (AS)

0143

* YOUNES, M.A. 1972. The regional pulse improvement project in Egypt. Bean Improvement Cooperative, Annual Report 15:99-100.

The objectives of the Egyptian Regional Pulse Improvement Project are the assembling of a germplasm collection from pulse producing countries of the world, the breeding of var. suitable for the region, and the improvement of cultural and management practices. Research is done by a team of scientists of the Agriculture Dept. in collaboration with the UN-FAO. Germplasm collections of major species, totalling about 438 foreign introductions (75 of Phaseolus vulgaris), have been assembled and evaluated for adaptation, vigor, yield components, disease resistance, and other characteristics. Promising introductions will be crossed among themselves and/or with local germplasm. (CIAT)

0151

* GEBRE WOLD, A.A. 1976. Results of feeding trials with crop residues in Ethiopia. Ethiopia, Institute of Agricultural Research. Annual Research Seminar no.6. pp.98-106.

Several crops residues were evaluated in feeding trials in Ethiopia in 1975. A finishing expt. lasting 100 days was conducted at Adami Tulu with 4 groups of 10 native cattle/group. Crop residues were haricot bean haulms, corn stover, teff straw, and corn cobs, each comprising 50% of the ration. Other ingredients were: molasses, noug cake, bone meal/meat meal mix, and salt (20, 25, 4, and 1%, resp., for the haricot bean haulms diet). Values for animal performance were as follows: av. initial wt., 193 kg; av. final wt., 243 kg; av. daily gain, 505 g; av. feed intake/day, 7.4 kg; kg feed intake/kg livewt. gain, 14.7. Highest daily gain was obtained with corn cobs (541 g). Highest feed consumption was observed among animals having the highest rate of gain, which also were the most efficient convertors of feed consumed. Only small differences were observed in the % of fat, edible meat, and bone. Boran steers were fed with sisal residue supplemented with haricot bean haulms, sunflower cake, and minerals in a pilot study to determine the food value of sisal both in the fresh state and after ensiling; likewise, an observation trial was conduced in Sidamo Province to determine the quality of silage made from coffee pulp and a mixture consisting of coffee pulp, corn stover, and haricot bean haulms. (CIAT)

0152

* AMARE RETTA 1976. Water requirements of crops in the Middle Awash. In Institute of Agricultural Research. Annual Research Seminar. Proceedings no.6. pp.265-286.

The problems posed by excess water or water stress are outlined. Trials were conducted at Melka Werer Research Station (Ethiopia) to determine when to irrigate and how much water to apply in maize, cotton, groundnuts, alfalfa, sesame, and haricot bean. Varying intervals of irrigation and varying watering duties were layed out in split plot or randomized block designs. Lateral seepage and leakage were minimized. In-going water was measured for each plot and crop growth parameters were taken. The overall

results are summarized in table form. Curves are given to help farmers or farm managers make decisions related to pumping capacity or quantity of water and derive a table on general recommendations for a given crop. Seasonal irrigation requirements, frequency of irrigation, rate of water application, and total no. of irrigations are given each crop. Values for haricot bean var. Mexican 142, sown in late Oct., are: 2 wk. (irrigation frequency), a water application rate of 10 cm, a total no. of 7 irrigations, a seasonal irrigation-water requirement of 70 cm, and a pumping or diversion requirements of 100 cm at 0.7 overall irrigation efficiency. Terminology is defined. (CIAT)

0153

* BERETON, R.G. 1980. Exports of pulses and their value. Ethiopian Grain Review 6(1):24.

Tables are presented on exports of pulses and their values in Ethiopia. A total of 15,498 t of haricot beans were exported in 1978-79, with a total value of 11,242,000 Ethiopian Birr, being this the highest value of all exported pulses. Total exports of grain products reached 88,341 t, of which 25,409 t corresponded to pulses, worth 43,908,000 Ethiopian Birr. (CIAT)

0156

* IMRU ASSEFA 1980. Lowland pulses: an introduction. Ethiopian Grain Review 6(1):16-22.

Lowland pulses which have shown promise in Ethiopia are described along with their agriculturally important attributes: haricot beans (Phaseolus vulgaris), cowpea, mung beans, pigeon pea, soybean, lima bean, hyacinth bean, adzuki bean, moth bean, tepary, horsegram, and winged bean. Haricot beans are grown in the medium rainfall, medium alt. areas of the Rift Valley, and in the highlands of the Chercher area in association with sorghum and maize. Although these lowland pulses have great potential, they are new and virtually unknown to most people, which poses a problem in their integration and cultivation. Moreover, their adaptation to the hot semiarid to humid tropics places them in almost nonagricultural areas. This means that successful adoption of the pulses in these areas will only be possible with help from both agronomists and extension workers. (CIAT)

0167

* ACLAND, J.D. 1971. Beans. Phaseolus vulgaris. In _____. East African crops: and introduction to the production of field and plantation crops in Kenya, Tanzania and Uganda. London, Longman Group Ltd. pp.20-25.

Data are presented on area planted to beans in Kenya, Tanzania, and Uganda (approx. 400,000, 12,000, and 270,000 ha, resp.). Bean plant characteristics, its ecology and var. used are briefly discussed. Cultural practices briefly described include seedbed preparation, planting, planting time and spacing, seed inoculation, use of fertilizers, weed control, and harvesting. Current yields are low (220-670 kg/ha) but with improved var., good husbandry, and good pest and disease control, yields of 1000 kg/ha can be expected. Major bean pests are discussed: Ophiomyia phaseoli, Heliothis armigera, Aphis fabae, Acanthoscelides obtectus (the main storage pest). Diseases such as bean rust (Uromyces phaseoli), anthracnose (Colletotrichum lindemuthianum), halo blight (Pseudomonas phaseolicola), and angular leaf spot (Isariopsis griseola), are probably the main cause of crop losses in beans and of yield fluctuations in East Africa. Several forms of utilization are described. (CIAT)

0190

* FISHER, N.M. 1974. A comparison of the relative seed yields of eight bean cultivars in pure stand and in mixtures with maize. Bean Improvement Cooperative. Annual Report 17:38-40.

An expt. was conducted at the Faculty of Agriculture Field Station (Kabete, Kenya), to evaluate relative seed yields of beans grown in pure stands and in association with maize (Hybrid 511). Eight bean cv. (Masterpiece, Mwezi Moja, Canadian Wonder, Long Tom, Mexican 142, Saxa, Contender, and Top Crop) were used as split plot treatments and the cropping system as the main plot treatment. There were 6 replicates, each subplot consisting of a row of beans 10 m long. The mean yields of all bean cv. in pure stand and in mixed crop were, resp., 2000 and 450 kg/ha. There was no interaction between cv. and cropping system on the basis of seed yield/ha. Cv. Masterpiece, Mwezi Moja, and Canadian Wonder gave the highest yields in both cropping systems, averaging 2300 kg/ha. The results did not suggest any great difference between the relative performance of the cv. in both systems. (CIAT)

0193

* FLOOR, J. 1983. Report on a pot experiment on Rhizobium inoculation and fertilizer application of beans (Phaseolus vulgaris). Thika, Kenya, National Horticultural Research Station. Grain Legume Project. Internal Report. 10p.

Pregerminated seed of bean cv. GLP-1004 (1 seed/pot) was inoculated with 1 ml of a mixture of Rhizobium strains no. 406 and 412 (from the U. of Nairobi) in an expt. carried out at the National Horticultural Research Station (Thika, Kenya). Treatments included 7 soils and 6 fertilizer/inoculation treatments, including 2 controls (one with inoculum). Plant-related characteristics are given. Except for no. of days to flowering, the soils and the fertilizer/inoculation treatments were highly significant; however, the interaction between both was not significant. Inoculation did not affect yield or nutrient status. All fertilizer treatments outyielded the controls. Nodulation was strongly affected by P. Yields on different soils depended on soil pH. No significant correlations were found between soil parameters and fertilizer response. N fertilization reduced the amount of water required to produce 1 kg DM. (CIAT)

0194

* FLOOR, J. 1983. Report on the results of plant tissue analyses of dry beans. A review of the nutrient status of whole beans, bean leaves, and bean seeds, as found in Grain Legume Project-experiments (1977-1983). Thika, Kenya, National Horticultural Research Station. Grain Legume Project. Internal Report. 16p.

The nutrient status of whole beans, bean leaves, and bean seeds as found in field trials carried out in 1977-83 by the Grain Legume Project, Thika (Kenya) is reviewed. Expt. reported are: time of planting x manure application rates; time of planting x rates of diammonium phosphate; cropping systems x rates of diammonium phosphate; national bean performance trial; and on-farm fertilizer trials. There was a significant yield decrease when beans were planted 3 wk. after onset of rains which can not be adscribed to disease incidence, water or nutritional status; differences occurred in plant Fe content, soil pH, and available Mn. In a late planted, irrigated trial, yields were low. Diammonium phosphate increased yields significantly (70%) and Fe and Mn content in leaves, possibly due to a lowering of pH and of redox. Cropping systems and fertilization were

found to significantly affect yields. For yields of 900-2250 kg/ha the uptake of N in the pure stand was less than in the mixed stand. The % of N and P in the leaves were very low and a marked difference in the % of K and Ca was observed between the 2 cropping systems. Yields over 2000 kg/ha were reported with low N contents in leaves (2.6-2.8%). In the performance trial during the long rains 1980 the difference in % of N in seeds depended upon the var. and also upon the site where the beans were grown. No clear relationships were found between the major nutrient levels and yields in whole bean analysis. Leaf sampling at the beginning of flowering, combined with soil sampling at the beginning and at the end of the trial, is recommended. (CIAT)

0195

* FLOOR, J.; OKONGO, A.O. 1982. Dry bean (Phaseolus vulgaris) responses to single-superphosphate and triple-superphosphate in Kenya. Thika, Kenya, National Horticultural Research Station. Grain Legume Project. Internal Report. 6p.

During the short rains 1980/81 and the long rains 1981, the Grain Legume Project carried out expt. on dry beans at 5 agricultural research stations in Kenya. Single superphosphate (160, 320, and 480 kg/ha) was tested against the triple superphosphate (80, 160, and 240 kg/ha) in a randomized complete block design with 7 replications. Bean var. used were GLP-1004 (Mwezi Moja) at Katumani, GLP-24 (Canadian Wonder) at Thika and Embu, and GLP-2 (Rose Coco) at Kisii and Kakamega. Results showed that only in 2 out of the 10 cases P significantly increased yield, and that no significant difference was observed between the 2 different fertilizers, indicating that, at least when no N is applied, S is not, under the present cultivation conditions, a limiting nutrient in bean production in Kenya. (AS)

0196

* FLOOR, J. 1982. Report on a pot experiment on Rhizobium inoculation and fertilizer application of beans (Phaseolus vulgaris). Thika, Kenya, National Horticultural Research Station. Grain Legume Project. Internal Report. 14p.

An expt. was set up at the National Horticultural Research Center (Thika, Kenya), to study the natural and induced nodulation in 15 soils from Machakos, Kisii, and Kakamega districts, and 1 soil from Thika under controlled conditions. Two inoculation treatments, no inoculation and inoculation with a Rhizobium strain from the U. of Nairobi (no. 406) and 4 fertilizer treatments, check, the addition of 0.70 g calcium ammonium nitrat/pot, 1.00 g triple superphosphate/pot, and 1.00 g diammonium phosphate/pot, were included. The design was a completely randomized block, 15 x 2 x 4 factorial, with only 1 replication. The no. of nodules was estimated and classified in 5 classes according to their no. Tables containing data on DM wt. of shoot and root, nutrient content of plants, total shoot uptake of N, P, and K, amount of water required to produce 1 kg DM, and nodulation class/treatment are presented. The inoculation of beans with Rhizobium strain 406 did not result in a significant higher shoot wt. nor in an increase in N content of the plants but when P was applied, inoculation resulted in a better nodulation than in case of no inoculation. The differences in shoot dry wt. are due to the addition of fertilizers, especially the treatment with diammonium phosphate which caused a 77% higher dry shoot wt. than the unfertilized treatment. The addition of fertilizers, particularly P, considerably reduced the amount of water needed to produce 1 kg DM. This finding might be of great importance for bean-growing in drier areas. Also, nodulation class was much higher when P

was added. Nodulation is good under controlled conditions, and P plays a very important role in bean growing. Further studies on the factors which limit nodulation under field conditions are recommended. (CIAT)

0202

* GERLAGH, M. 1982. Report of a consultancy mission to the Grain Legume Project, Thika, Kenya, National Horticultural Research Station. 11p. [Inst. for Plant Protection, Wageningen, Netherlands]

Findings and conclusions drawn from a consultancy mission to the Grain Legume Project (GLP), Thika, Kenya, regarding bean diseases in May 1982 are presented. Principal diseases found were halo blight (Pseudomonas phaseolicola) at Kisii, BCMV at Kakamega and Kisii, and anthracnose (Colletotrichum lindemuthianum) at Embu and Machakos, followed in importance by angular leaf spot (Phaeoisariopsis griseola) at Embu, scab (Elsinoe phaseoli) at Machakos and Kakamega, and southern blight (Sclerotium rolfsii) at Machakos. The need to implement plant resistance approaches is stressed. GLP most urgent needs are described and its role in the seed market is discussed (3000 ac. planted to GLP cv.). A demand exists for seed of new disease-resistant var. with increased production potential. (CIAT)

0209

* CROOT, W. DE 1979. Critical period for weed competition in food beans in Kenya. Kenya, Ministry of Agriculture. Grain Legume Project. 9p.
Paper presented at the Symposium on Grain Legume Improvement in East Africa, Nairobi, Kenya, 1979.

A series of expt. was conducted by the Grain Legume Project during 3 consecutive seasons in 1975-76 to determine the critical period for weed competition in food beans in Kenya. Expt. were situated at 5 stations in bean growing areas. Plots were left unweeded until 50% of the seeds planted had emerged or were kept weed free (weeded at 10, 20, 30, 40, 50 and 60 days after bean emergence). Results indicate that higher yields are obtained when bean fields are kept weed free from emergence until 50 days later. (AS)

0212

* HASSELBACH, O.E.; NDEGWA, A.M.M. 1982. Modifying the competitive relationship in maize-bean mixtures in Kenya. Summary. In Keswani, C.L.; Ndunguru, B.J., eds. Symposium on Intercropping in Semi-Arid Areas, 2nd., Morogoro, Tanzania, 1980. Proceedings. Ottawa, Canada, International Development Research Centre. p.68.

An expt. was conducted at the National Horticultural Research Station (Thika, Kenya) to study the nature of competition in maize-bean mixtures both above and below the ground. Two bean cv., Mwezi Moja (GLP 1004) and Canadian Wonder, were planted in pure stands and in association with maize cv. H 511. Planting times were 4, 2, and 1 wk. before maize, at the same time as maize, and 1 wk. after maize. There was a 43% reduction in the yield of beans grown in association with maize. Planting beans 1 mo. before maize gave the highest total yield/unit area as well as the highest bean yield. (CIAT)

0215

* HASSELBACH, O.E. 1980. Maize and bean ratios. Thika, Kenya, National Horticultural Research Station. Grain Legume Project. Internal Report no.GLP-18/191. Short Rains 79/80. 6p.

Increasing populations of beans (133,000, 178,000, 213,000, and 237,000 plants/ha) were used with decreasing populations of maize (67,000, 44,000, 27,000, and 15,000 plants/ha) in trials carried out at Thika, Kenya. Increasing interrow distance of maize decreased maize yields; however, beans compensated for the loss. Bean yields decreased by 42%, compared with the best pure stand yield, if maize was planted at the recommended 75-cm interrow distance (44,000 maize plants/ha). Maize planted at 125-cm interrow distance (27,000 maize plants/ha) allowed beans to produce 90% of the best pure stand yield and regarding LER, was the most promising treatment. (AS)

0216

* HASSELBACH, O.E. 1980. Response of bean to Rhizobium inoculation and fertilizers. Thika, Kenya, National Horticultural Research Station. Grain Legume Project. Internal Report no.GLP-15/53. 5p.

A soil which had showed profuse nodulation in previous expt. was added to pots containing 500 g soil in which no natural nodulation had taken place, to see whether nodulation could be induced by the former; both soils were obtained from Machakos district in Kenya. Cv. GLP 24 (Canadian Wonder) was used and different rates of N, P, and diammonium phosphate were added. The difference in Rhizobium population between the 2 soils was insignificant. From the point of view of inoculation, the addition of the 1st soil was a failure; however, it caused significantly higher dry plant wt. P promoted nodulation, whereas N had a negative effect. The influence of fertilizers on nodulation and on dry plant wt. were not related and the possible contribution of nodulation to gains in plant wt. was overshadowed by the addition of a modest N rate. In view of lab. results with Kenyan Rhizobium strains in the Netherlands with a complete nutrient medium, it can be asked whether there is a soil deficiency under field conditions. (CIAT)

0217

* HASSELBACH, O.E. 1980. Soil/yield relationship of beans under conditions of natural and induced nodulation. Thika, Kenya, National Horticultural Research Station. Grain Legume Project. Internal Report no.GLP-17/181. 7p.

A pot expt. was carried out at the Horticultural Research Station (Thika, Kenya) using a random selection of 75 top soils (0-20 cm depth) from the Eastern and Western Provinces to establish those potencially suitable for the growing of beans. Inoculation with Kenyan Rhizobium isolates was used as an exptl. treatment, to study their effectiveness and whether their effect can be related with any of the recorded soil properties. The trial was a 40 x 2 factorial with 1 replicate. Seed of cv. GLP 2 was planted pregerminated at 1 seed/pot and the inoculant was applied at 1 cm^3 of bacterial suspension/pregerminated seed. Bean growth and nodulation were related to pH and P. Addition of the inoculant contributed moderately to nodulation as it did to early flowering, but it did not result in dry wt. gains. (CIAT)

0218

* HASSELBACH, O.E.; KITIVO, D. 1979. Effect of bean density levels and ways of DAP applications in a maize/bean mixture. Thika, Kenya, National Horticultural Research Station. Grain Legume Project. Internal Report no.GLP-18/176-178. 3p.

The relationship between density and fertilizer level in maize/bean intercropping and the possibility of broadcasting the fertilizers instead

of applying to the furrow were studied at Embu, Kenya. Broadcasting diammonium phosphate proved to be superior to furrow application. Increasing the density of beans from 1 to 2 rows between 2 maize rows resulted in a bean yield increase of 46%. Maize yields were not significantly affected by fertilizer treatment and there was only a slight insignificant yield decrease when 2 rows of beans were interplanted instead of one. (CIAT)

0220

* HASSELBACH, O.E. 1978. The effect of some treatments to in maize interplanted beans; Mahoti-Thika; SR 1977-78. Thika, Kenya, National Horticultural Research Station. Grain Legume Project. Internal Report no.GLP-18/147-151. 5p.

Under moderate rainfall conditions in Thika, Kenya, beans and maize were planted in monoculture and in association to determine maize types most suitable for intercropping with beans. No yield advantages were observed; the interplanting of even 1 row of beans affected maize yields and maize competition reduced bean yields by 49% compared with monocropped beans. One maize plant equaled the population pressure of 4 bean plants. Fertilization with 93 kg diammonium phosphate/ha raised yields by 140%. Beans intercropped with Katumani Composite maize yielded significantly more than when intercropped with hybrid H 511. (CIAT)

0221

* HASSELBACH, O.E. 1978. The influence of the propagation site of beans on crop performance in Kenya. In Thika, Kenya, National Horticultural Research Station. Grain Legume Project. Interim Report no.14. Short Rains 1978-1979. Appendix 1. pp.1-4.

An expt. was designed at the National Horticultural Research Center (Thika, Kenya) to investigate the influence of the seed source on crop performance. Bean var. Rose Coco K74 originated from 1 source was grown at 5 locations (Katumani, Thika, Embu, Kisii, and Kakamega). Of these locations some are known for the regular occurrence of particular seed-transmitted diseases. In the subsequent generation the behavior of the offspring was compared. The resistance to anthracnose (Colletotrichum lindemuthianum), common blight (Xanthomonas phaseoli), halo blight (Pseudomonas phaseolicola), BCMV, and angular leaf spot (Isariopsis griseola) was studied. At Kisii marked seed losses took place related to the bulking station: seed yields of Kisii origin were less than half of the seed yields from an origin where the situation during the bulking was almost disease-free. Yield reductions were related to seedling emergence, although in vitro germination % of carefully selected seed was 100% or nearly so for all sources. (CIAT)

0222

* HASSELBACH, O.E. 1977. DAP versus the standard fertilizers for beans. Thika, Kenya, National Horticultural Research Station. Grain Legume Project. Internal Report no. GLP-18/133-138. 6p.

Diammonium phosphate was applied to bean cv. GLP 2 at rates of 100, 200, and 400 kg/ha in split applications (1st at planting and 2nd at beginning of flowering) and 200 kg/ha in a sole application at planting in a randomized block design with 4 replicates in Thika, Kenya. Diammonium phosphate at a rate of 200 kg/ha more than doubled bean yields and was economically feasible. Applied in the furrow it reduced seedling establishment, though at the above rate not significantly. Bean fly damage was significantly less if beans were fertilized with diammonium phosphate.

The action of diammonium phosphate should probably be attributed to its N content, though calcium ammonium nitrate with N at the same level failed to give a similar response. Double superphosphate, the recommended fertilizer, did not show any response. The acidifying effect of diammonium phosphate was only present near the place where it was applied and was more pronounced if initial pH was higher. At harvest the acid action could not be traced any more. (AS)

0223

* HASSELBACH, O.E. 1977. The effect of some treatments to in maize interplanted beans (3). Samuru, Thika. Thika, Kenya, National Horticultural Research Station. Grain Legume Project. Internal Report no.GLP-18/108. 5p.

A trial was conducted at Thika during 1977 to study the effect of plant density on bean yield and LER. Two bean cv. (Rose Coco K74 and Mwezi Moja) were planted in pure stands and in association with maize cv. H 512 at various plant densities. The design was a 2^3 factorial + 5 pure stands of maize + 3 pure stands of beans, with 4 replicates. A raise in density from 89,000 to 404,000 bean plants/ha, interplanted with maize, increased bean yields by about 500 kg/ha. Applications of 93 kg diammonium phosphate/ha to interplanted beans increased bean yields by another 250 kg/ha. Since the interplanting of beans, regardless of the treatment, did not affect maize yields, LER's were likewise positively influenced by the density and fertilizer treatments and attained values well above 1. The recommended spacing of maize (70 x 30 cm) appeared to be suboptimal; yields could be raised by increasing the normal population of 44,000 plants/ha to 62,000 plants/ha. Plant units, as used in replacement trials, should not be arrived at by dividing pure stand optimal densities of the component crops. (AS)

0231

* HUBBELING, N. 1973. Report on bean diseases in Kenya. Wageningen, Netherlands, Institute of Phytopathological Research. 27p.

The incidence, economic importance, source of infection, and control of main diseases, nutritional disorders, and pests ocurring in Kenya are given. The diseases, observed during different trips, mainly occurred in local food beans and in French beans grown for the fresh market. Fungal diseases of major importance reported are caused by Colletotrichum lindemuthianum, Macrophomina phaseoli, Fusarium solani f. phaseoli, Sclerotium rolfsii, Rhizoctonia solani, Uromyces appendiculatus, Isariopsis griseola, Erysiphe polygoni. Fungal diseases of minor importance are those caused by Ascochyta phaseolorum and A. boltshauseri, and Pythium sp. Bacterial diseases of major importance discussed include those caused by Pseudomonas phaseolicola, Xanthomonas phaseolicola, X. phaseoli var. fuscans and of minor importance that by Pseudomonas syringae. BCMV is important. Nutritional disorders observed due to Mn and perhaps Fe are described as well as the insect pests Heliothis armigera and Hylemia cillicrura. Recommendations on climatic conditions, soils, chemical control, and breeding for resistance are included. (CIAT)

0242

* KENYA. MINISTRY OF AGRICULTURE. 1979. Growing foodbeans in Kenya. Thika, National Horticultural Research Station. Grain Legume Project. Advisory Leaflet. 4p.

Cultural practices for growing food beans in pure and mixed stands with maize to improve the production in Kenya are given. These practices include

seed and land preparation, planting time and density, FYM, fertilizers, seed rate and spacing, weeding, pest and disease control, harvesting, and storage. The bean fly (Ophiomyia phaseoli) can be controlled with diazinon (1-1.5 l 60% EC in 500 l water/ha). Endosulfan (35% EC at 3 cc/l water) gives good control of the American bollworm (Heliothis zea). Beans to be used for planting should be treated against bean weevil with 0.1% lindane dust at 100 g/90 kg bag.

0245

* KENYA. MINISTRY OF AGRICULTURE. 1976. Beans. Thika, National Horticultural Research Station. Horticultural Handbook no.2. 11p.

The National Horticultural Research Station published a handbook on bean growing in Kenya which deals briefly with the following topics: types of beans for canning, among which Mexican 142 is the most important due to its high yield, and for consumption (Rose Coco, Mwezi Moja, and Canadian Wonder); French beans (Primour, Long Tom, Saxa, Master Piece, and Monel); climatic and edaphic requirements; land preparation; seed preparation and dressing; seed rate; fertilizers; plant density and planting time; weeding; mixed cropping; harvesting; and marketing. A section is reserved for symptomatology and control of the following main bean diseases and pests: anthracnose (Colletrotrichum lindemuthianum); rust (Uromyces appendiculatus), bacterial blight (Xanthomonas phaseoli), BCMV, ashy stem blight (Macrophomina phaseoli), angular leaf spot (Isariopsis griseola), Fusarium root rot (Fusarium solani), white mold (Whetzelinia sclerotiorum), bean fly (Ophiomyia phaseoli), aphids (Aphis fabae), American bollworm (Heliothis armigera), semi-loopers (Plusia sp.), thrips (Taenothrips sjostedti), and bruchids (Acanthoscelides obtectus). Water requirements, harvesting, and marketing for French beans are also included. (CIAT)

0248

* KENYA. MINISTRY OF AGRICULTURE. 1974. Bean Research Project. Recommendations for growing Mexican beans on large scale farms. Thika. 3p.

The bean var. Mexican 142 (small white seeded) is grown in Kenya for canning purposes, being either exported or canned locally. Recommendations for growing this var. are given. Growing conditions, time of planting, soil preparation, spacing, bean fly control, fertilizers, weed control, pests and diseases, harvesting, threshing, storage, and marketing are briefly described. (CIAT)

0249

* KENYA. MINISTRY OF AGRICULTURE. 1970. Bean production. Nairobi, Crop Production Division. Crop Advisory Leaflet no.286. 4p.

Bean production in Kenya is briefly reviewed. Beans are best grown between 1000-2000 m, in fairly dry areas, and planted at the onset of the short rains. Local var. Mwezi Moja and Rose Coco grow well in drier areas such as Machakos in Eastern Province. Canadian Wonder is recommended for 1300-2000 m such as Kikuyo grassland zone and Western and Rift Valley Province and Mexican 142 for slightly lower elevations such as below main road from Nairobi-Meru. Seed should be treated and good control of the bean fly (Ophiomyia phaseoli) has been achieved with 1002 aldrin w.p./45 kg seed. Spacings of 45-50 cm x 15 cm, with 1 seed/site at 3-4 cm deep, are recommended. Fertilizer, weeding, and measures of controlling rust (Uromyces phaseoli) and the bean aphid are included. Harvesting and storage practices are mentioned. With good management, yields can be increased from 5 to 8-10 bags/ac. (CIAT)

0256

* KINYUA, G.K. 1979. Laboratory and field screening for resistance to bean anthracnose (Colletotrichum lindemuthianum) in food beans. Thika, Kenya, National Horticultural Research Station. 3p.
Paper presented at the Symposium on Grain Legume Improvement in East Africa, Nairobi, Kenya, 1979.

A total of 142 bean var. were tested for their reaction to anthracnose (Colletotrichum lindemuthianum) in the lab. Eight proved to be resistant; tiny necrotic spots or no symptoms formed on the leaves and stems of the seedlings. In the field, 181 bean var. were also tested; 118 were resistant. In both lab. and field screening, black and small-seeded type bean var. were the most resistant. Consumer-acceptable big-seeded bean var. were severely attacked by C. lindemuthianum. (AS)

0257

* KINYUA, G.K.; OMUNYIN, M.E. 1979. Screening beans for resistance to halo blight in Kenya. Thika, Kenya, National Horticultural Research Station. 9p.
Paper presented at the BIC-NDBC Conference, Madison, Wisconsin, 1979.

A total of 600 Grain Legume Project (GLP) no. were screened for resistance to halo blight of beans (Pseudomonas phaseolicola), widely distributed in Kenya and causing considerable yield losses in bean crops. Seeds were inoculated with the bacterial suspension using the partial vacuum method which guarantees infection of all the susceptible seedlings. Eighty-seven were found to be resistant, predominantly black- and white-seeded var. Scores and seed types of the resistant no. are listed. (CIAT)

0282

* MUKUNYA, D.M. 1975. Sources of resistance to bean anthracnose and bean rust in Kenya local dry beans (Phaseolus vulgaris). Bean Improvement Cooperative. Annual Report 18:49-51.

The U. of Nairobi Bean Research Project has concentrated on screening for resistance to bean anthracnose (Colletotrichum lindemuthianum) and bean rust (Uromyces appendiculatus) among other important diseases. To assess resistance to anthracnose, 20 different isolates of the causal organism were inoculated into each of 9 lines (NB 510, NB 511, NB 518, NB 522, NB 524, NB 526, NB 528, NB 529, and NB 533). Bean rust resistance was evaluated for most of the 500 lines of the Project's collection; the disease occurred through natural infestation. Anthracnose resistance was identified in 6 lines for all isolates tested. Lines NB 524 and NB 528 were found to be resistant to both C. lindemuthianum and U. appendiculatus. (CIAT)

0283

* MUKUNYA, D.M. 1974. Bean diseases in Kenya. Bean Improvement Cooperative. Annual Report 17:57-59.

Diseases of beans in Kenya are reported, based on a survey conducted during the short rains season from Sept. to Dec., 1973, in 150 fields of 8 bean growing districts. A table with data on the severity and frequency of the following diseases is included: rust (Uromyces phaseoli), anthracnose (Colletotrichum lindemuthianum), angular leaf spot (Isariopsis griseola), Fusarium root rot (Fusarium solani f. phaseoli), halo blight (Pseudomonas phaseolicola), BCMV, Ascochyta leaf spot (Ascochyta phaseolorum), Rhizoctonia root rot (Rhizoctonia solani), southern blight (Sclerotium

rolfsii), charcoal rot (Macrophomina phaseoli), and dark zonate leaf spot (causal agent unknown). The most severe diseases of bean in Kenya are rust, halo blight, anthracnose, Fusarium root rot, angular leaf spot, and BCMV. (CIAT)

0291

* MWAKHA, E. 1980. Intercropping dry beans in high density arabica coffee. 1. Preliminary observations on bean growth and yield. Kenya Coffee 45(531):187-192.

In an observational trial at the Coffee Research Station, Ruiru, Kenya, 1 or 2 rows of dry beans were intercropped for 3 consecutive seasons in recently stumped, high density coffee with a population range of 5000-20,000 trees/ha. Data obtained indicated that bean vegetative growth, 1st compound leaf chemical composition, pod and seed set were influenced by the position of the bean plant in relation to the coffee canopy. Coffee densities higher than 6667 trees/ha failed to sustain normal growth of the last bean crop prior to commencement of 1st coffee picking, probably due to shading by coffee canopy. These preliminary results indicate that it is possible to obtain 4 consecutive bean crops from stumped high density coffee without affecting the subsequent coffee yield. Further studies are presently being undertaken on coffee canopy/undersown bean growth interactions, with a view to optimizing bean and coffee production on the same land. (AS)

0308

* OLUOCH, P.O.; GASTEL, A.J.G. VAN 1982. Dry beans 1981: report on the national performance trials. Thika, Kenya, National Horticultural Research Station. Grain Legume Project. External Report no.65. 40p.

Data collected in trials conducted both in the long rains of 1981 and the short rains of 1981-82 are presented. Eleven potential var. were tested against standard var. (GLP 2, GLP 24, or GLP 1004) in the 1st season; of 11 new var. entered during the 2nd season, only var. S.T. 92, F.S. 438, and F.S. 520 were retained for further testing. In both expt. a split plot design was used with 4 replications. Main treatments were pure and mixed cropping systems (medium, late maturing, and Katumani maize var.), and the subplots were 12 and 16 bean var. for the 2 seasons, resp. Data are given for individual sites and characters. F.S. 44 gave the highest yield in pure and mixed stands during the long rains over all sites, GLP-288 in pure stand and GLP-1004 in mixed stand during the short rains (over all sites). S.T. 92 was the 2nd highest yielding var. and the most likely to be considered for release. (CIAT)

0311

* OMUNYIN, M.E. 1980. Survey of bean common mosaic virus affecting beans (Phaseolus vulgaris L.) in Kenya. In Kenya, University of Nairobi. Faculty of Agriculture. Plant Protection Program. Report no.3. pp.139-149.

The incidence of the bean common mosaic disease on small-scale farms in Kenya was studied as well as the occurrence of BCMV strains; virus isolates were collected for further study with a view to improve the efficiency of screening progenies for resistance or tolerance to BCMV. The disease was found to occur in most small-scale farms where beans were grown either as a pure crop or mixed with maize and other crops. The source of seeds for planting on farms under survey was known to be either the local market or the previous harvest. Disease incidence was found to be in a low range of 0-20%, with only occasional incidences recorded of up to 60%. BCMV was

recognized in the field by characteristic mottling, leaf rolling, chlorosis, stunting, vein clearing, or necrotic lesions. Isolates that exhibited characteristic symptoms of BCMV were collected for further investigation. (AS)

0312

* OMUNYIN, M.E. 1979. Screening for resistance to bean common mosaic virus in food beans (Phaseolus vulgaris L.). Thika, Kenya, National Horticultural Research Station. 9p.
Paper presented at the Symposium on Grain Legume Improvement in East Africa, Nairobi, Kenya, 1979.

A total of 500 bean cv. from the National Horticultural Research Station, Thika, Kenya, were tested for resistance to BCMV under screenhouse conditions and with artificial inoculation. Infectivity and necrosis tests were applied to screen symptomless cv. and those with local discolorations for presence or absence of the virus in the plant and for genetic distinction of the cv., resp. Of the cv. tested, 435 (approx. 85%) showed clear reactions either with mosaic or with systemic necrosis and were hence susceptible. Eighteen cv. (4%) were resistant; 12 reacted with pinpoint lesions or local vein necrosis; 3 showed local discolorations but systemic spread of the virus could not be detected, whereas the other 3 showed no symptoms but also reacted negatively in the infectivity test. The remaining cv. either had poor germination or reacted with unclear symptoms. (AS)

0314

* PERE, W.M.; MAGOYA, J.K.; RHEENEN, H.A. VAN 1982. Stop bean weevil infestation with sunflower oil. Kenya Farmer no.8:18.

Methods to protect bean seeds against weevils (Acanthoscelides obtectus) are briefly described. Treatments with chemicals (malathion or lindane at 2 and 1%, resp.), ashes, and sunflower oil are included. The latter is the most effective if used with small quantities of seed (2 cm^3 sunflower oil/kg bean seed). (CIAT)

0316

* QURESHI, J.N. 1979. Critical levels of N and P in bean leaves and the removal of some macro and micro nutrients by a bean crop. Nairobi, Kenya, National Agricultural Laboratories. 8p.
Paper presented at the Annual General Meeting of the Soil Science Society of East Africa, 5th., Mjoro, Kenya.

Beans were grown in the field under rainfed conditions at Kabete, Kenya, during 1978-80 to evaluate critical levels of N and P in beans and estimate amounts of some major and micronutrients removed by various components of the bean plant. Var. Mwezi moja was grown the 1st 2 yr and K74 the last year. Six increasing rates of N and P were applied separately. Critical levels of N and P were estimated in leaves, sampled just before flowering. Values of 3.82% for N in Mwezi moja and 0.42 and 0.31% for P in K74 were obtained. Mwezi moja beans responded significantly to N (1978 only) and P fertilization. Application of 40 kg P/ha doubled grain yields over the control in both yr. Fertilizer response in K74 was lost due to bean rot infection. Nutrient removal from the soil by various components of the bean plant was also estimated. N and K were removed in greatest amounts followed by Ca, Mg, P, S, Fe, Mn, Zn, and Cu in that order. Grains remove most N, P, Mg, and S. K is removed in about equal amounts by grains and hulled pods. Ca and the trace elements Cu, Mn, and Fe occur mostly in hulled pods and stems while Zn is mostly in grains and stems. (AS)

0320

* RHEENEN, H.A. VAN; PERE, W.M.; MAGOYA, J.K. 1983. Protection of stored bean seeds against the bean bruchid. FAO Plant Protection Bulletin 31(3):121-125.

Due to the severe damage of bean seeds by the bean bruchid (Acanthoscelides obtectus) in Kenya, 5 series of trials using different bean var. were carried out to test the effectiveness of ashes (kitchen and coffee wood) and lindane dust (4%), sunflower oil, maize germ oil, wood ashes, and malathion dust. Control of the pest by chemical seed treatment was successful, but equally successful was treatment with maize germ oil and sunflower oil applied in a dosage of 2 ml of oil/kg seed. Although ashes gave some protection, beetle control was not always sufficient. Practical application of vegetable oil to stored bean seeds is strongly recommended. (AS)

0323

* RHEENEN, H.A. VAN 1981. Information storage and retrieval for beans by means of punch cards. Bean Improvement Cooperative. Annual Report 24:2-3. [National Horticultural Research Station, Grain Legume Project, P.O. Box 220, Thika, Kenya]

A punch card system for literature information is briefly described. Figures showing sections of punch cards for classification of literature and description of germplasm are included. (CIAT)

0326

* RHEENEN, H.A. VAN 1979. Breeding for anthracnose resistance in Kenya. Thika, Kenya, National Horticultural Research Station, Grain Legume Project. 6p.
Paper presented at the Bean Anthracnose, Angular Leaf Spot and Common Bacterial Blight Workshop, Cali, Colombia, 1979.

Results of 2 breeding programs, backcrossing and pedigree selection, to obtain resistance to anthracnose (Colletotrichum lindemuthianum) in acceptable and high yielding bean cv. are discussed and an approach for future work is suggested. (AS)

0355

* ZOEBL, D. 1983. Beans becoming a staple in the Kenya diet. Kenya Farmer no.21:13.

Although beans are not a very old crop in East Africa, consumption of this pulse in Kenya is approx. 20 kg/head/yr. and the total area planted to this crop is approx. 500,000 ha. Beans have replaced indigenous crops due to their agronomic characteristics: higher yields, require less labor, do not show a tendency to shattering as local legumes do, ripen evenly, and yield more calories and protein/day cultivation. These characteristics also apply to maize which is intercropped with beans. It is unlikely that local legumes such as cowpea and pigeon pea will disappear from Kenyan diets, however, Kenyan farmers need to plant cash crops that are less time-consuming. (CIAT)

0363

* AYONOADU, U.W.U.; EDJE, O.T.; MUGHOGHO, L.K. 1973. Seed size as a factor in navy beans production. Bean Improvement Cooperative. Annual Report 16:63-66.

A preliminary report of an investigation carried out during the cool season at the Bunda College of Agriculture (Lilongwe, Malawi) on the effect of seed size on yield of canning beans is presented. Ten determinate bean lines were evaluated at Dwangwa Irrigation Project. Six of the lines (AB4-1, AB14-2, AB28-1, AB29-1, AB40-2, and AB40-35/1) were breeding lines of the F_5 generation; 4 var. were imported (Kerman, Gallaroy, and Burnia from Australia, and Seafarer from USA). The expt. was randomized block design with 5 replicates. The % of cannable beans was the proportion of beans which were retained on a circular screen size 5.5 mm in diameter but passed through 8.0 mm. Seed size was the wt. of 100 whole seeds oven-dried at 100°C for 24 h. Data on total seed yield and yield of cannable beans, seed yield distribution according to screen size, and other agronomic characteristics are given. The highest yielding cv. was AB4-1 (2744 kg/ha). Seafarer, with 95% cannable beans, gave the highest cannable yield (2014 kg/ha). AB29-1 was one of the highest yielding lines, but it gave the lowest cannable yield (720 kg/ha). The no. of seeds/pod was negatively correlated with the yield of cannable beans. Although the correlation coefficient was not significant it indicates that the greater the no. of seeds in the pod, the smaller the seeds and this would tend to reduce the proportion of cannable beans. (CIAT)

0364

* AYONOADU, U.W.U.; MUGHOGHO, L.K.; EDJE, O.T. 1972. Selection and varietal improvement of Phaseolus vulgaris beans. Lilongwe, Malawi, Bunda College of Agriculture. Research Bulletin no.3. pp.37-47.

Progress made during 1970-72 in the selection and improvement of Phaseolus vulgaris beans, in both greenhouse and field trials at Bunda, Malawi, is reported. An intensive resistance breeding program was started using the exotic lines resistant to anthracnose (Colletotrichum lindemuthianum), halo blight (Pseudomonas phaseolicola), common bacterial blight (Xanthomonas phaseoli), and common mosaic, and a local line resistant to rust (Uromyces appendiculatus). Evaluation of breeding lines and cv. from the Malawi Bean Collection under irrigated and under rainfed conditions showed that lines with acceptable yield levels have been developed. Results also indicate that yields from trials under irrigation are about 50% higher than rainfed trials. (AS)

0368

* EDJE, O.T. 1982. Effects of frequency of irrigation on dry bean yields. Bean Improvement Cooperative. Annual Report 25:28-29. [Bunda College of Agriculture, P.O. Box 219, Lilongwe, Malawi]

The incidence of the frequency of irrigation on the yield of dry beans was studied in an expt. conducted at Bunda College of Agriculture (Lilongwe, Malawi) during the dry season of 1981. Determinate bean cv. Nasaka was planted on ridges spaced 91 cm apart and sown on 2 rows/ridge at a spacing of 10 cm between plants within rows. All plots (5 ridges each 6 m long) were irrigated until after emergence; thereafter, 6 treatments were used: irrigation every 3(W_3), 5(W_5), 7(W_7), 10(W_{10}), 15(W_{15}), and 20(W_{20}) days, irrigating 13, 9, 7, 4, 3, and 2 times, resp.). Seed yield varied significantly with the frequency of irrigation with W_3 yielding the highest (3007 kg/ha) and W_{10} the lowest (1595 kg/ha). The correlation coefficients between seed yield and each of the following, no. of branches/m^2, seeds/pod, seeds/m^2, and seed size, were 0.9134, 0.8186, 0.9511, and 0.5752, resp. The correlation coefficient between seed yield and the frequency of irrigation was 0.9118. (CIAT)

0369

* EDJE, O.T.; LAING, D.R. 1982. Physiological aspects of maize and beans in monoculture and in association. Summary. In Keswani, C.L.; Ndunguru, B.J., eds. Symposium on Intercropping in Semi-Arid Areas, 2nd., Morogoro, Tanzania, 1980. Proceedings. Ottawa, Canada, International Development Research Centre. pp.69-70.

The growth of maize and beans in monoculture and in association was studied in a field trial conducted in 1977 at Palmira (Colombia), near CIAT, to obtain information on how these crops compete with each other. A brachytic maize var., ICA H 210, and a climbing bean var., P 589, were used under irrigation in a randomized block design with 4 replications. Treatments were: maize monoculture, bean monoculture, and maize and bean in association on the same plot. Total DM of beans (monoculture or in association) increased almost linearly with time until 86 days after planting; thereafter it declined. DM distribution in leaves, stems, and pods of bean monoculture at 58 days after planting was 41.0, 33.0, and 4.1%, resp., whereas DM distribution was 33.0, 45.0, and 1.5%, resp., for intercropped beans for the same period. Total no. of nodes/m^2 for bean in monoculture and in association was 786 and 618, resp. Bean yields in association with maize were reduced by 51%. (CIAT)

0371

* EDJE, O.T. 1981. Effect of planting pattern and plant density on bean yield. Bean Improvement Cooperative. Annual Report 24:101-102. [Bunda College of Agriculture, P.O. Box 219, Lilongwe, Malawi]

Trials were carried out at Bunda College of Agriculture, Lilongwe Agricultural Development Division, and Mbawa Research Station, to investigate the effect of planting pattern and plant density on bean seed yield. Three dry bean cv. (Nasaka, P402, and P643), 3 planting patterns (2, 1, and 1 rows/ridge and 1, 2, and 4 plants/hill, resp), and 2 plant densities (8 and 24 plants/m^2) were used. Mean cv. yields averaged over planting pattern and densities were 917, 892, and 794 kg/ha for cv. Nasaka, P402, and P643, resp. Planting 2 or 4 seeds/hill increased seed yield by 25 and 15%, resp., over planting 2 rows/ridge with 1 plant/hill. Decreasing plant population from 24 to 8 plants/m^2 increased seed yield by only 15%. (CIAT)

0372

* EDJE, O.T. 1981. Effects of density of bean and planting pattern of maize and beans in association. Bean Improvement Cooperative. Annual Report 24:99-100. [Bunda College of Agriculture, P.O. Box 219, Lilongwe, Malawi]

A trial was conducted during 1978-79 crop season in Bvumbew, Bunda, and Bolero in the southern, central and northern regions of Malawi, resp., to evaluate the effect of varying the density of bean plants and planting pattern of maize when grown in association. Vigorous indeterminate climbing bean cv. 336 and maize cv. MH12 were used along with 3 treatments: 1 or 2, 2 or 4, and 3 or 6 bean plants/1, 2, and 3 maize plants, resp. Increasing plant density from 36,630 (1 bean plant/1 maize plant) to 72,455 plants/ha (6 bean plants/3 maize plants) had no effect on bean yield, therefore increasing seed rate beyond 1, 2, or 3 bean plants/1, 2, or 3 maize plants is not recommended. (CIAT)

0376

* EDJE, O.T. 1981. Studies on bean and groundnut in monoculture and in association. Bean Improvement Cooperative. Annual Report 24:96-98. [Bunda College of Agriculture, P.O. Box 219, Lilongwe, Malawi]

An expt. was conducted at Bunda College of Agriculture (Lilongwe, Malawi) during the 1978-79 crop season to study the effect of growing beans in monoculture and in association with groundnut. Determinate dry bean cv. Nasaka and 4 groundnut cv. (RG1, Chaimbana, Malimba, and Mani Pintar) were used. Planting beans in association with groundnut had no significant effect on bean yield, which averaged over all groundnut cv. was 1292 kg/ha vs. 1498 kg/ha in monoculture. (CIAT)

0379

* EDJE, O.T. 1979. Cropping systems for small farmer. Lilongwe, Malawi, Bunda College of Agriculture. Research Bulletin no.10. pp.10-34.

Mixed cropping, sequential cropping, and crop rotation are considered as the most important cropping systems for the small farmer in Malawi, characterized by owning 1.2-1.6 ha, with limited credit and power sources (mostly human and animal), in need of stable yields and not able to afford monocultures. The advantages of these cropping systems are highlighted and their limitations discussed. Ninety-four % of cultivated land in Malawi is intercropped, pulses being intercropped mainly with maize. The following types of mixed cropping systems are described: mixed cropping with no row arrangement, row intercropping, relay cropping, strip cropping, and interculture (arable crops below perennial crops). Research priorities for small farmers are discussed. (CIAT)

0384

* EDJE, O.T. 1978. Effects of plant density, row width and fertilizer on bean yield under irrigation. Bean Improvement Cooperative. Annual Report 21:36-37.

An expt. was conducted at Bunda College of Agriculture (Lilongwe, Malawi) during the cool season of 1976, as part of a broad project aimed at developing package practices for irrigated bean production. Treatments were: 2 plant densities (22 and 44 plants/m^2), 2 row widths (22.5 and 45.0 cm), and 3 N levels (0, 60, and 120 kg/ha). Cv. 253/1 was used. Highest yield (4232 kg/ha) was obtained at the low density, narrow width, and high N level combinations. (CIAT)

0385

* EDJE, O.T. 1978. Response of dry beans to shading treatments. Bean Improvement Cooperative. Annual Report 21:34-36.

An expt. was carried out at the Bunda College of Agriculture (Lilongwe, Malawi) to determine the effect of shading on bean yield. Bean cv. 253/1 was planted on 91-cm ridges under rainfed and irrigated conditions. Shades were grass mats 6 m long and 3 m wide, supported on bamboo poles 0.8 m long; each mat covered 3 ridges which constituted the gross plot. Treatments were shade for 1, 2, 3, and 4 wk. from the beginning of flowering, shade throughout the season from seedling emergence, and no shade. Yield was generally higher under irrigated than under rainfed conditions. Beans shaded for 1 wk. from the beginning of flowering showed a yield reduction of 37.5%; shading beans for 2 and 3 wk. decreased yields by 50.5 and 49.2%, resp. The primary yield component most affected by shading was the no. of pods/m^2. It is recommended that beans be planted before maize in intercropping to avoid bean yield reduction. (CIAT)

0388

* EDJE, O.T.; MUGHOGHO, L.K.; RAO, Y.P. 1976. Effects of defoliation on bean yield. Bean Improvement Cooperative. Annual Report 19:29-31.

The effects of N fertilizer and defoliation on the leaf and seed yield of a determinate dry bean cv., 253/1, were studied during 1974 at Bunda College Farm, Lilongwe, Malawi. The design was a split-plot with N level (0, 40, and 80 kg/ha) as the main plot and defoliation frequency (1, 2, and 3 times) as the subplots. All plots received 33 kg P and K/ha, resp., before planting. Mean seed yields were 562, 999, and 1049 kg/ha for 0, 40, and 80 kg fertilizer/ha, resp. Defoliation (3 leaves/plant) done 1, 2, and 3 times during the season reduced seed yield by 2.5, 9.4, and 43.0%, resp., averaged over N levels. It was recommended to apply 40 kg N/ha and defoliate about 6 leaves/plant to obtain high yields and to use fully expanded tender leaves as green vegetables. (CIAT)

0389

* EDJE, O.T.; MUGHOGHO, L.K.; RAO, Y.P. 1976. Effects of mixed cropping of maize and beans on seed yield. Bean Improvement Cooperative. Annual Report 19:31-34.

An expt. was conducted at the Bunda College of Agriculture Research Farm (Lilongwe, Malawi) during the rainy season of 1974-75 to develop package practices for growing Phaseolus beans in monoculture and in association with maize. Determinate bean cv. 253/1 and indeterminate cv. 1200 were used along with maize cv. SR.52. Results are tabulated for the 9 treatments used in the expt. Bean yields were significantly ($P = 0.01$) reduced (54% for cv. 253/1) when grown in association with maize but the total seed yields of mixed stands were always higher than those of pure stands. From the results, it appears that mixed cropping can increase production/unit area and make max. use of land inputs. (CIAT)

0390

* EDJE, O.T.; MUGHOGHO, L.K. 1976. Effects of number of seeds per pod on yield and yield components in beans. Bean Improvement Cooperative. Annual Report 19:34-35.

A trial was carried out to determine the effect of seeds produced from different seeded pods on pod characteristics and yield of a subsequent crop. Seeds were obtained from an expt. carried out at Dwangwa (Malawi) under irrigated conditions in 1973 to determine the response of bean to 6 levels of N (0, 40, 80, 120, 160, and 200 kg/ha). Pods from the 120 kg N/ha were separated into 2-, 3-, 4-, and 5-seeded pods. In 1974 the seeds from these pods were planted again at Dwangwa. A randomized block design was used. Pods with 3 or 4 seeds occurred more frequently than any other. Pod length increased with the no. of seeds/pod, but the mean pod length, pooled over pod frequency, was essentially the same (ranged from 10.2 to 10.5 cm). Seed yields from 2-, 3-, 4-, and 5-seeded pods were 2487, 2349, 2522, and 2677 kg/ha, resp. (CIAT)

0391

* EDJE, O.T.; MUGHOGHO, L.K. 1976. Photosynthetic efficiency of the different zones of the bean plant. Bean Improvement Cooperative. Annual Report 19:26-29.

A study was carried out at Bunda College Farm (Lilongwe, Malawi) to determine the photosynthetic efficiency of 3 zones of Phaseolus beans. Determinate bean cv. 373 was planted on 45-cm ridges and at 10 cm between plants. A split split plot design was used with 3 treatments. Main plots were levels of N (40 and 80 kg/ha) and subplots, growth stages (21 and 35 days from planting), and the sub-subplots, 3 photosynthetic zones (A, top third; B, middle third; and C, bottom third). The leaves within each

portion of the plant constituted a zone and 8 zones were considered: A, B, C, AB, AC, BC, ABC, and control. Yield decreased with delay in defoliation. Mean yield of 7 zones (excluding check), pooled over fertilizer levels and zones, were 1350 and 1039 kg/ha for 21 and 35 days from planting, resp. Increasing the level of N from 40 to 80 kg/ha increased yield by only 18%. Yields, pooled over N levels and growth stages for zones A, B, C and complete defoliation, were 1108, 1552, 960, and 579 kg/ha, resp., indicating that zone B was the most efficient. (CIAT)

0396

* EDJE, O.T.; MUGHOGHO, L.K.; AYONOADU, U.W.U. 1974. Growth, development and yield of beans at varying ridge widths. Bean Improvement Cooperative. Annual Report 17:34-36.

Two determinate bean cv., 334/2 and 1198, were planted at the Bunda College Farm (Lilongwe, Malawi) at 3 ridge widths (30, 45, and 60 cm) to determine their effect on yield and yield components. All treatments were replicated 6 times and received 400 kg compound fertilizer (8-15-10) at planting. Growth measurements were determined at 4 stages of growth. Cv. 334/2 with a denser canopy produced more DM at all ridge widths than cv. 1198, although the latter, with a narrower canopy, had higher pod wt. than the former at 68 days from planting. The no. of pods/m^2 increased with narrow ridge width in both cv. The correlation between the no. of seeds/pod and yield was r = 0.759 for cv. 334/2 compared with r = 0.605 for cv. 1198. (CIAT)

0398

* EDJE, O.T.; MUGHOGHO, L.K.; AYONOADU, U.W.U. 1973. Agronomy experiments on Phaseolus beans. Lilongwe, Malawi, Bunda College of Agriculture. Research Bulletin no.4. pp.38-67.

Field expt. on germplasm evaluation, var. trials, production systems, fertilizers, plant populations and spacings, fertilizer and plant populations, and crop physiology were conducted under rainfed and irrigated conditions in several ecological regions in Malawi during the 1972-73 growing season, aimed at producing recommended practices for the economic production of different types of beans. Results of germplasm evaluation and var. trials indicated that many bean lines have high yielding potential and that diseases such as anthracnose (Colletotrichum lindemuthianum), angular leaf spot (Isariopsis griseola), halo blight (Pseudomonas phaseolicola), bacterial blight (Xanthomonas phaseoli), rust (Uromyces phaseoli), and root rot continue to be diseases of major economic importance in beans. The production of indeterminate beans without staking is not recommended since unstaked beans produce about 50% of their potential as compared with staked beans. In addition to the low yield, seed quality was poor because pods of unstaked beans were generally lying on the ground where fungal growth and water and soil splashing on them caused considerable reduction in seed quality. Expt. on the effect of defoliation 0, 25, 50, 75, and 100% of bean leaves from determinate beans indicated that picking of leaves for use as relish detracted from seed yield and that the bottom half or bottom 2/3 of the plant was the most efficient in seed yield production. A split N trial indicated that splitting N was more beneficial than single application provided rainfall was reliable, otherwise single application at planting was just as good, cheaper, and less injurious to the plant than split application. A fertilizer placement trial indicated that planting seeds in a row 5 cm from 2 fertilizer bands had comparable results with seeds planted at 5 cm above the fertilizer band, indicating that the latter method should be used because of the extra labor involved in the former method. The trial on the effect of ridge width and plant spacing showed that the highest yield of indeterminate dry beans was produced on 45-cm

ridges compared with 60-cm and 90-cm ridges although it was difficult to train vines on stakes at 45-cm apart due to the narrowness of the distance between ridges. A N fertilizer expt. showed that in addition to increasing seed yield, N also increased CP content significantly (P = 0.005) and N and CP were also significantly and positively correlated (r = 0.984), indicating that 96.8% of the variation in CP content was due to differences in N level. (AS)

0399

* EDJE, O.T.; MUGHOGHO, L.K.; AYONOADU, U.W.U. 1972. Agronomy experiments on beans Phaseolus vulgaris L. (Savi). Lilongwe, Malawi, Bunda College of Agriculture. Research Bulletin no.3. pp.20-36.

Field expt. were conducted both under rainfed and irrigated conditions in 7 ecological regions of Malawi during the 1971-72 growing season to produce package practices for the economic production of different types of Phaseolus beans. The results of method of providing support, both vertical and horizontal, for indeterminate beans under rainfed conditions indicated that apart from reduction in seed quality, seed yield was reduced by about 39% when bean plants were not staked. Expt. carried out to determine the effect of defoliation on seed yield showed that depending upon the bean type and the no. of leaves removed, seed yield was decreased by 12-41%. Plant population expt. indicated that optimum seed yields were not reached; however, highest plant populations gave highest yields. The ability of bean plants to compensate for seed yield at low plant populations was illustrated in these expt. Fertilizer trials indicated that although beans are a legume crop, N fertilizers are still essential for obtaining high yield. (AS)

0404

* INTERNATIONAL SERVICE FOR NATIONAL AGRICULTURAL RESEARCH. 1982. A review of the agricultural research system of Malawi. The Hague, Netherlands. Report to the Government of Malawi. ISNAR 88. 88p.

The agricultural research system of Malawi was reviewed in order to advise how it could be improved. Recent performance of the agricultural sector, as well as factors affecting the pattern of agricultural growth, are examined. Major aspects of the current system, including institutions, resources, and linkages with other institutions, are examined. The main problems of the research system are discussed and recommendations are given. Less than 0.5% of the country's agricultural gross domestic product is invested in research. The most critical need is a steady flow of adequate funds for replacing equipment, supplies, and materials, and for internal transportation. Research within the Ministry of Agriculture, at Bunda and Chancellor Colleges, and at each of the 11 research stations is examined in detail. Work on beans (850,000 ha) is being carried out at Chitala, Kasinthula, and Mbawa research stations. (CIAT)

0405

* MSUKU, W.A.B.; EDJE, O.T. 1982. Effect of mixed cropping of maize and bean on bean diseases. Bean Improvement Cooperative. Annual Report 25:16-18. [Crop Production Dept., Bunda College of Agriculture, P.O. Box 219, Lilongwe, Malawi]

In an expt. carried out at Bunda College and Bembeke (Lilongwe, Malawi) during the 1980-81 growing season, dwarf bean cv. Nasaka and climbing bean cv. Kansama were planted in monoculture and in association with a maize cv. Malawi hybrid (MH12) to study the relationship of the 2 cropping systems with the incidence of bean diseases. A scale of 1-5 (grades of 1, 2, 3, 4,

and 5, for 0.10, 1-25, 26-50, 51-75, and 76-100% infection or death of the plant, resp.) was used to record disease incidence. Bacterial damage by blights (Ascochyta phaseolorum and Thanatephorus cucumeris), rust (Uromyces phaseoli), and anthracnose (Colletotrichum lindemuthianum) was higher in dwarf and climbing beans in monoculture than in association with maize, but there was no difference in the amount of diseases in climbing beans under the 2 cropping systems at Bembeke. Angular leaf spot (Isariopsis griseola) incidence was higher in beans in association than in monoculture at both localities. (CIAT)

0407

* MUGHOGHO, L.K.; EDJE, O.T.; AYONOADU, U.W.U. 1972. Bean Improvement Programme in Malawi. Bean Improvement Cooperative. Annual Report 15:69-71.

A bean improvement program started in 1969 at Bunda College of Agriculture, Lilongwe, used the collection of 4000 lines obtained from all parts of Malawi as a basis for breeding high yielding, disease-resistant bean var. suitable for canning, and also studied bean production under irrigation. The program also evaluated the germplasm collection as well as the agronomy, physiology and crop protection, and breeding programs. Material and information is exchanged with the Grain Legume Research Units at Mekereke (Uganda), Cambridge U. (England), and the International Institute of Tropical Agriculture (Nigeria), among others. (CIAT)

0423

* KHACHANI, M. 1981. Contribution a l'etude de la response du haricot vert a l'inoculation. (Study on the response of green beans to inoculation). These Ing.Agr. Rabat, Morocco, Institut Agronomique et Veterinaire Hassan 2. Memoire (3eme cycle agronomie). 116p.

Expt. were conducted under field and growth chamber conditions at Guich Exptl. Station and the Dept. of Soil Sciences of the Institut Agronomique et Veterinaire Hassan 2 (Morocco) to study the effect of inoculating Phaseolus vulgaris with different strains of Rhizobium phaseoli. Under field conditions, inoculation with a mixture of 3 different Rhizobium strains (CIAT 57, 404, and 676) significantly improved plant growth (size and DM). Yield of the inoculated plant was also increased over the control by approx. 51%; however, yields did not reach the level obtained by 100 U of N. Under growth chamber conditions, there was a significant difference between the strains of Rhizobium in their ability to fix N with the different var. Strains Loukous No. 3 and CIAT 676 gave the best results. When 100 U of N was applied per hectare plant nodulation was significantly reduced. (AS)

0425

* NEHRI, A. 1980. Essai de fertilisation de la culture du haricot-vert. Comparaison de quelques techniques de fumure organique. (Fertilization trials of haricot bean crops. Comparison of organic fertilization techniques). These Ing.Agr. Rabat, Morocco, Institut Agronomique et Veterinaire Hassan 2. 49p.

Local bean var. Royal nel was fertilized with NPK and 6 different rates of horse manure (from 10 to 60 t/ha) at the Institut Agronomique et Veterinaire Hassan 2, Rabat, Morocco. The land had not been cultivated for 10 yr. There were 3 fertilization dates and 4 harvests (at 4-day intervals). Exptl. operations are detailed. Results of soil and manure analyses are given as well as data on germination, growth, plant height, nodule no., petioles and leaf stems N contents, and yields. Yields

increased with higher manure doses. Best yields varied between 10.9-12.5 t/ha. Higher profits were given by 16 t manure/ha, applied on the 3rd date (Jan. 21). The application of 40 t manure/ha (25 days before sowing) was similar to the application of 50-60 t manure/ha (70 or 50 days before sowing). (CIAT)

0428

* DEEMING, J.C. 1979. Ophiomyia phaseoli (Tryon) (Diptera:Agromyzidae) attacking bean plants (Phaseolus vulgaris L.) in northern Nigeria. Nigerian Journal of Entomology 3(2):129-132.

Ophiomyia phaseoli was recorded attacking bean plants at Samaru, Nigeria, in 1976. The 3rd instar larva and puparium are described and parasites are named. (AS)

0437

* OKIGBO, B.N.; GREENLAND, D.J. 1976. Intercropping systems in tropical Africa. In Stelly, M.; Kral, D.M.; Eisele, L.C.; Nauseef, J.H., eds. Symposium on Multiple Cropping, Knoxville, Tennessee, 1975. Proceedings. Madison, Wisconsin, American Society of Agronomy. Special Publication no.27. pp.63-101.

A comprehensive review is presented of characteristics of cropping systems in traditional farming practices in tropical Africa. Factors contributing to changes in cropping systems and adaptations to prevailing conditions are discussed and a regional and country survey of multiple cropping systems is presented which included Nigeria and other countries of West Africa, countries of Central and Southern Africa, and East Africa. Multiple cropping systems can be considered part of traditional farming in Africa, with mixed intercropping in compound farms, a complex but stable agroecosystem, as the most widespread. Patch intercropping and relay cropping are more common than successive cropping sequences. Intercropping gives the farmer higher total yields and greater returns than pure stands; it also minimizes pest and disease losses, and risk. Advantages of intercropping are stressed and disadvantages are mentioned. (CIAT)

0438

* OKIGBO, B.N. 1973. Grain legumes in the farming systems of the humid lowland tropics. In IITA Grain Legume Improvement Workshop, 1st., Ibadan, Nigeria, 1973. Proceedings. Ibadan, International Institute of Tropical Agriculture. pp.211-223.

The place of legumes in traditional farming systems of tropical Africa, especially Nigeria, is discussed. Prevailing farming systems are: shifting cultivation, bush fallow, rudimentary sedentary cultivation, intensive sedentary cultivation as compound farming or terrace farming. The importance of legumes in the av. diets of the population is stressed. Phaseolus vulgaris seeds are utilized as food; they are a minor crop. New potential uses would be as livestock feed, green manure, and for control of erosion. Beans are intercropped in relay or multiple cropping patterns with or without overlapping growing periods, or as a sole crop in rotational cropping. Problems in realizing the full potentialities of grain legumes in the humid tropics are outlined. (CIAT)

0439

* OELSLIGLE, D.D.; McCOLLUM, R.E.; KANG, B.T. 1976. Soil fertility management in tropical multiple cropping. In Stelly, M.; Kral, D.M.;

Eisele, L.C.; Nauseef, J.H., eds. Symposium on Multiple Cropping, Knoxville, Tennessee, 1975. Proceedings. Madison, Wisconsin, American Society of Agronomy. Special Publication no.27. pp.275-292.

The development of fertilization practices, and the adaptation of existing ones, to multiple cropping patterns, particularly for marginal farmers, are reviewed. It is important that the economics of the practices be considered simultaneously with their biological potential. Basic concepts are established on characteristics of the soil (initial fertility, fertility management and maintenance, physical properties) and the crop (nutrient requirements, patterns of growth and nutrient accumulation, adaptability to seasonal variation). Fertilizer should be applied to those crops which responded to it, and little or none to nonresponding ones. Yields increased from 0.61 to 1.49 to 2.25 MT/ha for multiple cropped climbing beans, and from 1.04 to 2.04 to 2.44 MT/ha for multiple cropped bush beans when 3 increasing NPK levels (0-0-0, 212-63-109, 424-126-218) were applied. Fertilization practices of specific systems are discussed: strip cropping, double cropping, ratoon cropping, relay intercropping, row intercropping. Various aspects of nutrient supplying are considered: rate, placement, sources, and timing of applications. Fertilization practices appropriate for mixed intercropping are probably the most complex because of the spatial arrangement of plants. The need for performance data (both crop and nutrient) is stressed. (CIAT)

0440

* RAHEJA, A.K. 1973. A report on the insect pest complex of grain legumes in northern Nigeria. In IITA Grain Legume Improvement Workshop, 1st., Ibadan, Nigeria, 1973. Proceedings. Ibadan, International Institute of Tropical Agriculture. pp.295-301.

Research on insect pests of grain legumes, in particular cowpea, at the Institute for Agricultural Research, Samaru, Zaria (Nigeria) is presented. A table with yields and observations made of different legume crops, including beans (Phaseolus vulgaris), cultivated in Samaru in 1971-72, is included. Beans yielded 221 and 136 kg/ha, sprayed with DDT/BHC and unsprayed, and 62 and 37 kg/ha (sprayed and unsprayed, resp.), during the 2 yr. Ootheca and Coryna damage was heavy during 1st 6 wk. Flowering took place during the 4th wk., and pod formation in the 5th. A heavy thrip attack was reported. Harvesting was done during wk. 8-9. In 1972 substantial aphid damage was observed. (CIAT)

0441

* WILSON, G.F.; ADENIRAN, M.O. 1976. Intercropping of cassava with vegetables. In Monyo, J.H.; Ker, A.D.R.; Campbell, M., eds. Symposium on Intercropping in Semi-Arid Areas, Morogoro, Tanzania, 1976. Report. Ottawa, Canada, International Development Research Centre. p.24.

The results of a series of expt. on vegetables in a cassava-based cropping system for the humid tropics, carried out by the farming systems program of the International Institute of Tropical Agriculture, Ibadan, Nigeria, are briefly discussed. With the aid of irrigation 1 crop of cassava was intercropped with 3 of vegetables (tomato-okra-French bean); the highest yield was obtained when cassava rows were 2 m apart. Cassava suppressed the yields of okra and French bean. The poor performance of French bean could have been due to the zero tillage method used. (CIAT)

0458

* INSTITUT DES SCIENCES AGRONOMIQUES DU RWANDA. 1982. Cultures associees. (Intercropping). In _____. Compte rendu des travaux du Departement des Productions Vegetales. Exercice 1981. Rubona. pp.137-140.

Data are presented on cultural trials carried out with different crop associations at Rubona and Karama, Rwanda, in 1981. Results of intercropping trials at Karama (colluvium soils) and Burenge (transition soils) are given in table form. At Karama and Burenge, resp., av. yields of 1909 and 708 kg/ha (climbing bean) and of 1333 and 600 kg/ha (dwarf beans) were obtained. (CIAT)

0493

* NZITABAKUZE, Z.B.; MOSKALENKO, L.N.; RAUTENSHTEIN, I.I.; SHIINIKOVA, V.K. 1977. [Lysogeny in nodule bacteria of kidney beans (Rhizobium phaseoli) from the soils of Rwanda and the USSR]. Izvestiya Timiryazevskoi Selskokhozyaistvenooi Akademii 3:15-20.

Eighteen strains of Rhizobium phaseoli isolated from bean nodules grown on different soils were studied for lysogeny by the method of electronic microscopy and cross trials. In 9 strains phage particles were found in culture liquor. The amount of phage in the cultures increases after induction, which proves their true lisogenous state. Morphologically phages are divided into 3 groups according to the origin of the exptl. cultures. After cross planting the phage could be isolated only in 1 case — when culture liquor of R. phaseoli K15 was put on the plot of R. phaseoli F2 (phage K15/F2). This phage is morphologically different from the phage particles which are present in the culture liquor of R. phaseoli K15. The origin of the phage K15/F2 is discussed. (AS)

0496

* GOLATO, C. 1967. Cercosporiosi del fagiolo in Somalia. (Cercosporiose of beans in Somalia). Rivista di Agricoltura Subtropicale e Tropicale 61(4-6):159-162.

Cercosporiose was reported affecting Phaseolus mungo in Genale's area (Somalia). Disease symptoms, morphological characters, and biometric data of the causal organism are given. Phaseolus sp., P. vulgaris, and P. lunatus are indicated as being attacked by the fungi. On basis of the data reported the pathogenic agents are considered to be: Cercospora columnaris and C. stuhlmanni; Isariopsis griseola; Graphium laxum; Arthrobotryum puttemansii; Phaeoisariopsis griseola. The disease is reported to have a wide geographical distribution (Americas, Africa, Europe, and Asia). (CIAT)

0497

* BOELEMA, B.H. 1967. Fuscous blight of beans in South Africa. South African Journal of Agricultural Science 10(4):1059-1063.

Six isolates of Xanthomonas phaseoli var. fuscans were studied: its occurrence in S. Africa was 1st established in 1962 on pods of bean cv. Contender and Seminole, in the form of slightly sunken, reddish-brown spots with a darker edge and a lighter center. Small differences found among isolates are given. Inoculation expt. were also conducted with the isolates, but even though they differed slightly in virulence, the symptoms induced were virtually the same. There are differences in their virulence towards different bean cv. The importance of fuscous blight in breeding work with beans is emphasized. (CIAT)

0498

* COERTZE, A.F.; VAN DEN BERG, A.A. 1981. Planting density in bush beans. Bean Improvement Cooperative. Annual Report 24:1.

A trial was conducted in 1980 at the Horticultural Research Institute (Pretoria, South Africa) to evaluate the effect of 10 plant densities (from

59,492 to 555,327 plants/ha) on seed yield of snap bean cv. Rolito. No significant difference in yield was found at densities of 138,827 plants/ha and above. The no. of pods/plant and the mass of plants increased at low density planting. The no. of pods/plant varied from 44 at the lowest to 8 at the highest density planting. Plant height, height at which the pods were borne, and the effect on weeds were better at high than at low density plantings. (CIAT)

0508

* DRIED BEANS are nutritious, tasty and cheap. Farming in South Africa 39(11):55-56. 1964.

The nutritive value, tastiness, and low cost of dried beans and other legumes, as basic ingredients of many dishes, are highlighted. Dried beans contain approx. 10% water and 20% protein compared with 65-90% water and 2.5% protein in green beans. Although the quality of dried legume protein is not as high as that of animal foods, they compare favorably with meat, fish, egg, and cheese. Beans are also a source of vitamin B, Ca, and Fe and, when they are allowed to germinate, of vitamin C. Hints are given for cooking beans. (CIAT)

0513

* GROBBELAAR, W.S.; ROCHER, P.M. 1967. Sugar-bean varieties in the winter- rainfall region. Farming in South Africa 43(1):15,17.

Performance tests have been carried out since 1949 on sugar bean var. on the Cape Flats (South Africa). Over a period of 8 yr (1949-57), var. performance was very consistent. Var. Khaki consistently produced a significantly higher yield than any other var. Satisfactory results were also obtained with Speckled Sugar, Round Speckled Sugar, Riversdale Sugar No. 1, Red Speckled Sugar, White Sugar, and Weerskyn. Painted Lady (Lappies) produced very low yields (almost 50% less than Khaki). At Lutzville in the Olifants River Valley in 1958, yields were very high with 23.3 bags/morgen (1 morgen = 2.116 ac) in comparison with 15.2 bags at Cape Flats. Small-seeded white var. such as Great Northern, Michigan Robust, and White Navy Haricot performed sometimes better than Khaki and at Lutzville were not subject to leaf rust. Under irrigation at Elsenburg (1960), av. yields were 13.5 bags/morgen. (CIAT)

0515

* IMMINK, R.J. 1957. Dwarf bean varieties for the Transvaal Middle- and Highveld. Farming in South Africa 33(9):44.

A no. of dwarf bean var. which are suitable for the Transvaal High- and Middleveld (South Africa) are discussed. For this region, var. selected should yield regular crops of a high quality whether planted early or late in the season. Quality includes stringlessness, a reasonable fiber content, an adequate quantity of the jelly-like substance that occurs between the seeds (of importance to canning), straightness of pods, and dark green color. Early maturing var. result in lower production costs and, although no completely bacterial blight-resistant var. have been developed, some var. possess a higher degree of resistance than others. Well-known var. discussed are: Long Tom, Black Wonder, Tender Green, Flight, Rooikrans, Streamliner, and Topcrop. (CIAT)

0519

* JOUBERT, T.G. LA G.; VERMEULEN, W.J. 1955. A new pole-bean variety "Green Savage". Farming in South Africa 30(351):297-298.

A new pole bean var., Green Savage, which was developed from a cross between Savage Wonder and Canfreezer, is described. The dry seed is grey-brown in color, with a black ring around the hilum; it is fairly small (0.44 in. long), slightly kidney-shaped and with an av. wt. of 100 seeds/oz. A tendency to hard-skin, probably due to low humidity and dry conditions, was present in the past. Pods have an av. length of 6-12 in., with good canning quality (stringless and with very low fibre content). Plants are robust and fairly resistant to rust (Uromyces appendiculatus). Trials conducted over 7 seasons at the Horticultural Research Station, Pretoria (South Africa) showed that Green Savage outyielded 4 other pole bean var., including Canfreezer, the best early var. [21.7 and 19.8 t/morgen (1 morgen = 2.116 ac), resp.] in 1954. These 2 var. yielded an av. of 23.3 and 21.1 t/morgen, resp., in 5 trials over a period of years. (CIAT)

0520

* JOUBERT, T.G. LA G. 1954. Hard-skin in beans. Farming in South Africa 29(337):225,232.

A case of hard-skin in one of the best runner bean var., Green Savage, was reported for the 1st time during the summer season at the Horticultural Research Station, Pretoria (South Africa). More than 90% of the seed planted at the beginning of Sept. 1953 was hard-skinned. After soaking for a few weeks it still remained hard-skinned. Germination was brought about by mechanical injury of the seed coat only. At the end of Nov. 1953, all signs of hard-skin had completely disappeared from tested seed. Later planting of the same seed (Jan. 1954) revealed no hard-skin in any sample. Other var. and crosses were unaffected and, since no hard-skin occurred at the 2nd planting, environmental conditions rather than heredity seemed to influence this phenomenon, ascribed to a decrease in humidity since the min. % of RH for the planting, harvesting, and storage periods were very low. Storage of beans at a low humidity is therefore considered as the principal reason for hard-skin in beans. (CIAT)

0521

* KNOX-DAVIES, P.S. 1965. Pycnidium production by Macrophomina phaseoli. South African Journal of Agricultural Sciences 8(1):205-218.

A method developed for the abundant production of pycnospores for inoculation purposes is described. Further observations on the physiology of pycnidium production by Macrophomina phaseoli are presented. Long wave UV light stimulated M. phaseoli to sporulate abundantly on autoclaved peanut meal in 2% water agar, and to a lesser extent, on other types of plant material. Isolates from bean, cotton, maize, sorghum, tobacco, and tomato were induced to sporulate. One maize isolate failed to sporulate. Pycnidia formed abundantly on filter paper impregnated with an ether extract of peanut meal. It is suggested that most isolates of M. phaseoli require an ether-soluble precursor of a photoactivated sporulation intermediary, variation in the ability of isolates to sporulate on simple media reflects a variation in their capacity to synthesize this precursor, and the natural occurrence of pycnidia on different susceptible crop species is associated with the content of this precursor in the host tissues. (AS)

0522

* LAUBSCHER, F.X. 1944. Field beans. Farming in South Africa 19(217): 246-248,254.

The importance of clear seed identification of field beans is stressed. There exists a loose terminology to indicate var. reflecting vague trade

distinctions. Suitable areas for the cultivation of beans in South Africa are identified: Transvaal highveld, the districts of Ermelo, Belfast, Middelburg, and Bethal accounting for 20% of total European production. Var. Bomba and Round White Haricot are the most important. A 2nd important field bean area is near Koster in the western Transvaal, which produces the Van Zyl bean (speckled sugar bean var.). Small Khaki is a var. that does well in the Orange Free State. In Natal, the most popular var. are Bomba, Victory, and Round Yellow Sugar. Other var. mentioned are Painted Lady (Prince Albert district mainly), and Lappies (Cold Bokkveld area). Characteristics of several var. are discussed. It is advised for growers to keep their own seed requirements or to buy only such seed as can be identified beyond all doubt. (CIAT)

0527

* SELLSCHOP, J.P.F. 1953. The grading of dry beans. Farming in South Africa 28(328):223-225.

The importance, requirements, and limitations of the grading of dry beans are presented. Sampling and grading procedures are described. Beans which do not conform to these requirements are considered undergrade. Objectionable odors, chemical-treated seed, live insects, presence of Jack or Sword beans, or more than 14% MC prevent grading of beans. Present price-guarantee provisions for classes of beans A to G are given. Grades P.B. 3, P.B. 4, P.B. 5, M.B. 1, M.B. 2 are allowed, resp., max. % by wt. of defective beans (8, 12, 7, 3, 5), differently-colored beans (1, 2, 3, 0.5, 0.7), off-type beans (3.5, 5.0, 7.0, 1.5, 2.5), beans with broken testa (40, 50, 50, 20, 30), and foreign matter (1, 2, 3, 0.10, 0.25). (CIAT)

0528

* SELLSCHOP, J.P.F.; BREVIS, J. 1969. Soil and fertilizer requirements of dry beans. Farming in South Africa 45(9):38,44.

Fertilizer and soil requirements of dry beans regarding drainage, moisture, OM, and pH, are briefly discussed. The fertilizer procedure should be based on the crop production potential of the soil and on the results of soil tests. For beans, the general fertility of the soil should be maintained at an appropriate level. All, or some, of the necessary fertilizers could be band-placed along the rows when the seed is being planted. Time and manner of application are described for Ca, Mg, mixed fertilizers, N, P, and K. (CIAT)

0529

* SELLSCHOP, J.P.F. 1968. Beans in demand. Farming in South Africa 43(11):21.

With the increase in the consumption of tinned and packaged foodstuffs, there is a growing demand for small white beans, which are generally preferred to other types of beans. However, spoilage in the field due to unfavorable weather conditions, use of sprawling var., or long stacking periods justify the lack of interest in the production of a greater proportion of small white beans. Pea beans, with a more upright growth habit, should therefore be studied in more detail. (CIAT)

0543

* ABDEL-GABAR, A.G. 1970. Fasulia. In Ed-Damer, Sudan. Hudeiba Research Station. Annual Report 1970-1971. Ed-Damer. pp.4-6.

Results of var., sowing time and plant density expt. carried out at the Hudeiba Research Station (Sudan) are given. Seed yield/feddan (1 feddan = 0.42 ha) was significantly influenced by sowing time, var., and plant density. Yields decreased considerably with early sowing. Mid-Oct. gave the largest yield: 1090 kg/feddan, at 10-cm spacing. Var. RO/2/1 outyielded Beladi. Best yields were obtained with closer spacing. One thousand-seed wt. decreased with very early and late sowing. Plant density seemed to have no effect on seed wt. which was lower for Beladi; this var. also had fewer pods/unit area. Increased plant spacing reduced no. of pods/unit area and increased no. of seeds/unit area. Trials were also conducted on the effect of N, water regimes, and type of seedbed on bean yield. Short watering interval and N application considerably increased yields, although the total amount of water remained the same for all irrigation cycles. Twenty kg applied N/feddan increased yields by approx. 20% compared with no N. The interactions N x watering and seed bed x watering were significant. No. of pods and of seeds/unit area were significantly affected by water regime and by N application. One thousand-seed wt. increased with short water interval (248 vs. 202 g for 7 and 21 days, resp.). (CIAT)

0544

* ABDEL-GABAR, A.G. 1979. Effect of fertilizer, seed bed and water regime on fasulia seed yield. In Ed-Damer, Sudan. Hudeiba Research Station. Annual Report 1971-1972. pp.7-8.

Effects of fertilizer, seedbed, and water regime on bean seed yields were studied at Hudeiba Research Station (Sudan) in 1971. Results were similar to those of previous years. Yields increased substantially with the application of N and shorter watering interval. All treatments received the 2nd watering after 7 days and thereafter, different water cycles: 10, 5 and 3 waterings at 7-, 14-, and 21-day intervals, resp., for a total amount of water applied of 1890, 1840, and 1840 m^3/feddan/season, resp. (1 feddan = 0.42 ha). Yield variation due to water cycles was mainly a result of water distribution during the growth period. Since total amount of water applied was almost the same, it is unlikely that the cost of watering will vary between treatments. (CIAT)

0546

* AGEEB, O.A.A. 1981. Fieldbeans. In Ed-Damer, Sudan. Hudeiba Research Station. Annual Report 1976-1977. Ed-Damer. pp.10-12.

In a watering interval expt. at Hudeiba Research Station (Sudan) it was confirmed that the reproductive phase of field bean plants was more sensitive to water stress than the main vegetative phase. Watering every week throughout the growing season gave the best yield which was 106 and 170% more than watering every 2 or 3 wk., resp. When studying the interacting effects of watering interval and sowing date on grain yield, a significant response to main effects and interaction was found. With weekly watering optimum sowing date was Oct. 18. This date shifted towards Nov. with a watering interval of 2-3 wk. Field bean plants were insensitive to wide variations in plant spacing, which is attributed to plant plasticity. When the crop is sown in Oct., it should be harvested within 110 to 120 days from sowing to prevent heavy grain yield losses. Sowing date had a significant effect on grain yield, plant height, no. of pods/plant, and 100-seed wt. (CIAT)

0547

* AGEEB, O.A.A. 1981. Fieldbeans variety and watering interval trial. In Ed-Damer, Sudan. Hudeiba Research Station. Annual Report 1975-1976. Ed-Damer. pp.7-9.

The effects of 9 watering treatments on grain yield of field bean var. Giza 1 and H.72 were studied in randomized blocks with 6 replicates. Plot size was 9 x 3 m. All main factors tested significantly affected grain yields but interactions were not significant. Var. H.72 significantly outyielded Giza 1 by 21%. The effect of watering regimes before pod formation was slightly significant; watering every 14 or 21 days decreased yields by 14% when compared with watering every 7 days. The effect of treatments at pod formation was highly significant (P = 0.001). Increasing watering interval from 7 to 14 or 21 days significantly decreased grain yield by 24 and 46%, resp. (CIAT)

0548

* AHI, M.A. 1980. Glasshouse experiment on seddling blight of fasulia caused by Macrophomina phaseoli (Maubanc) Ashby. In Ed-Damer, Sudan. Hudeiba Research Station. Annual Report 1973-1974. Ed-Damer. pp.93-94.

The Hudeiba Research Station (Sudan) received samples of bean seedlings infected with ashy stem blight from the research substation at Khashm El Girba in Oct. 1972. All isolates from these samples gave Macrophomina phaseoli. Twelve pots were filled with Gezira soil and then sterilized at 160°C for 3 h; 6 of these pots were infected with cultures of M. phaseoli and 6 were left as controls. Each pot was planted with 5 sterilized bean seeds in Nov. 1972 and the expt. was repeated in Jan. and April of 1973. Typical symptoms of ashy stem blight were observed in infected pots. (CIAT)

0549

* AYOUB, A.T. 1979. Fasulia experiments. In Ed-Damer, Sudan. Hudeiba Research Station. Annual Report 1971-1972. Ed-Damer. pp.55-58.

Results of several studies and expt. carried out at the Hudeiba Research Station (Sudan) are reported. Investigations on a wilt-like disorder revealed that injury and Na plant content were closely associated. Na content of injured plants was more than 5-fold that of healthy plants, resulting in cation imbalance (reduced Ca and Mg). More N and P accumulated in petioles and stems of injured plants. Peak injury was detected at 50% flowering. Var. Beladi was more susceptible than RO/2/1. To test whether increasing Ca availability in soils enhanced salt tolerance in bean plants, a factorial design expt. was carried out with 6 levels of calcium phosphate (0, 0.5, 1, 2, 4, and 8 mM) and 5 levels of sodium chloride (0, 5, 10, 20, and 40 mM) in irrigation water. Plants grew better and had higher yields at Ca levels above 1.0 mM. Increasing Na levels in the substrate increased Na content in plant tissue. The effects of salinity level and soil amendment with gypsum, straw mulch, and animal manure were studied in the field. Germination % were 73, 66, and 58 for low, medium, and high Na levels, resp. There were highly significant differences between sodium chloride treatments but not between soil amendment treatments. (CIAT)

0554

* CHINA, W.E. 1931. A new species of Erythroneura (Homoptera, Jassoidea) injurious to French beans (Phaseolus vulgaris) in the Sudan. Bulletin of Entomological Research 22:53-54.

Erythroneura lubiae sp.n. was received for identification from the Imperial Institute of Entomology. Diagrams and a detailed description of this new species, which is a pest of French beans in the Sudan, are given, and the manner in which its structure and color differ from all other Ethiopian species of Erythroneura is noted. (CIAT)

0555

* EL-HILO, H.A. 1978. Effect of fertilizer and in-row spacing on the yield of dry beans. In Ed-Damer, Sudan. Hudeiba Research Station. Annual Report 1966-1967. Ed-Damer. pp.78-80.

The effect of fertilizer and in-row spacing (5, 10, and 25 cm along 70-cm ridges) on Baladi bean yields was studied in a factorial expt. carried out in heavy karu soil at the Hudeiba Research Station (Sudan) in Oct. 1966. When N (2 N) was added, whether alone or with complete fertilizer, yields increased significantly. Overall mean yields were 395, 447, 466, 544, and 547 kg/feddan (1 feddan = 0.42 ha) for the control, 1 N, complete fertilizer, 2 N, and 1 N + complete fertilizer, resp. In-row spacing had marked effect on yields, the 5 cm in-row spacing giving the highest av. yield (522 kg/feddan). The fertilizer x spacing interaction was significant at the 5% level. In the 5 and 10 cm in-row spacing, seed abortion was 3% less than in the 25 cm spacing. If methods to increase the ratio of 5-, 6-, and 7-seeded pods and reduce abortion within these pod classes are found, yield/unit area should be increased. (CIAT)

0561

* HASSAN, M.S. 1980. Drybeans variety trials. Effect of sowing date on snapbeans. In Wadi Medani, Sudan. Gezira Research Station Library. Annual Report 1973-1974. Sudan. pp.376-377.

Nine dry bean var. (White Beans, Baladi S.S., Baladi, Dark Red Kidney, Great Northern, White Kidney, Light Red Kidney, Michigan Rea, and Perry Marrow) were sown in the Gezira (Sudan) in a var. trial. White Beans and Baladi gave the highest yields, 690 kg/feddan (1 feddan = 0.42 ha), while Perry Marrow gave the lowest (190 kg/feddan). In a randomized block expt. at the same location, snap bean var. Giza-3 was sown on 15 Oct., 30 Nov., 15 Nov., and 30 Nov. to study the effect of sowing date on yield. The difference among yields was highly significant (P = 0.001). Yields decreased with later planting dates, the highest (4956 kg/feddan) being obtained by the 15 Oct. sowing. (CIAT)

0563

* HASSAN, M.S.; EL-FAHAL, A.; FAGER, S.E. 1979. Snap bean variety trial. In Ed-Damer, Sudan. Hudeiba Research Station. Annual Report 1971-1972. Ed-Damer. p.123.

Ten snap bean var., White Bean, Beladi Selected, Contender, Buschanhnen Plena, Extender, Resist Asgrow Valentine, Bountiful, Tender Crop, Tender Green Imp, and Wade, were tested at the Hudeiba Research Station at Shendi (Sudan), yielding, resp., 6.5, 5.9, 3.6, 3.3, 3.3, 3.1, 2.6, 2.4, 2.1, and 1.2 t/feddan (1 feddan = 0.42 ha). Differences in yield were highly significant. (CIAT)

0565

* ISHAG, H.M. 1977. Haricot beans. In Ed-Damer, Sudan. Hudeiba Research Station. Annual Report 1970-1971. Ed-Damer. pp.11-12.

Seeds of haricot bean var. RO 2/1 were inoculated with local strains of rhizobia designated as S (Sudanese strain). Treatments were: control, N, Rhizobium, and Rhizobium + N. A randomized block design was used with 4 replicates. Six-wk.-old plants showed no effect of inoculation but after 12 wk., growth of root and shoot increased as a result of the inoculation. Highest yield was obtained with the combination of Rhizobium and N (8% more than control). (CIAT)

0569

* MUTWAKIL, A. 1978. Fasulia (Phaseolus vulgaris). In Ed-Damer, Sudan. Hudeiba Research Station. Annual Report 1966-1967. Ed-Damer. pp.30-31.

White-seeded bean var. trials showed that the Beladi type gave the highest yield (506 kg/feddan; 1 feddan = 0.42 ha) and its superiority over Great Northern 1140, Great Northern 59, and Great Northern 123 was significant at the 5% level with yields of 421, 415, and 412 kg/ha, resp. Great Northern 31 was not significantly different from Beladi. Beladi had the highest no. of pods/plant and of seeds/pod. In another var. trial 4 color-seeded var., Red Mexican 35, Pinto 111, Red Mexican 34, and Red Kidney Charleroi, were compared with white-seeded var. Beladi. There were no statistical differences in yield among var. although great differences were observed. The no. of pods/plant was greater in high yielding colored var., whereas in Beladi the main factor that contributed to yield potential was the no. of seeds/pod. Five promising pea-bean type var. were also compared with Beladi as check. These var. were not well adapted to conditions with statistically lower seed yields, and fewer no. of seeds/pod and lower seed wt. (CIAT)

0572

* SALIH, F.A. 1982. Fasulia or haricot beans (Phaseolus vulgaris L.). In Ed-Damer, Sudan. Hudeiba Research Station. Annual Report 1977-1978. Ed-Damer. pp.50-53.

Results of expt. on Phaseolus vulgaris at Hudeiba Research Station (Sudan), during 1977-78, are reported. Line 8R outyielded, although not significantly, other curly top resistant selections and also had the highest no. of pods/plant (22.9). Red Mexican had the highest 1000-seed wt. followed by RD/2/1 (311 and 273 g, resp.). No significant differences in yield were found among new FAO introductions of white-seeded beans; HRS 559 and HRS 536 appeared to be superior to the others. In breeding trials, Na toxicity caused crop failure and sowing time was found to be critical for Karu soils under arid conditions. No. of plants/unit area was the predominant factor affecting seed yields in early sowings. Plant losses exceeded 70% when plants were sown earlier than Oct. Emphasis was given to selection for tolerance to Na toxicity and curly top resistance. In the crossing program, the colored seed var. were tolerant to sodic soils. A foreign collection (133 types) was planted for observation. In expt. of single plant selection and sowing date, almost all factors significantly influenced plant population at harvest. Red Mexican significantly outyielded all other var. and lines with the exception of line no. 6, but it also had the lowest no. of pods/plant and no. of seeds/pod. Var., sowing date, and their interaction significantly affected days to 50% flowering. Differences in seed yield are reported for beans planted at 3 different sowing dates. (CIAT)

0574

* SALIH, S.H. 1979. Haricot beans (fasulia). In Ed-Damer, Sudan. Hudeiba Research Station. Annual Report 1974-1975. Ed-Damer. pp.47-49.

Two var. trials were conducted at Hudeiba Research Station (Sudan) in 197
one for snap beans and the other for curly top resistant selectio
Significative differences were found in all characters tested, except
of seeds/pod, in a trial which included 9 snap bean cv. replicated 5 t
Yields ranged between 38.8-332.2 kg/feddan (1 feddan = 0.42 ha) for c
423 and HRS 435, resp. Low yields were partly attributed to poor s
significative correlation was found between yield and no. of pod
1000-seed wt. and no. of days to flowering were negativ
significativelv correlated at the 1% level. Significative differ

found in all characters except for yield and no. of pods/plant when 9 curly top resistant selections were tested with RO/2/1 and Red Mexican. Yields ranged from 318 to 518 kg/feddan; pods/plant from 5.8 to 8.6; seeds/pod from 3.3 to 4.9; 1000 seed wt. from 217 to 312 g; days to flowering from 38 to 48; and days to maturity from 89 to 96. Thirty-one navy bean collections were propagated in a large area to obtain seed for future preliminary yield trials. (CIAT)

0580

* YASSIN, T.E.G. 1979. Fasulia (Phaseolus vulgaris). (Beans). In Ed-Damer, Sudan. Hudeiba Research Station. Annual Report 1971-1972. Ed-Damer. pp.27-28.

In trials conducted at Hudeiba and Shendi (Sudan), in a randomized block design with 3 replicates, var. Red Mexican, RO/2/1, R1/13, R1/5, R1/7, R1/25, and Great Northern No. 35 presented yields of 774 and 921, 659 and 780, 669 and 767, 473 and 752, 613 and 748, 761 and 728, and 582 and 724 kg/feddan (1 feddan = 0.42 ha), resp., at both sites. Nine lines selected for curly top resistance, and RO/2/1 and Red Mexican, were grown in randomized blocks with 5 replications. Significant differences were observed in seeds/pod, seed wt., days to 50% flowering and to maturity. Recently acquired snap bean material was completely killed at the seedling stage, which may have been due to the high salt content of the plot. (CIAT)

0581

* YASSIN, T.E.G. 1977. Fasulia (Phaseolus vulgaris L.): regional variety trials. In Ed-Damer, Sudan. Hudeiba Research Station. Annual Report 1970-1971. Ed-Damer. pp.15-16.

Seven bean var. were tested at Shendi and Hudeiba (Sudan) in a randomized block design replicated 5 times. Seed yield was satisfactory at Hudeiba but poor at Shendi due to disease incidence at the latter. Four introduced navy bean var. and the standard var. RO/2/1 were tested at Hudeiba in a 5 x 5 Latin square design. RO/2/1 gave highest yields [ca. 100 kg/feddan; (1 feddan = 0.42 ha) more than the best introduced var.] and also had significantly more seeds/pod; however, it was a late maturing var. and had lighter seeds. RO/2/1, used as control, also outyielded 5 var. of the pea-bean type when tested at Hudeiba in a 6 x 6 Latin square design, by about 200 kg/feddan. RO/2/1 had much heavier seeds than the other var. Nine selections from RO/2/1 and Beladi were also grown for observations and seed multiplication. (CIAT)

0589

* BROCKMAN, F.E. 1975. Grain legume improvement in Tanzania. In Luse, R.A.; Rachie, K.O., eds. IITA Collaborators' Meeting on Grain Legume Improvement, Ibadan, Nigeria, 1975. Proceedings. Ibadan, International Institute of Tropical Agriculture. pp.150-152.

With USAID support the International Institute of Tropical Agriculture has launched a national maize and grain legume research and training program in Tanzania, which comprises research, production, and training in grain legumes. Plans include: (1) initially, investigation of var. and management factors under controlled conditions at the Agricultural Research Institute, Ilonga; (2) extensive testing of the findings of initial trials, at regional farm testing sites; (3) introduction of a production package to farmers through production demonstration plots on farmers' fields. In Tanzania, French beans are widely grown at elevations above 1000 m. They

are grown for the dry seed and the young tender leaves. Major insect pests are the bean fly (Ophiomyia phaseoli) and aphids. Bean rust (Uromyces phaseoli) and angular leaf spot (Isariopsis griseola) cause great loss in the high elevation production areas. (CIAT)

0619

* MANSFIELD, J.E. 1982. Mixed cropping in Tabora region. Summary. In Keswani, C.L.; Ndunguru, B.J., eds. Symposium on Intercropping in Semi-Arid Areas, 2nd., Morogoro, Tanzania, 1980. Proceedings. Ottawa, Canada, International Development Research Centre. pp.158-159.

Upland annual rainfed crops grown within Tabora region (Tanzania) are mentioned. French beans and other legumes are found in mixed croppings which vary in combination from year to year. It is a highly flexible system that has developed over the years and it is highly resistant to changing to monocropping as far as family food crop production is concerned. Yields show a high C.V. (CIAT)

0622

* MATERU, M.E.A. 1972. Morphology of adults and description of the young stages of Acanthomia tomentosicollis Stal. and A. horrida Germ. (Hemiptera, Coreidae). Journal of Natural History 6:427-450.

The morphology of adults and young of Acanthomia tomentosicollis and A. horrida, both pests of Phaseolus vulgaris, Cajanus cajan, and Dolichos lablab in Tanzania, is described in detail. Measurements of head-width and antennal segments of nymphs and adults were made. The heads of adults and nymphs of A. tomentosicollis are wider than those of A. horrida. The comparisons of head and antennal growth showed that the 2 species developed at about the same rate. Some of the morphological features of these species are remarkably primitive and are probably new features known in the Pentatomamorpha. (AS)

0628

* MTENGA, L.A.; SUGIYAMA, T. 1974. A note on the amino-acid composition of some legume seeds grown in Tanzania. East African Agricultural and Forestry Journal 39:307-310.

The amino acid content of seed of 5 legume crops (cowpea, groundnut, kidney bean, pigeon pea, and soybean) grown in Tanzania are presented and compared with data from other sources such as FAO regarding essential amino acid content and protein score. Kidney bean had the highest lysine content and was relatively low in CP content. Results suggest that soybean with higher protein score (69) than groundnuts (43) are a potential source of protein supplement to cereal diets. They also show that the amino acid composition of legume seeds grown in Tanzania is very close to that of the same seeds in other parts of the world, although Tanzanian cowpeas showed a high tryptophan content. (AS)

0630

* NATIONAL CROP RESEARCH PLANNING COMMITTEE. 1979. Grain legume agronomy report for 1978-79. Tanzania, Ilonga Agricultural Research Institute. 23p.

Results on trials carried out with cowpea and soybean, and on double cropping and legume/cereal crop rotation in Tanzania during 1978-79 are given. Data collected from village trials are also presented in which promising bean var. were evaluated. At Nyamboge, T_8 yielded 1394 kg/ha,

which was significantly higher than yields obtained by T_3, Sumbawanga, and Canadian Wonder, but the same as Mexican 142. At Bwanga and Nkongore there were no significant var. differences. The optimum planting density for Canadian Wonder was determined. Plant populations were: 400,000, 333,333, 266,667, 200,000, and 133,333 plants/ha. The highest yield was obtained with 266,667 plants/ha and disease incidence was higher with 400,000 plants/ha. (CIAT)

0631

* NATIONAL CROP RESEARCH PLANNING COMMITTEE. 1979. Grain legume breeding report for 1978-79. Tanzania, Ilonga Agricultural Research Institute. 22p.

Breeding work done in Tanzania during 1978-79 to develop high yielding and widely adapted var. of cowpea, soybeans, beans, and green gram is briefly described. An uniform bean cv. trial was conducted at Ismani, Gairo, Tengeru, Maruku, and Lyamungu to evaluate 20 cv. which had been found promising in previous years. The relative ranking of var. differed with locations: GN Valley EA1272U ranked 1st at Ismani, P692-A at Gairo, and P311-A-L at Tengeru. This last var. performed consistently better at all sites and had the highest mean yield, followed by YC-2, P692-A, and T-8. Forty-eight bean lines/var. were evaluated at Lyamungu, Maruku, Ismani, and Tengeru with Canadian Wonder as check. A randomized block design with 4 replications was used. Eighteen var. yielded significantly higher than Canadian Wonder; Santa Anna was the highest yielder (2590 kg/ha), followed by P-323 (2584 kg/ha), PR-15-R-52 (2568 kg/ha), and P-512 (2566 kg/ha). (CIAT)

0632

* PATEL, P.N. 1975. Disease problems in grain legumes in Tanzania. In Luse, R.A.; Rachie, K.O., eds. IITA Collaborators' Meeting on Grain Legume Improvement, Ibadan, Nigeria, 1975. Proceedings. Ibadan, International Institute of Tropical Agriculture. pp.86-88.

Pathogens reported up to 1960 in grain legumes in Tanzania are listed. Bean diseases include: mosaic (BYMV and BCMV), angular leaf spot (Isariopsis griseola), anthracnose (Colletotrichum lindemuthianum), ashy stem blight (Macrophomina phaseoli), damping-off (Corticium solani), grey mold (Botrytis cinerea), halo blight (Pseudomonas phaseolicola), leaf blotch (Ascochyta phaseolorum), leaf spot (Mycosphaerella pinodes), mildew (Leveilluta taurica), rust (Uromyces appendiculatus), Sclerotinia disease (Sclerotinia sclerotiorum), white mold (Hyalodendron album), and wilt (Fusarium sp. and Pythium ultimum). In a French bean var. trial at Ilonga all the test lines were severely affected by common or fuscous bacterial blight (Xanthomonas phaseoli or X. phaseoli var. fuscans) which infected leaves, stems, and pods. In some lines, death was the result of heavy infection on stem at cotyledonary joint. Angular leaf spot was also observed. The production and distribution of disease-free seed is recommended. (CIAT)

0637

* THE SEEDS (regulation of standards) Act, 1973. The Gazette of the United Republic of Tanzania 57(7):39-72. 1976.

Seed regulations for 1976 (Tanzania) are presented: interpretation of terminology, exemptions, grades, grade names, and standards set out in schedules; restrictions, marking and labelling, inspection, sampling. For Phaseolus vulgaris data is given on min. wt. for submitted sample, purity

analysis, and examination for noxious weed seed and foreign matter (1000, 700, and 1000 g, resp.). The following standards for basic, registered, and certified bean seed are mentioned: min. pure seed, 98% for all 3 grades; total weed seeds, 0, 2, and 4/kg; other seeds, 0, 0, and 2/kg; inert matter, 2.0% for all 3 grades; other var. or classes, 0.01, 0.05, and 0.10%, resp. Max. % of prohibited noxious weeds is 0 for all 3 grades. Min. germination is 80.0% for all 3 grades. Max. % of bacterial blight (Xanthomonas phaseoli) and anthracnose (Colletotrichum lindemuthianum) is 0 for all 3 grades. BCMV % are 0, 0.5, and 0.5, resp., and halo blight (Pseudomonas phaseoli) % are 0, 0.5, and 1.0, resp. (CIAT)

0639

* SEENAPPA, M. 1983. Suitability of a modified minicolumn for detection of aflatoxin in maize and beans. In International Symposium on Mycotoxins, Cairo, Egypt, 1981. Proceedings. Cairo, National Research Centre. pp.227-230. [Dept. of Food Science & Technology, Univ. of Dar es Salaam, P.O. Box 643, Morogoro, Tanzania]

The Holaday and Lansden minicolumn was modified to be used for ascending chromatography and was successfully applied to aflatoxin detection in maize and French beans contaminated by Aspergillus parasiticus (NRRL 3145). Ascending development is rapid when carried out in narrow test tubes (150 mm long, 14 mm od, 11 mm id) and does not require the use of vacuum or external air pressure. This mode of minicolumn development is suggested for incorporation in an aflatoxin field kit. (AS)

0642

* SILBERNAGEL, M.J. 1982. The Tanzanian-Washington State Title XII Bean CRSP. Bean Improvement Cooperative. Annual Report 25:30-31.

Principal investigators in charge of the project of breeding beans for disease and insect resistance and determination of their economic impact on subsistence farm families are listed. This project is jointly conducted by the Washington State U. (USA) and the U. of Dar es Salaam, Morogoro, Tanzania, and has included graduate educational opportunities at U.S. universities. The amount of money (%) contributed for this project is included. The interest and support of the CIAT bean team is briefly mentioned, regarding the supply of germplasm, published information, training, and even help in the establishment of the breeding program. (CIAT)

0646

* TANZANIA. MINISTRY OF AGRICULTURE. 1978. Report of research results of National Grain Legume Research Programme, 1977-78. Tanzania, Ilonga Agricultural Research Institute. 33p.

Results of expt. carried out on beans, cowpeas, and soybeans at Ilonga and other research stations and on-farm test sites in 1977-78 in Tanzania are summarized. Significant bean yield responses to N and P applications were obtained in the regions of Iringa (4 sites) and Mbeya (4 sites); in Iringa, the N x P interaction was significant as well and a 250% yield increase was obtained with the application of 60 kg of N and P/ha, compared with the unfertilized control. No response to K was obtained at either location. An economic analysis method is briefly described. Although the high rate of application (60 kg of both N and P) would be the most economically attractive alternative, the analysis indicates that still higher rates might be recommendable as the marginal rate of return on the last increment in capital is 340%. For Mbeya, the best treatment would be 30 kg of both N

and P/ha. Further research is needed. Population effects were studied in bean/maize intercropping. Bean yields were found to be controlled by both bean and maize densities and ranged from 30 to 70% of monocropped bean yields. A productivity plateau was reached at higher densities of either or both crops and only their proportions in the total yields varied. (CIAT)

0649

* TANZANIA. OFFICIAL CERTIFICATION AGENCY. 1978. Rules, regulations and certification procedures. Dar es Salaam. 28p.

Rules, regulations, and seed certification procedures of the Tanzania Official Certification Agency are presented, including: definition of seed certification; purpose of certification; seed production committee; elegibility requirements for certification of crop var.; elegibility, qualification, and responsibilities of growers; definition of seed grades; limitations of generations; establishment of source of seed; deadline dates for applications and procedures; field management and isolation; fees and charges; handling of crop prior to inspection; field inspection; weeds; off-types; field and seed standards for maize, wheat, oats, barley, sorghum, soybeans, rice, millet; harvesting, threshing, drying, labelling and storing; processing of seed; sampling lots and storage of processed seed; seed analysis for certification; bagging requirements; tagging, labelling and sealing; misuse of certification privileges, and inter-agency certification. Standards applicable to beans regarding certified % grade are: pure seed (min. of 98%); total weed seeds (4/kg); other crop seeds (2/kg); inert matter (2.0); other var. or classes (0.10); prohibited noxious weeds (none); restricted noxious weeds (none); moisture (12.0); germination (min. of 80.0); bacterial blight-infected seed (none); anthracnose-infected seed (1.0); and common bean mosaic infected-seed (5.0). (CIAT)

0653

* WALLACE, G.B. 1941. Yellow bean mosaic and notes on other bean diseases. East African Agricultural Journal 7:114-115.

Certain French bean var. which were reported to be only slightly susceptible to the BYMV of North America were imported from the USA on account of their resistance to common mosaic, and were sown at Lyamungu in Tanganyika Territory (Tanzania). Under these conditions the beans maintained their resistance to common mosaic, but were so severely attacked by yellow mosaic as to rule out any possibility of growing these otherwise useful var. in the area. The North American yellow mosaic cannot be carried in the seed, and therefore the disease was not introduced with the imported seeds. If the Tanaganyika disease is the same as the North American one it must have already been present in the land. If, however, it is different no conclusion can be drawn. The Tanganyika disease resembles the North American yellow mosaic in symptoms, but not all diagnostic characters have been seen in the local disease. A bacterial disease, which produces sun-scorch symptoms in bean fields, and a bean fly problem which can cause 100% loss of the crop in the short rains, but is unsignificant in the main crop, are also briefly mentioned. (CIAT)

0654

* WALLACE, G.B. 1939. French bean diseases and bean fly in East Africa. East African Agricultural and Forestry Journal 5(3):170-175.

In the 1930's poor growth and low yields of French beans were observed in the Tanga and Northern Provinces of Tanganyika Territory in East Africa.

This situation was caused by the diseases halo blight (Phytomonas medicaginis var. phaseolicola), rust (Uromyces appendiculatus), common mosaic, anthracnose (Colletotrichum lindemuthianum), and yeast spot (Nematospora coryli) as well as by the bean fly [Agromyza (Melanagromyza) phaseoli]. Plant symptoms observed and control methods used are described. (CIAT)

0659

* ALPERT, M.E.; HUTT, M.S.R.; WOGAN, G.N.; DAVIDSON, C.S. 1971. Association between aflatoxin content of food and hepatoma frequency in Uganda. Cancer 28(1):253-260.

Aflatoxin levels were determined in 480 food samples stored for consumption between harvests and collected from different parts of Uganda, in 1966-67. Among these samples, 29.6% contained detectable levels of aflatoxins and 3.7% contained more than 1 microgram/kg. The frequency of aflatoxin contamination was particularly high in provinces with a high hepatoma incidence, or where cultural and economic factors favored the ingestion of moldy foods. This observation suggests that aflatoxin exposure may account for the high incidence of hepatoma in Uganda and perhaps elsewhere. (AS)

0663

* DAVIES, J.C. 1970. Insect infestation and crop storage. In Jameson, J.D., ed. Agriculture in Uganda. New York, Oxford University Press. pp.274-280.

In Uganda food losses due to insects, rodents, and fungi are probably greater than 10%. Factors favoring insect infestation are discussed: temp., RH, MC, poor hygiene, and presence of old stock. Primary infestation can also occur in the growing crop such as the case of Acanthoscelides obtectus in beans. Insects recorded on from stored products (cereals, legumes including beans, oil seeds, dried root crops, and tobacco) in Uganda are listed. Bionomical data are given for some important pests: A. obtectus and Zabrotes subfasciatus both attack stored beans. A brief life history is reported on this last pest. Storage and control measures are described for subsistence farms. (CIAT)

0666

* DAVIES, J.C. 1962. A note on in-sack storage of beans using 0.04% gamma BHC dust. East African Agricultural and Forestry Journal 27(4):223-224.

An expt. was set up at Kwanda Research Station (Kampala, Uganda), to test a dosage of 8 oz of 0.04% gamma-BHC dust/200 lb beans (stored in sacks) for protection of 3 bean var. (Banja, Canadian Wonder, and Mutike) against bruchids (Acanthoscelides obtectus). Monthly samples were taken from both treated and untreated beans over 12 mo. to evaluate % of seeds bored by the bruchid. Results showed that treatment with gamma-BHC is a worthwhile measure. Beans were virtually unattacked after 12 mo. of storage, while untreated beans showed 30-40% bored seeds over the same period. Figures indicate that Mutike beans are particularly susceptible to bruchids while Canadian Wonder may have a degree of resistance. (CIAT)

0667

* DAVIES, J.C. 1960. Coleoptera associated with stored products in Uganda. East African Agricultural Journal 25:199-201.

Species of Coleoptera, belonging to 22 families, found associated with stored food products and some nonfood products (leather, paper, books) are listed. A survey conducted mainly in the northern, eastern, and western areas of Uganda, and a study of the large no. of available specimens in the Kawanda Research Station insect collection were used as sources of information. Species are rated as to their abundance (very common, common, uncommon, rare, and very rare) and distribution (universal, Western, Northern, and Eastern Provinces, Ankole, Bugisu, Buganda, Busoga, Bunyoro, and Teso). The following species were found associated with beans: Acanthoscelides obtectus, Bruchidius atrolineatus, Calandra oryzae, Carpophilus obsoletus, Lophacateres pusillus, Tenebroides mauritanicus, and Tribolium castaneum. A. obtectus, C. oryzae, L. pusillus, and T. mauritanicus were very common and universally distributed. (CIAT)

0679

* LEAKEY, C.L.A.; ATKINS, J.; MAGARA, J. 1972. Bean rust studies in Uganda. Bean Improvement Cooperative. Annual Report 15:60-63.

Several research studies carried out on bean rust (Uromyces phaseoli) in Uganda, as well as a related program being undertaken at Cambridge U. (England), are briefly reviewed. Well known bean var. that have been scored either as fully susceptible to or as severely damaged by common rust races (scores of 5 and 4, resp., on a 0-5 scale) are listed in addition to small-seeded erect (determinate or indeterminate) bush bean var. that could be used as resistance sources against rust in breeding programs for canning beans in East Africa. (CIAT)

0680

* LEAKEY, C.L.A. 1972. Crop index in beans. Bean Improvement Cooperative. Annual Report 15:64-65.

Different aspects of the crop index of beans, considered as the measure of the dry wt. produced by a crop put into the useful product, in this case the seeds, are briefly described: variation over bean crops, comparison between var., effect of plant population, and its potential as an aid for breeding for yield. (CIAT)

0685

* LEAKEY, C.L.A. 1970. Anthracnose resistance breeding in pinto beans in Uganda using the are gene from Cornell 49-242. Bean Improvement Cooperative. Annual Report 13:60-61.

At Makerere College, Uganda, a program to improve the resistance to anthracnose (Colletotrichum lindemuthianum) of pinto beans, was undertaken. In Uganda, the are gene appeared to confer virtual immunity to all isolates of C. lindemuthianum, except 2 races isolated in 1964 which gave slight but typical anthracnose lesions, but with negligible sporulation. To 1970 about 15 hybrid families had been obtained, of which the most advanced selections of the early crosses were at F_5. Screening for anthracnose resistance was carried out on 10 F_3 seedlings raised from seed of single F_2 plants. Homozygous susceptible F_2 families were discarded while homozygous resistant and heterozygous families were selected on the basis of unreplicated F_3 progeny rows with replicated lattice trials commencing in F_4. (CIAT)

0686

* LEAKEY, C.L.A. 1970. Background to current breeding work at Makerere University College, Uganda. Bean Improvement Cooperative. Annual Report 13:59-60.

Current breeding and hybridization programs at Makerere U. College (Uganda) are briefly reviewed. The early years of the breeding program led to the selection of several promising var. (Banja 2, Mexico 11, and Mexico 142). Var Diacol Nima, resistant to angular leaf spot (Phaeoisariopsis griseola), introduced from Colombia, proved to be well adapted and high yielding over a wide area of 1200-1600 m in Uganda and Kenya. A hybridization program was started in 1961 and some of the resultant new lines are now being replicated in Kenya, Uganda, and Tanzania, and are also being used as starting materials in a new program at Makerere to improve yield and disease resistance. (CIAT)

0687

* LEAKEY, C.L.A.; STABURSUIK, A. 1970. Scope for breeding for improved protein content and quality in dry seed beans in Uganda. Bean Improvement Cooperative. Annual Report 13:61-62.

Var. recommended to help solve the problem of protein deficiency in the Ugandan diet are reported. Var. Banja 2, yielding 850 lb/ac and with 21% protein on the sample harvest and 0.20 g met./100 g beans, was the standard var. at the start of the breeding program. Var. Diacol Nima is higher yielding (1000 lb/ac) and is equally acceptable by consumers. This var. also has 23.5% protein and 0.23 g met./100 g bean. Var. Kabanima, yielding 1250 lb/ac and with 26.0% protein and 0.26 g met./100 g bean, is a new selection. The protein % on dry wt. basis and met. as a % of protein are included for var. Ocop 9x, Pronel, Cuarentino, and Pop 412: 28.9 and 0.9, 28.5 and 0.9, 29.5 and 1.0, and 31.2 and 1.0%, resp. (CIAT)

0691

* LEAKEY, C.L.A. 1963. French beans and their diseases in Uganda. Kampala, Uganda, Department of Agriculture. Bulletin no.4. 3p.

Diseases are probably the major factor limiting bean productivity in Uganda, where it is a major staple in the local diet and has export potential. Farmers are encouraged to sort out seed and reject damaged seed, planting var. in separate blocks to help reduce disease incidence and enable them to draw a distinction between resistant and susceptible var. Major diseases of beans in the country are those caused by Colletotrichum lindemuthianum, Uromyces appendiculatus, Isariopsis griseola, Xanthomonas phaseoli, Pseudomonas phaseolicola, and X. phaseoli var. fuscans. Minor diseases include those caused by Ascochyta phaseolorum, Ramularia deusta, Sclerotinia sclerotiorum, Nematospora coryli, and Leveillula taurica. Symptomatology of these diseases and of others caused by unknown fungi is briefly described. (CIAT)

0701

* OSIRU, D.S.O.; WILLEY, R.W. 1976. Studies on mixtures of maize and beans with particular emphasis on the time of planting beans. In Monyo, J.H.; Ker, A.D.R.; Campbell, M., eds. Symposium on Intercropping in Semi-Arid Areas, Morogoro, Tanzania, 1976. Report. Ottawa, Canada, International Development Research Centre. p.23.

A series of expt. were carried out at Makerere, Uganda, to examine the importance of different growth cycles in the productivity of mixtures of bean and maize. Treatments used were maize in monoculture, 2/3 maize-1/3 beans; 1/3 maize-2/3 beans, and beans in monoculture at 3 plant populations and at 3 planting dates. The maturity periods of beans and maize were 85 and 120 days, resp. Yields of the mixtures were up to 25% higher than those achieved by monocrops. This advantage decreased markedly with delayed planting of the beans. (CIAT)

0713

* RUBAIHAYO, P.R.; RADLEY, R.W.; KHAN, T.N.; MUKIIBI, J.; LEAKEY, C.L.A.; ASHLEY, J.M. 1973. The Makerere programme. In Nutritional improvement of food legumes by breeding: based on proceedings of a symposium sponsored by PAG, held at the Food and Agriculture Organization, Rome, Italy, 1972. New York, Protein Advisory Group of the United Nations. pp.117-130.

A brief progress report is given on research carried out up to 1973 on soybean, cowpea, bean, pigeon pea, and groundnut, and future research trends on these crops at Makerere U. (Uganda) are suggested. Major emphasis of work on beans since 1967 has been on the use of hybridization between Colombian-bred Diacol Nima and its derivatives, produced from crosses in the Kawanda program, and stringless vegetable var. carrying the are gene. Another major criterion in bean improvement is canning acceptability. Although protein content and quality as measured by met. content is considered of great importance, this has not been elevated to a major place in selection of segregating populations due to the lack of a suitable screening method. A survey of a world collection of beans in Uganda has shown widespread susceptibility to prevalent races of rust (Uromyces phaseoli), but approx. 20 accessions with small seeds and reasonable adaptation have indicated resistance to some of these races. Line ICA Guali, from Colombia, and Junes and Tara (bred in Nebraska, USA) are being studied as potential parents with resistance to common blight (Xanthomonas phaseoli). (CIAT)

0715

* SENGOOBA, T. 1974. Seed transmission of angular leaf spot of beans (Phaseolus vulgaris). In Proceedings. 2nd. Symp. U. Soc. Agron. Kampala. pp.140-143.

An expt. was carried out in the 1st season of 1975 to establish the site in which plant to seed transfer of angular leaf spot (Phaeoisariopsis griseola) occurs. Bean pods infected by the disease were collected from 3 bean var. (Banja 2, K20, and L-Tom) and categorized into 3 groups: (A) seeds under lesions covering pericarp, (B) seeds under lesions not covering the hilum, and (C) seeds from uninfected portions of the pericarp. A 4th group was set up (D) with a sample of seeds from Banja 2. Var. K20 and L-Tom were only used to estimate % of seed infection. Percentage of discolored seeds, no. of lesions/pod, and % of seed infection were recorded. Results indicate that P. griseola is carried in the seed only by the hilums; the fungus sporulated in 84% of the planted hilums and it did not grow from testa, cotyledons, or embryos. Seed transmission studies showed that infection started 17 days after planting. At 25 days from planting 33.3 and 2.7% of the seedlings in groups A and B, resp., were infected while none of the seedlings in group C was. (CIAT)

0807

* JACK, R.W. 1913. The bean stem maggot. Rhodesia Agricultural Journal 10:545-553.

The importance, distribution, life cycle, damage to the plant, and host plants (Vigna and Phaseolus) of the bean stem maggot (Agromyza fabalis) and resistant var. are described. Natural enemies (a Braconid wasp) and allied species attacking cowpeas are reported. Possible control measures are mentioned: removal of stems and the use of a trap crop (a few rows of cowpea). (CIAT)

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