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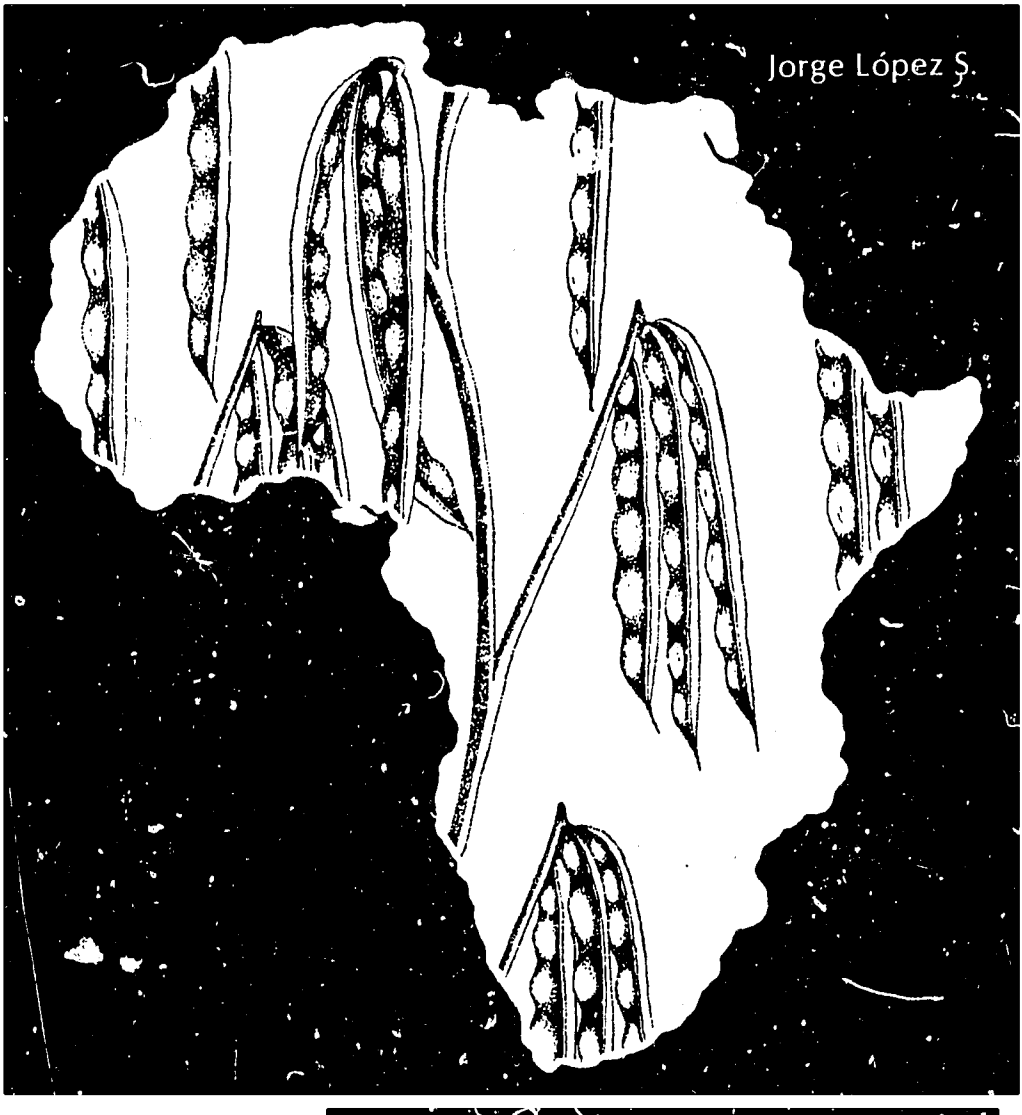
Bibliography on bean research in Africa

Jorge López S.



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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 181-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 experimental 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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INTRODUCTION

This bibliography was generated in response to the needs of a relatively new scientific network - the African bean research network. In March of 1980, a group of delegates from institutions with bean research programs met at Lilongwe, Malawi, to discuss their aspirations for the improvement of bean (Phaseolus vulgaris L.) production in Eastern Africa. They agreed that, although beans had produced good yields on experiment stations, yields in farmers' fields rarely exceeded 500 kilograms per hectare. They called for a regional research program, the main objectives of which would be to develop high yielding, agronomically stable cultivars, with good quality seed and resistance to major pests and diseases. Greater collaboration at the regional and international levels was considered instrumental in achieving the objective of improved yields.

This network, although still in the early stages of development, now extends beyond East Africa, and encompasses the following countries: Algeria, Burundi, Egypt, Ethiopia, Kenya, Libya, Malawi, Morocco, Rwanda, Sudan, Tanzania, Tunisia, Uganda, and Zambia. It has become increasingly more important, with the growth of the network, that researchers in one country know what has been done in another, and that all the network members have access to the bean research already done in Africa.

A thorough revision of references cited in research appearing in journals, proceedings, books, reports, theses, and others, constituted the primary source of information for this bibliography. We are also proud to have had, in microform, the record of agricultural research (including beans) in Rwanda, Zaire, and Burundi, compiled and conserved by the Centre d'Information Appliquée au Developpement et a l'Agriculture Tropicale in Belgium.

Other sources include:

Dr. Collin A. Leakey, who contributed fifty difficult-to-obtain documents from Uganda, Tanzania, and Kenya. We greatly appreciate his contribution.

International Information System for the Agricultural Sciences and Technology—AGRIS

Royal Tropical Institute's Abstracts on Tropical Agriculture

Commonwealth Agricultural Bureaux abstract journals

BioSciences Information Service

The primary emphasis in this collection has been put on the retrieval and "rescue" of non-conventional literature that would not be available through other sources. Furthermore, CIAT's Bean Information Center has pledged to take a dynamic approach to delivering the literature to the research network. We hope this bibliography will be a good beginning in that direction. In this regard, the assistance of the users of this bibliography is essential. An update will be produced, with the collaboration of the scientists in the research network. All contributions are actively solicited, and persons who send articles to be added to the collection may order copies of articles currently in the collection, free of charge.

The organization of the citations by country highlights the research on beans that has been carried out at the national level, and research papers

have been written on each one of the countries. The affiliation of the first author was also taken into account for this purpose.

The citations, within each country, are arranged alphabetically by author and, within the papers of each author, by year in chronological order. Citations preceded by an asterisk (*) indicate that the complete document is available at the Bean Information Center. Abstracts are provided for more than 50 percent of the citations. Authorship of abstracts is acknowledged by the use of the following acronyms:

AS - author's summary
CAB - Commonwealth Agricultural Bureaux
BIOSIS - BioSciences Information Service
RTI - Royal Tropical Institute
CIAT - abstracts taken from CIAT data base

Many of the CIAT abstracts were purposely written for this bibliography by Francy González and Lynn Menéndez, documentalist and editor, respectively, of the Bean Information Center, whom the author wishes to thank for their timely collaboration.

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

Farming systems 0013 0236 0340 0435
Economics 0200
Humid tropics 0435 0436 0438

When ordering photocopies, this bibliography should be specified as the source. Address requests to:

Bean Information Center
Communication and Information Support Unit
CIAT
Apartado Aereo 6713
Cali, Colombia

GENERAL

0001

* CENTRO INTERNACIONAL DE AGRICULTURA TROPICAL. 1983. Genetic improvement for the Andean Zone and Eastern Africa. In _____. Bean Program. Annual Report 1982. Cali, Colombia. pp.105-120.

A crossing block of 474 bean var. (bush and climbing types) has been formed consisting of commercial cv. in Africa and selected lines offering resistance to pests and diseases. It was sent to Chipata (Zambia), Lyamungu (Tanzania) and Rubona (Rwanda). Most of the breeding population sent to Africa was handled by the F_2 progeny method. Collaborative activities may be summarized as follows: RWANDA — Approximately 300 materials from CIAT are being evaluated in Karama, Rubona and Rwerere. Promising results were obtained at Karama and Rubona with BAT 127, BAT 202, BAT41,A21. BURUNDI — BAT 1297 gave promising results in the Mosse region. Collaboration on the search for improved resistance to bean fly is underway. KENYA — Quarantine restrictions delayed the evaluation of EP and IBYAN materials. TANZANIA — Trials were sent to Lyamungu, Morogoro and Uyole. Collaborative activities are coordinated through the Title XII project at Morogoro. MALAWI — IBYAN trials demonstrated promising results. Variety mixture studies of the Title XII project are of interest. ZIMBABWE — BAT 1296, BAT 1297 and BAT 1230 gave promising results. Collaboration with the Department of Research and Specialist Services is sought. Adaptation and nitrogen fixation studies are planned with the University of Zimbabwe. ZAMBIA — Links were established with the new grain legume project at Chipata. The crossing block, EP82 and IBYAN trials were sent for evaluation. (CIAT)

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.

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.

0004

DUDAL, R. 1981. Bodemgeschiktheidsondersoek op wereldvlak. Agricultura (Belgium) 29(1):57-71.

Land suitability on a world basis — Soil and climate. Land evaluation for wheat, rice, maize, Panicum millaceum, potatoes, sweet potatoes, cassava, Phaseolus, soybean, cotton; the case of Africa. (AS)

0005

HAMAD, A. 1972. Current research problems on grain legumes. Ministry of Agriculture. Ukiriguru Research Notes Index 2:55.

0006

HUIGNARD, J. 1979. Les bruches des haricots: un danger capital pour les recoltes legumineuses alimentaires. Afrique Agriculture no.52:16-18.

0007

* KAISER, W. J. 1976. Important diseases and pests of bean (Phaseolus vulgaris), lima bean (Phaseolus lunatus) and pigeon pea (Cajanus cajan) in Africa. African Journal of Plant Protection 1:97-102.

Beans, lima beans and pigeon peas are important food crops that often provide a major source of protein in the diets of inhabitants of many countries of Africa south of the Sahara. Diseases and pests are important factors contributing to the erratic, low yields and poor quality. Beans are adversely affected by several pests and pathogens at various stages of plant development, which seriously reduce seed yields and quality. Important bean diseases are anthracnose (Colletotrichum lindemuthianum), rust (Uromyces phaseoli), angular leaf spot (Isariopsis griseola), halo blight (Pseudomonas phaseolicola), common and fuscous blights (Xanthomonas phaseoli and X. phaseoli var. fuscans), and BCMV. Pests include Acanthoscelides obtectus, Zabrotes subfasciatus, Maruca testulalis, Heliothis spp. and Agrotis spp. Control of the diseases and pests limiting the cultivation of these legumes in Africa is essential if yields and quality are to be increased. Different control measures presently being utilized are discussed. Breeding and selection of var. that are resistant to one or more of the important pests and pathogens of these crops appear to offer the most attractive means of control for the long term. (CIAT)

0008

* LONDOÑO, N.R.; GATHEE, J.W.; SANDERS, J.H. 1981. Bean production trends in Africa 1966-79. In Regional Workshop on Potential for Field Beans in Eastern Africa, Lilongwe, Malawi, 1980. Proceedings. Cali, Colombia, Centro Internacional de Agricultura Tropical. Series 03EB-1. pp.19-29.

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

0009

* NORMAN, M.J.T. 1982. A role for legumes in tropical agriculture. In Graham, P.H.; Harris, S.C., eds. Biological Nitrogen Fixation Technology for Tropical Agriculture, Cali, Colombia, 1981. Papers presented. Cali, Centro Internacional de Agricultura Tropical. pp.9-26.

Economic, nutritive, and biological role for both grain and pasture legumes in tropical agriculture is reviewed. Particular attention is paid to the importance of legumes in multiple cropping systems and to the role of forage legumes in cropping systems. (AS)

0010

OLUBAYO, F.; KHAMALA, C.P.M. 1979. A comparative study of population development of the bean beetle Acanthoscelides obtectus (Say) in bean cowpea and pigeon pea seed diets.
Paper presented at the Symposium on Grain Legume Improvement in East Africa. Kenya, University of Nairobi, 1979. 14p.

0011

* RACHIE, K.O. 1973. Improvement of food legumes in tropical Africa. In Nutritional improvement of food legumes by breeding. Proceedings. New York, Protein Advisory Group of the United Nations. pp.83-92.

0012

* REGIONAL WORKSHOP ON POTENTIAL FOR FIELD BEANS IN EASTERN AFRICA; Lilongwe, Malawi, 1980. Proceedings. Cali, Colombia, Centro Internacional de Agricultura Tropical, 1981. 226p. CIAT Series No. 03EB-1. (ISBN 89206-07-4).

Initially the CIAT's Bean Program based in Cali, Colombia, directed its efforts to Latin America, and now that lines have been developed with the potential to increase production and productivity of beans in this region, a workshop was programmed with the University of Malawi to study the feasibility of starting a collaborative regional program in Eastern Africa. The Workshop served as a forum for the diagnostic analysis of the contraints limiting bean (Phaseolus vulgaris L.) production in the Eastern African countries, and for discussions of the action to be taken at the national, regional and international levels to increase bean production. The proceedings of this workshop includes reports on bean production in each of the participating countries (Burundi, Kenya, Malawi, Rwanda, Tanzania, Uganda and Zambia), followed by a summary of panel discussions and the concluding recommendations for increasing bean production in Eastern Africa. (CIAT)

0013

* SCHOONHOVEN, A. VAN 1981. Summary of country reports. In Regional Workshop on Potential for Field Beans in Eastern Africa, Lilongwe, Malawi, 1980. Proceedings. Cali, Colombia, Centro Internacional de Agricultura Tropical. Series 03B-1. pp.201-206.

The seven country reports (Burundi, Kenya, Malawi, Rwanda, Tanzania, Uganda and Zambia) are summarized as follows: importance of beans, bean types produced, production environment, production system, factors limiting production, and research achievements. The concluding remark stated that to insure a growing population with a steady supply of adequate affordable protein, rapid solutions must be found to overcome the bean production contraints outlined. (CIAT)

0014

* STANTON, W.R. 1966. Phaseolus. In _____. Grain legumes in Africa. Rome, Food and Agriculture Organization of the United Nations. pp.106-115.

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.

0016

WALLACE, M.M. 1946. Sclerotinia disease of beans and other crops. East African Agricultural Journal 9(3):171-172.

0017

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

ANGOLA

0018

* CONSTANTINO, A.T. 1959. O feijao de Angola. Alteracao das suas qualidades culinarias durante o armazenamento. Lisboa, Junta de Investigacoes do Ultramar. Estudos, Ensaios e Documentos no.63. 125p.

The author describes the experiments carried out in the laboratory in order to evaluate the influence of fumigation with carbon disulphide and also the temperature and humidity conditions of storage in so far as they are likely to affect the cooking quality of beans from Angola. The following factors were considered: appearance factors (wholeness, colour and defects), kinaesthetic factors (hardness of cotyledons and texture of seedlings) and flavour factors. Discussion of results. Based on these and on bibliographic sources the author dissuades from the storage of Angola beans or the fumigation with CS_2 at a humidity above 13%. (RTI)

0019

CONSTANTINO, A.T. 1958. O feijao de Angola. Panorama actual da sua cultura, comércio e armazenamento. Lisboa, Junta de Investigacoes do Ultramar. Estudos, Ensaios e Documentos no.49. 117p.

0020

CONSTANTINO, A.T. 1956. O carneiro do feijao, Acanthoscelides obtectus (Say). Lisboa, Junta de Investigacoes do Ultramar. Estudos, Ensaios e Documentos no.15. 174p.

0021

* O FEIJAO no programa de extensao rural de Angola. Reordenamento no. 33:26-29. 1974.

Beans are an important crop in the Central High Plains of Angola. Yields are low, averaging about 150-250 kg/ha. Recommendations are presented on the growing of beans, including the choice of good varieties, the use of fertilizers and the practice of crop rotation. The most important diseases and their control are mentioned. (RTI)

0022

* STEELE, P.J.B. 1974. The pattern of agriculture in Angola. World Crops 26(1):30-33.

Agriculture in Angola is conveniently divided into 5 major zones: coastal, S., E., N. and central. Among the principal crops are beans (species not stated) grown mostly in the E., cassava, grown everywhere except in the S., cotton in the N. and on the coast, potatoes in the central zone, maize everywhere but mainly in the central zone, millet in the S., rice in the N. and E. and on the coast, sorghum in the S. and E. and wheat in the central zone. Tabular data are presented for the area and level of production, and for the average yield/ha of the major crops in 1970-1. (CAB)

BURUNDI

0023

* DEVOS, P.; VAN DURME, J. 1982. Le haricot (Phaseolus vulgaris L.) au Burundi. Bujumbura, Institut des Sciences Agronomiques du Burundi. Departement de la Production Végétale. 9p.

0024

* DEVOS, P.; KABENGELE, A. 1981. Haricot (Phaseolus vulgaris). In Institut des Sciences Agronomiques du Burundi. Rapport des activités de recherches 1980. Bujumbura. p.14.

Trials were conducted to compare the performance of 9 bean var. at different altitudes. In regions located between 800 and 1200 m altitude, var. Karama var. 1/2 yielded an average of 1966 kg/ha. Diacol Calima gave the highest average yield (1869 kg/ha) at altitudes above 1200 m. (CIAT)

0025

* DIEUDONNE, C. 1981. Bean production in Burundi. In Regional Workshop on Potential for Field Beans in Eastern Africa, Lilongwe, Malawi, 1980. Proceedings. Cali, Colombia, Centro Internacional de Agricultura Tropical. Series 03EB-1. pp.30-34.

The importance of beans in Burundi (Africa) is briefly analyzed; 120,000 t dry beans are produced per yr on approx. 240,000 ha during 3 seasons: Oct.-Dec., Feb.-May, and June-Sept. Major factors limiting production are described: climatic (soils, rainfall), phytopathological [anthracnose (Colletotrichum lindemuthianum) and aphids (Aphis fabae)], and phenotypical factors; aspects of research and extension carried out by the Department of Agronomy of the Ministry of Agriculture and Animal Production are also included. Aspects of the research program of the Agronomic Science Institute are listed: var. selection, preliminary and final trials of selected var., and distribution of new var. (CIAT)

0026

* FOCAN, A. 1961. Recherches agronomiques et productivite. Bulletin Agricole du Congo Belge 52(3):231-244.

0027

* INSTITUT DES SCIENCES AGRONOMIQUES DU BURUNDI. 1968. Haricots. In _____. Rapport Annuel 1964. Bujumbura. pp. 31, 68, 111-112, 137.

0028

* INSTITUT DES SCIENCES AGRONOMIQUES DU BURUNDI. 1966. Haricots. In _____. Rapport Annuel 1965. Bujumbura. pp. 25, 67, 99.

0029

* INSTITUT DES SCIENCES AGRONOMIQUES DU BURUNDI. 1965. Zone d'altitude superieure. Station de Recherches Agronomiques de Kisozi. In _____. Rapport Annuel pour l'Exercice 1964. Bujumbura. pp.105-191.

0030

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1959. Station d'Essais de Kisozi. In _____. Rapport Annuel pour l'Exercice 1958. Bruxelles. pp.494-500.

0031

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1958. Centre de Planning Agricole du Mosso. In _____. Rapport Annuel pour l'Exercice 1957. Bruxelles. pp.503-510.

0032

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1958. Station d'Essais de Kisozi. In _____. Rapport Annuel pour l'Exercice 1957. Bruxelles. pp.497-502.

0033

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1957. Station d'Essais de Kisozi. In _____. Rapport Annuel pour l'Exercice 1956. Bruxelles. pp.521-526.

0034

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1955. Station d'Essais de Kisozi. In _____. Rapport Annuel pour l'Exercice 1954. Bruxelles. pp.466-470.

0035

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1953. Station d'Essais de Kisozi. In _____. Rapport Annuel pour l'Exercice 1952. Bruxelles. pp.375-379.

0036

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1952. Station d'Essais de Kisozi. In _____. Rapport Annuel pour l'Exercice 1951. Bruxelles. pp.410-414.

0037

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1948. Station d'Essais de Kisozi. In _____. Rapport Annuel pour l'Exercice 1947. Bruxelles. pp.215-216.

0038

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1944. Station Experimentale de Kisozi. In _____. Rapport Annuel pour l'Exercice 1942-1943. pp.148-151.

0039

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1943. Station Experimentale de Kisozi. In _____. Rapport Annuel pour l'Exercice 1940-1941. Leopoldville. pp.140-145.

0040

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1941. Station d'Essais de Kisozi. In _____. Rapport Annuel pour l'Exercice 1939. Bruxelles. pp.290-295.

0041

* VERHOYEN, M. 1983. Les virus des vegetaux au Burundi. Tropicultura 1(1): 21-22.

Viral diseases observed on different plant species (maize, cassava, beans, cyphomandra, potato, etc.) in Burundi are described. Further inspections are needed to complete this inventory and pathogens should be examined under specialized laboratory conditions to perfect their identification. Conclusively, the following control measures are proposed: correct identification of the pathogen, prevention of virus diffusion outside the plant multiplication and selection sites, crop rotations, knowledge of vectors and their biology. Estimations of crop losses should indicate research priorities. (AS)

CAMEROON

0042

DOYEN, M. 1972. Intensification des associations culturales dans l'ouest Cameroun. Bulletin des Recherches Agronomiques de Gembloux. Hors Serie:269-173.

In West Cameroon, perennial crops (coffee, plantain) and annual ones (maize, groundnut, beans, cocoyams, yams, pumpkin and so) are traditionally associated on a same plot. (AS)

0043

SHAMARAEV, G.E.; BAKHAREVA, S.N.; KORSAKOV, N.I. 1975. [Agriculture of Cameroon]. Trudy po Prikladnoi Botanike, Genetike i Selektsii (1975) 54(3):214-230.

The agriculture of Cameroon and its structure and trends are briefly outlined on the basis of an expedition by Russian agriculturists in 1974-5. Of individual crops attention is given to maize, sorghum, Pennisetum americanum, cowpeas, Phaseolus vulgaris, pigeon pea, velvet bean [Mucuna deeringiana] groundnut, sesame, cassava, tannia (Xanthosoma sagittifolium), taro (Colocasia esculenta), sweet potato, yams, potatoes, cotton and tobacco. (CAB)

CAPE VERDE

0044

SOUSA, H.T. DE 1957. Alimentacao e saude nas ilhas de Cabo Verde. Cabo Verde 8(92):3-10.

Maize is the chief food crop in the Cape Verde Islands. Introduced by the Portuguese in the 16th century, it has adapted itself well to the dry conditions prevailing in the archipelago. Beans rank next to maize in importance, followed by "mandioca", the sweet potato. The main national dish is "cachupa", a mixture of boiled maize and beans. The nutritional value of maize; its exclusive consumption occasions pellagra, an avitaminosis, which manifests itself very frequently in the archipelago during periods of drought. The diet must be complemented with other foods. Meat and milk consumption is low, this also being the case with fish and eggs. The amount of fruit on the diet, too, is generally inadequate. Methods of improving the nutrition of the indigenous population. (RTI)

EGYPT

0045

ABD-EL-GALEEL, A.E. 1979. Studies on the effect of some growth regulators as foliar spray on snap bean plants. MSc. Thesis. Shebin El-Kom, Egypt, Menoufia University. 146p.

0046

ABD-EL-RAHIM, H.M.; ABDALLAH, N.M. 1982. Response of field bean plants to the application of some plant growth hormones. Cairo, Egypt, Ain-Shams University. Faculty of Agriculture. Research Bulletin no. 1756. 11p.

0047

* ABDEL-FATTAH, M.A.A.; NASSAR, S.H.; HANAFY, M.S.N. 1974. Evaluation of some snap bean varieties. A. Growth, flowering and yielding ability. Agricultural Research Review (Egypt) 52(3):107-124.

Field trials were conducted to study the effects of 3 planting dates (Sept. 1, Oct. 1 and Nov. 1) and 2 planting methods (planting on one or both sides of the ridge) on 3 French, 2 American and 1 local bean variety. Effects of the treatments on growth, flowering and yields of beans are discussed. It is concluded to plant beans in Sept. or Oct. for obtaining the highest yields for the local market and for export. The French var. Fin de Villeneuve had a wide range of adaptability for producing the highest yields for export. The var. American Seminole proved to be suitable for the local market. The local var. Giza 3 was recommended for both the local market and export. It is recommended to plant beans on both sides of the ridges for obtaining the highest yields. (RTI)

0048

ABDEL-FATTAH, M.I.; EL-GUINDY, M.A.; ISSA, Y.H. 1978. Effect of natural and artificial diet on the biology of the cotton bollworm Heliothis armigera HBN. In Conference on Pest Control, 4th. Cairo, Egypt, 1978. Proceedings, Cairo, National Research Centre. pp.15-18.

0049

* ABDEL-GHAFFAR, A.S.; EL-ATTAR, H.A.; EL-HALFAWI, M.H.; ABDEL-SALAM, A.A. 1982. Effects of inoculation, nitrogen fertilizer, salinity, and water stress on symbiotic N_2 fixation by Vicia faba and Phaseolus vulgaris. In Graham, P.H.; Harris, S.C., eds. Biological Nitrogen Fixation Technology for Tropical Agriculture, Cali, Colombia, 1981. Papers presented. Cali, Centro Internacional de Agricultura Tropical. pp.153-159.

Effects of inoculation, salinity, water stress and nitrogen fertilization on N_2 fixation by faba beans and beans are reported. Inoculation of faba beans increased nodulation and nitrogenase activity, while addition of N fertilizer (180 kg/ha) supressed nodulation and N_2 fixation but increased yields. Saline conditions also depressed nodulation and N_2 fixation and decreased crop yield in the absence of fertilizer N. Water stress inhibited nitrogenase activity in faba beans, but had no marked effects on nodulation. Inoculation of Phaseolus vulgaris markedly enhanced nodulation and N_2 fixation, plant dry weight, N content, and final yield. The granular inoculum had a better effect than either the powder form or liquid culture. Application of N fertilizer (100 kg/ha) reduced nodulation and depressed nitrogenase activity but resulted in yields less than those obtained through inoculation. Salinity and water stress inhibited nodulation, depressed nitrogenase activity, and decreased the yield of bean plants. Maximum N_2 fixation and yield were obtained when plants were irrigated every 7-12 days. (AS)

0050

ABOU EL-FADL, M.; LOFT, M.; HAROON, H.A.T.; ABD EL-GAWAD, H.; ATTIA, R.; IBRAHIM, A.N.; BAHA EL-DIN, S.; FARRAG, F. 1963. Analysis of some factors affecting the nodule formation on garden beans in Egypt. Agricultural Research Review (Egypt) 41(2):37-58.

0051

ABOU EL-FADL, M.; EL-SHERBINI, M.F.; FAHMY, M. 1959. Analyeis of some factors affecting nodule formation on roots of besns in Egypt. Agricultural Research Review (Egypt) 37(2):269-279.

0052

ABOU-NEAMA, M.A. 1977. Studies on the evaluation of certain fungicides seed dressings of systemic action for the control of some seedborne diseases. Cairo, Egypt, Al-Azhar University. Faculty of Agriculture. 111p.

0053

* AFIFI, A.F. 1975. Effect of volatile substances from species of Labiatae on rhizospheric and phyllospheric fungi of Phaseolus vulgaris. Phytopathologische Zeitschrift 83(4):296-302.

Effects of emanations from Origanum majorana and Ocimum basilicum on the germination of spores of rhizospheric fungi of P. vulgaris, Origanum majorana and Ocimum basilicum plants grown singly or in association are discussed. Leaf volatiles from Origanum majorana inhibited most bean phyllosphere fungi except Penicillium citrinum which was stimulated. Leaf volatiles of Ocimum basilicum inhibited germination of Aspergillus niger, Cochliobolus spicifer, Cunninghamella elegans, Fusarium moniliforme, F. semitectum and Penicillium citrinum in the bean phyllosphere while germination of Alternaria tenuis and P. chermesinum was enhanced. Origanum majorana and Ocimum basilicum inhibited germination of about 1/2 the rhizosphere fungi tested. (BIOSIS)

0054

AHMED, A.L.; ABDEL-FATTAH, M.I.; ABDEL-RAHEEM, M.M. 979. Efficiency of some insecticides. Menoufia Journal of Agricultural Research 2:333-334.

0055

* AHMED, A.M.; HEIKAL, M.M.; ZIDAN, M.A. 1980. Effects of salinization treatments on growth and some related physiological activities of some leguminous plants. Canadian Journal of Plant Science 60(2):713-720. Also in Bulletin of the Faculty of Science (Egypt) 8(18):107-122. 1979.

When subjected to salinity levels of 0, 20, 40 or 60 meq NaCl/l the kidney bean (Phaseolus vulgaris) cv. Harvester and Contender and cowpea (Vigna unguiculata) cv. Asmarly and Creamy 7 exhibited significant changes in their physiological activities. The trends and magnitudes of these changes depended on the cv. as well as on the level of salinity. Generally, stomatal frequency and transpiration rate were significantly reduced and water content was considerably increased. Biosynthesis of pigments and photosynthetic activity and consequently leaf area and DM accumulation were considerably reduced as the concn. of NaCl in the nutritive medium increased. Mineral composition also exhibited significant changes but the 12 dominant feature was the high accumulation of Na in salinized plant tissues. (CAB)

0056

AHMED, A.M.; HEIKAL, M.M.; ZIDAN, M.A. 1979. Photosynthesis and some other growth parameters of some leguminous plants as affected by salinization treatment. Bulletin of the Faculty of Science (Egypt) 8(18):123-140.

0057

AHMED, E.I.; EL-CHEIKH, A.E. 1979. The side effect of some pesticides on kidney bean plants, under various conditions of organic matter, soil moisture and seasonal effect. Menoufia Journal of Agriculture Research 2:357-374.

0058

ALD-ELDIN, M. 1967. Growing an imported new bean variety for exporting its green fresh yield. In Arabic Horticultural Conference, 2nd. 1967. Proceedings. Cairo. pp.237-239. (in Arabic)

0059

ALI, A.M.M.; MOHAMED, H.; DESSOUKI, I.A.M. 1979. DNA relatedness in five species belonging to different genera in the tribe Phaseoleae. Cairo, Egypt, Ain-Shams University, Faculty of Agriculture. Research Bulletin no.1058. 11p.

0060

ALLAM, E.K.; EL-AFIFI, S.I.; EID, S.A.; KISHTAH, A.A.A. 1979. Comparative study between the effect of bean common mosaic virus and bean yellow mosaic virus on some chemical compounds of leaves and inmature seeds of bean plants. In Egyptian Phytopathology Congress, 3rd. Cairo, Egypt, 1979. Proceedings. Cairo. Egyptian Phytopathology Society. pp.35-48.

0061

ALLAM, E.K.; EL-AFIFI, S.I.; EID, S.A. 1979. Some factors affecting the presence of some viruses in bean seeds. In Egyptian Phytopathology Congress, 3rd, Cairo, Egypt, 1979. Proceedings. Egyptian Phytopathology Society. pp.49-61.

0062

ALLAM, E.K.; OMAR, R.A; GAMAL EDDIN, A.S. 1978. Sources of infection with potato leaf virus (PLRV) in fields and during storage. Annals of Agricultural Sciences (Egypt) 20(2):117-126.

0063

* ASHOUR, N.I.; KABESH, M.O. 1975. A preliminary study on fritted trace-elements (F.T.E.) as a fertilizer for bean plant (Phaseolus vulgaris) grown in calcareous soil. Agrochimica 19(3/4):271-276.

In pot trials, beans (P. vulgaris) were given 4 different types of fritted trace elements at 0, 50 or 100 mg/kg soil. On a clay soil only 2 types increased yield of seed and tops, while on a calcareous soil all types increased yield, but those which were active in the clay soil were more active than the other types. The higher activity was related to a higher Mn content which was 20.9 and 21.8% in the more-active types and 2.4 and 4.0% in the less-active types. (CAB)

0064

ATTIA, M.S.; NASSER, S.H.; EL-SHAMY, M.R. 1970. Giza 3 - A new white-seeded snap bean cultivar resistant to normal bean mosaic. In Conference on Vegetable Production and Research for Marketing and Export, 2nd. 1970. Proceedings. Cairo, Ain-Shams University, Faculty of Agriculture. p.26. (in Arabic)

0065

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

0066

AWADALLA, M.Z.; SOUTHGATE, D.A.T. 1978. The composition of some native Egyptian foodstuffs. Plant Foods and Man 2(3/4):147-151.

C067

* BAKR, T.M.A.; MOHAMED, M.S.; MOUSTAFA, E.K. 1983. Evaluation of leaf protein isolates of some Egyptian crops. Food Chemistry 10(1):15-23.

The in vitro digestibilities by pepsin, pancreatin and pepsin followed by pancreatin of the leaf protein isolates of 4 Egyptian crops were studied. Bean (Phaseolus vulgaris) and cabbage leaf protein isolates were more digestible with pepsin and pancreatin used individually, as well as with pepsin followed by pancreatin, than those of tomato and sugarcane. There were only minor variations in the amino acid content of the different leaf protein isolates, with the sulphur-containing amino acids (methionine and cysteine) being lowest in concentration. Bean and cabbage leaf protein isolates were superior to those of tomato and sugarcane with regard to availability of amino acids for human nutrition. (AS)

0068

* BAKR, T.M.A.; MOHAMED, M.S.; MOUSTAFA, E.K. 1982. Leaf protein isolates from some Egyptian crops. Food Chemistry 9(4):295-301.

The optimum conditions were studied for the extraction of N from the leaves of Egyptian crops of Phaseolus vulgaris cv. Tendergreen, cabbage cv. Capitata, tomato cv. Rutgers and sugarcane cv. Natal Co.310. The highest protein contents were found in bean (29.7%) and tomato (28.0%) leaves; cabbage contained 20.6% and sugarcane only 6.04%. Analyses are tabulated for fractions of leaf N and composition of leaf protein isolates. (AS)

0069

* BELAL, M.H.; GOMAA, E.A.A. 1979. Determination of dimethoate residue in some vegetables and cotton plants. Bulletin of Environmental Contamination and Toxicology 22:726-730.

Tomato, cucumber and bean plants were sprayed twice, 15 days apart in June and July, with ½ l dimethoate/feddan (1 feddan = 4200 m^2) and leaf samples were collected 1, 3, 7, 14 or 21 days after the 2nd application. On all dates the highest residues were found in tomato leaves, and at 21 days these leaves yielded the only determinable residue which, at 2.1 ppm, was above the tolerance level. (CAB)

0070

DERAZ, S.N. 1980. Effect of some growth regulators on the biosynthesis of amino acids and protein in Phaseolus vulgaris L. M.Sc. Thesis. Shebin-El-Kom, Egypt, Menoufia University. Faculty of Agriculture. 105p.

0071

* DOWEDAR, S.A.; WALLY, M.A.; FAHMY, M.A. 1978. Effect of calcium chloride and latex treatments on keeping quality of snap bean pods. Cairo, Egypt, Ains-Shams University. Faculty of Agriculture. Research Bulletin no. 857. 5p.

Snap bean pods (Giza 3 variety) were treated with calcium chloride solutions (3 or 6%), latex solutions (1 or 3%) or with a mixture of both solutions. Pods were stored at room temperature (19-24°C) for 11 days. The 2 latex treatments showed the least number of decayed fruits and the least percentage of weight loss. Effects of the treatments on chlorophyll content and on total soluble solids and acidity are discussed. (RTI)

0072

* EGYPT. MINISTRY OF AGRICULTURE. 1932. French beans (Fasoolia) Phaseolus vulgaris L. Cairo. New Series Leaflet no. 7. 4p.

Plant characteristics and cultivation of snap bean in Egypt are described. The most cultivated var. in Cairo is Baladi. Planting takes place in Jan. and harvesting in early April; however, successive sowings are made throughout the summer until the beginning of Oct. Aspects related to planting, quantity of seed, planting distances, fertilizers, and irrigation are given. Pods are ready for harvest in 45 days in summer and in 70-80 days in spring. In the northern part of Delta the 1st planting is made 10-15 days later than in the southern district. (CIAT)

0073

EL-ASHWAH, E.T.; SEDKY, K.A.H.; ZAKI, S.A.; SEDKY, H.A. 1980. Chemical composition and nutritional evaluation of canned vegetable baby foods. Cairo, Egypt, Ain-Shams University. Faculty of Agriculture. Research Bulletin no. 1305. 20p.

0074

EL-ASHWAH, E.T.; ZAKI, S.A.; SEDKY, K.A.H.; SEDKY, H.A. 1980. Effect of storage on chemical composition, acceptability and microbiological quality of canned vegetable baby foods. Cairo, Egypt, Ain-Shams University. Faculty of Agriculture. Research Bulletin no. 1306. 19p.

0075

* EL-ATTAR, S.; SABET, K.; NOUR-EL-DIN, F. 1967. Studies on common bean mosaic diseases in U.A.R. (A) Properties of the causal virus. Agricultural Research Review (Egypt) 45(1):122-135.

Bean common mosaic virus disease can be experimentally transmitted by sap-inoculation, by grafting, by seeds from infected bean plants and by the aphis Myzus persicae. Susceptible bean plants, infected at an early stage of growth, may produce as high as 50% infected seeds. A low percentage of seed transmission takes place from plants infected during flowering stage. There is no relation between seed infection and position of the seeds in the pod. Bean varieties Suisse Blanc, Monte Calm, and Stringless Green Refugee have been found susceptible to BCMV. The varieties Idaho Refugee, Contender, Seminole, Michelite, Topcrop, and Tenderlong have been found resistant. Under certain conditions, some of these resistant varieties react to infection with BCMV. Idaho Refugee seedlings collapse when approach-grafted to infected seedlings of Stringless Green Refugee. Detached primary leaves of Tenderlong and Topcrop develop local lesions when inoculated with the virus and incubated in darkness at 34°C. BCMV has been found to infect sieva and lima beans, cowpea and broad bean. Watermelon, cucumber, pepper, tobacco, and pea are not infected. Bean common mosaic virus has a thermal inactivation point between 57°C and 58°C and a dilution end point above 1:1000. The virus can resist ageing for 24-34 hrs. at room temperature. The purified preparation of BCMV remains infective for 35 days when stored at 5°C. Infectivity of the virus is checked at pH 4.5 but does not seem to be affected at pH value ranging from 5.0 to 7.8. The virus is not of anisotropic nature as it does not show stream double refraction when examined through polarized light. (AS)

0076

* EL-ATTAR, S.; SABET, K.; NOUR-EL-DIN, F. 1967. Studies on common bean mosaic disease in U.A.R. B. Distribution, movement, and serology of the causal virus. Agricultural Research Review (Egypt) 45(1):136-142.

Common bean mosaic virus was found to be present in roots and all above-ground parts of infected plants. The abscission of inoculated primary

leaves, 4 days after inoculation, allows sufficient time for BCMV to move to the stem and to induce typical symptoms of the disease. Detaching the inoculated leaves after 3 days induced a different disease condition characterized by the production of slightly chlorotic, very thick leaves with depressed vein traces giving the leaf a rugoaed appearance A modified method for partial purification of BCMV was developed by nomogenizing frozen infected leaves of bean in the presence of phosphate buffer of pH 7.1 and centrifuging the sap at low-speed and then high-speed. A specific antiserum was successfully prepared through the use of purified virus suspension. Agglutination reactions of infected sap diluted to 1:2 and 1:4 was achieved by the use of antiserum diluted up to 1:512. Crude sap of the thick-leaf condition showed positive agglutination reaction with BCMV-antiserum diluted up to 1:128. The absorbed serum reacted with BCMV infected sap. (AS)

0077

EL-BAKRY, A.M.; MIDAN, A.A.; MALASH, N.M.; OMRAN, A.F. 1980. Effects of phosphate, as localized or foliar applications, and nitrogenous fertilizer along with their interactions on snap bean plants. I. Growth and chemical constituents. Monoufeia Journal of Agricultural Research 3:311-338.

In field trials at Shebin El-Kom in 1978-9, soil application of 200 kg P_2O_5/feddan had no effect on growth of Phaseolus vulgaris cv. Giza 3 but foliar application of 0.5-1% P_2O_5 increased growth especially in conjunction with soil N application. P and N fertilizers both increased the N content of various organs. Seed and pod protein contents were increased by N fertilizer and foliar P but not by soil P application. Both fertilizers decreased the chlorophyll content but increased the total carbohydrates in the pods. (1 feddan = 0.42 ha). (CAB)

0078

EL-BAKRY, M.A. 1966. Effect of plant density and nitrogen fertilizer on the growth and yield of snap bean. M.Sc. Thesis. Cairo, Ain-Shams University. Faculty of Agriculture.

0079

* EL-BANOBY, F.E.; RUDOLPH, K. 1981. Specific watersoaking 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.

0080

EL-BEHEIDI; M. 1980. The effect of nitrogen status and bacteria inoculation on the yield of beans (Phaseolus vulgaris L.). Beitrage zur Tropische und Subtropische Landwirtschaft und Tropenveterinarmedezin 8(4):295-301.

In Egypt, the effect was studied of calcium nitrate as a fertilizer and of the inoculation of seeds by "Nodulin" on the yield of beans. Crops required higher doses of N, if cultivated as a summer crop, while extra N was of no value for autumn cultivation. The use of 37 kg N/ha gave no significant yield increase, whereas 75 or 150 kg N/ha increased the yield of the summer crop significantly. The yield of the autumn crop showed a significant increase after fertilizing with 37 kg N/ha, whereas more N reduced the yield in comparison with the control. In general the inoculation of bean seeds is useful. (AS)

0081

* EL-GHARABLY, G.A.; EL-RAZEK, M.A. 1982. Responses of snapbeans to

applications of phosphorus and iron in calcareous soils. Journal of Plant Nutrition 5(4-7):721-728.

In a greenhouse pot experiment P 0-300 and Fe 0-40 ppm were applied to a sandy calcareous soil in which snapbeans were grown. Phosphorus, Fe, Ca, Mg, Mn, and Zn were determined in 21- and 35-day-old snapbeans, and dry-matter yield was recorded separately for tops and roots. Symptoms of Fe deficiency developed on plants in those pots where no Fe was applied. With the application of 20 ppm Fe, the symptoms were prevented. Maximum plant growth was obtained when 150 ppm P was added. At each level of P, dry matter was maximum in the absence of added Fe. The mineral content of snapbean plants was affected by increased levels of applied P and Fe. Significant interactions were found between P and Fe treatments for most of the characteristics measured. High Fe decreased Zn and Mn in plants, and high P decreased them further. (AS)

0082

EL-GHOBASHY, R.E.; FRANCIS, R.R.; EL-NAGGAR, H.A.; KHALIFA, M.H. 1981. Biochemical effects of dintramire and flourodifen on protein and amino acids content in green pods and seeds of Phaseolus vulgaris. Cairo, Egypt, Ain-Shams University. Faculty of Agriculture. Research Bulletin no. 1552. 20p.

0083

* EL-HABBASHA, K.M.; BEHAIRY, A.G. 1977. Influence of root exudates on seed germination and seedling development of some cultivated plants. Zeitschrift fur Acker und Pflanzenbau 145(1):66-74.

Under laboratory and glasshouse conditions the effect of cabbage cv. Balady, bean (Phaseolus vulgaris) cv. Cemenol, onion cv. Behairy, tomato cv. Pritchard and squash cv. Eskanderani root exudates on seed germination and seedling development of each crop were studied. Germination of P. vulgaris was increased by root exudates from squash seedlings and decreased by those from cabbage, P. vulgaris and onion. The fresh wt. of P. vulgaris seedlings was reduced by exudates from cabbage, squash, onion, P. vulgaris and tomato in descending order. Seedling dry wt. was slightly reduced by cabbage, bean and onion exudates and increased by the others. (CAB)

0084

* EL-HABBASHA, K.M. 1974. [The influence of anaerobic conditions, 2,4-dinitrophenol and root injuries on the exudation of organic substances by the roots of Phaseolus vulgaris]. Izvestiya Timiryazevskoi Sel'skokhozyaistvennoi Akademii 3:8-12.

In solution-culture trials, anaerobic conditions (pumping N_2 into the substrate) increased the exudation of sugars by roots of P. vulgaris by 100% and of amino acids by 246%, whereas increased aeration reduced the exudation of both substances. 2,4-dinitrophenol at 10^{-4}M increased the exudation by 5200 and 2600%, respectively. The removal of 25% of the root system decreased the exudation of sugars but increased that of amino acids, whereas the removal of 50% of the roots slightly decreased the exudation of both substances. (AS)

0085

* EL-HABBASHA, K.M.; BEHAIRY, A.G. 1973. [The secretion of some organic substances by Phaseolus vulgaris roots under different temperatures, light intensities and calcium cation contents.] Izvestiya Timiryazevskoi Sel'skokhozyaistvennoi Akademii 4:204-208.

In solution culture, the roots of P. vulgaris exuded more sugars and amino acids at 0.5°C and at 40° than at 20-30° and the extreme temperatures also

changed proportions of the exuded amino acids. The introduction of Ca^{++} into the cultural solution decreased exudation and reduced the number of exuded amino acids. Increases in light intensity decreased the amounts of exuded sugars and amino acids, but increased the number of amino acids. (AS)

0086

EL-HABBASHA, K.M.; BEHAIRY, A.G. 1971. Effect of pH, potassium and calcium cations on secretion of sugars and amino acids from roots of bean plants. Izvestiya Timiryazevskoi Sel'skokhozyaistvennoi Akademi 2:218-221.

0087

EL-KADY, M.A.S.; EID, S.A.; KISHTAH, A.A. 1979. Isolation, purification and electron microscopy of cucumber mosaic virus from bean. In Egyptian Phytopathology Congress, 3rd. Cairo, 1979. Proceedings. Egyptian Phytopathology Society. pp.92-101.

0088

* EL-LEBOUDI, A.; MAKSOUD, A.; MIDAN, A. 1976. A note on the interaction between nitrogen and phosphorus for snap bean plants. Egyptian Journal of Soil Science 16(1):21-35.

In a 2-yr field trial at Shebien El-Kom, snap beans (Phaseolus vulgaris) were given 0 or 20 kg N/feddan applied at 24 days after sowing and 0 or 36 kg P_2O_5/feddan at 24 or in 2 equal split dressings at 24 and 50 days after sowing, or seeds were inoculated with Rhizobium. P had no significant effect on yield or nutrient composition. N and inoculation increased DM yield from 2.8 g/plant to 6.48 and 6.6 g, resp. Both treatments also significantly increased the number of pods/plant, seed yield/feddan and pod yield/feddan. N had no effect on seed P or K content but increased the N content from 4.78 to 5.82%. Rhizobium had a similar effect. (1 feddan = 0.42 ha). (CAB)

0089

* EL-LEBOUDI, A.; MAKSOUD, A.; MEETKESS, A.; MIDAN, A. 1974. Fertilization and chlorophyll-carbohydrate status in snap bean plants. Agricultural Research Review (Egypt) 52(5):109-115.

In trials during 2 years, snap bean (Phaseolus vulgaris) plants were given 0 or 100 kg $(NH_4)_2SO_4$, 0 or 100 kg K_2SO_4, and 0 or 200 kg superphosphate/ac, the N and P being applied 24 days after sowing and the P at 24 or as a split dose at 24 and 50 days after sowing. $MnSO_4$ was applied as single or split foliar treatments or as a seed treatment (12 h in 0.25% $MnSO_4$ solution). P, K, N and Mn treatments and inoculation with Rhizobium all increased chlorophyll and carbohydrate contents but these effects were significant only with the N and inoculation treatments; there were no interactions between P and any of the other treatments. (CAB)

0090

* EL-LEBOUDI, A.; MAKSOUD, A.; MIDAN, A.; MITKEES, A. 1974. Response of snap bean plants to fertilization with phosphorus, potassium and manganese. Agricultural Research Review (Egypt) 52(5):149-159.

The requirements of snap beans (Phaseolus vulgaris) for fertilizer K and Mn, with or without applied P, on clay loam alluvial soil were investigated. Treatments included 0 or 200 kg superphosphate/feddan as a single or 2 split doses, 0 or 100 kg K_2SO_4/feddan and $MnSO_4$ as a foliar spray or seed treatment. Plant DM and seed yields were significantly improved by K but not by the P or Mn treatments. (1 feddan = 0.42 ha). (CAB)

0091

EL-MAHDY, L.D.A. Studies on the effect of processing on persistance of some chlorinated hydrocarbons insecticides residue in vegetable and fruit crops. M.Sc. Thesis. Cairo, Ain-Shams University. Faculty of Agriculture. 126p.

0092

* EL NAHRY, F.I.; DARWISH, N.M.; THARWAT, S. 1977. Effect of preparation and cooking on the nutritive value of local kidney bean (Phaseolus vulgaris var. Giza 3). Qualitas Plantarum. Plant Foods for Human nutrition 27(2):141-150.

Nutritive value and protein quality of kidney bean before and after different methods of preparation and cooking were studied. Kidney bean seeds (var. Giza 3) were either boiled or soaked and then boiled. Moisture, crude protein, fat, carbohydrate, ash, fibre, caloric value and some minerals including calcium, phosphorus and iron were determined in both raw and prepared seeds. Evaluation of the protein quality was done by determining the protein efficiency ratio, net protein ratio and serum analysis of rats fed diets containing either raw or prepared seeds. The results showed that kidney bean is rich in carbohydrate and protein, a poor source of dietary calcium and a reasonably good source of dietary iron. Although seeds boiled without soaking contained higher percentages of minerals than those boiled after soaking, they were lower in protein quality. (RTI)

0093

EL-OKSH, L.L.; ARIF, L.H. 1980. Response of snap bean plants to cycocel under different water regimes. Cairo, Ain-Shams University. Faculty of Agriculture. Research Bulletin no. 1345. 11p.

0094

* EL-SHAARAWI, A.F.; MEGAHED, A. 1976. Some morphological and histological responses of Phaseolus vulgaris L. to chlormequat (CCC) and gibberellic acid (GA_3). Annals of Agricultural Science (Egypt) 6:259-274.

Seeds of P. vulgaris cv. Siminol sown on 28 April 1975 in pots were given NPK 2 weeks later. On the 16th day, 1 group of pots was sprayed with tap water (control); 4 groups were sprayed with 50 p.p.m. GA_3 and then with 3000 p.p.m. chlormequat at 1, 3 or 9 days later; 4 other groups were sprayed with 3000 p.p.m. chlormequat and then with 50 p.p.m. GA_3 at 1, 3 or 9 days later. Chlormequat retarded stem elongation, but the number of internodes was unaffected; stem diam. was increased. Transverse cell division was retarded while longitudinal division, particularly in the stelar cambium was stimulated, thus producing more conducting elements. Shoot wt. was unaffected. GA_3 increased stem length due to longer cell elongation in the internodes. Longitudinal division was retarded. Thus, plants were thinner and had weaker stems, though stem dry wt. increased slightly. The effects of GA_3 were not reversed by chlormequat application, but the effects of chlormequat on internode length were reversed by GA_3; all internodes responded when GA_3 was applied 1 or 3 days after chlormequat, but only the upper internodes responded when GA_3 was applied 9 days later. (CAB)

0095

* EL-SHARKAWY, A.M.; EL-SHAL, M.A.; ABDEL-RAZEK, A.H. 1980. Effect of plant population on growth, yield and quality of some bean cultivars (Phaseolus vulgaris L.). I. Vegetative growth and green yield. Alexandria Journal of Agricultural Research 28(3):197-208.

The two bean cultivars used, did not significantly differ in their plant

height, early yield, total yield and number of green pods per plant. The plant height was not significantly affected by the spacing or the number of plants per hill. However, either planting at wide spacings (22.5 and 30 cm) or leaving only one plant per hill caused a significant increase in the number of leaves, leaf area and fresh weight of vegetative growth per plant. The narrowest spacing (7.2 cm) or growing two plants per hill increased the early and total yield per feddan. On the contrary, the highest green yield per plant and the greatest number of green pods per plant were obtained by using wide spacings (22.5 and 30 cm) or by growing only one plant per hill. (AS)

0096

* EL-SHARKAWY, A.M.; EL-SHAL, M.A.; ABDEL-RAZEK, A.H. 1980. Effect of plant population on growth, yield and quality of some bean cultivars (Phaseolus vulgaris L.). III. Dry yield and its components. Alexandria Journal of Agricultural Research 28(3):209-218.

The results generally indicated that the two bean cultivars used did not differ in their dry seed yield, the average number of seeds per pod and the percentage of protein content of dry seeds. Giza 3 cultivar produced a higher number of pods per plant, while Contender gave a higher shelling percentage and a higher average weight of 100 seeds. The total seed yield per feddan increased by using the closest spacing (7.5 cm) or by growing two plants per hill, though the average seed yield per plant was reduced. The average number of seeds per pod and the average weight of 100 seeds were not significantly affected by spacing or the number of plants per hill. A higher number of dry pods per plant was obtained from the plants spaced at 30 cm or by growing only one plant per hill. (AS)

0097

EL-WARRAKI, A.G.; ZIDAN, Z.H.; EL-KALUBI, M.; GIBRIEL, A.Y. 1978. Effect of malathion and dimethoate insecticides on peroxidase and catalase of some vegetables and fruits. Annals of Agricultural Science (Egypt) 22(1): 31-37.

0098

ESKAROUS, J.K.; SOBHY, B.T. 1979. Effect of gamma radiation on hemagglutinins of newcastle disease virus and different cultivars of Vicia faba, Glycine max and Phaseolus vulgaris seeds. In Egyptian Phytopathology Congress, 3rd., Cairo, 1979. Proceedings. Cairo, Egyptian Phytopathology Society. pp.130-140.

0099

FADEL, F.; EL-KHADEM, M.; BADR, M.M. 1979. Effect of certain crops on white rot of onion. I. Effect on the disease incidence. Tanta Journal of Agricultural Research (Egypt) 5(2):95-101.

0100

FADL, F.A.M. 1983. Induced mutations for resistance to rust in beans and peas. Mutation Breeding Newsletter no.21:5.

The Phaseolus vulgaris varieties Giza 3 and Giza 4 and pea varieties Little Marvel and Lincoln were treated with gamma rays (8, 10 or 12 krad) or ethyl methanesulphonate (EMS) (0.5-1.5%). Plant resistant to Uromyces phaseoli (=U. appendiculatus) and U. pisi were selected in the M_2 and confirmed in the M_3 for all four varieties. The radiation treatment was more effective than EMS at producing resistant plants in peas and the EMS treatment was more effective in P. vulgaris. (CAB)

0101

* FATTAH, M.A.A.A.; NASSAR, S.H.; HANAFY, M.S.N. 1974. Evaluation of some

snap bean varieties. I. Growth, flowering and yielding ability. Agricultural Research Review (Egypt) 52(3):107-124.

The effect of 3 planting dates (Sept., Oct., Nov.) and 2 sowing methods (using one or both sides of the ridge) on 5 introduced french bean var., as well as the locally bred Giza 3, was studied from 1967-69. Detailed data on plant growth and flowering patterns are given for the 6 var. As for yielding ability, wt of green pods/plant decreased with delayed planting date. Giza 3 and Seminole yielded the heaviest green pods. Planting on both sides of the ridge gave highest yields. Specific recommendations are made for the best var. according to their agronomic characteristics. (CIAT)

0102

* FODA, H.A.; EL-GHOBASHY, A.S.; ABU-TABEIKH, A.T. 1973. Effect of kinetin, gibberellic acid and a combination of both on the endogenous hormones and inhibitors of Phaseolus vulgaris and Vigna sinensis plants. Egyptian Journal of Botany 16(1/3):171-190.

In glasshouse trials, treatment of P. vulgaris and V. sinensis (= V. unguiculata) with kinetin, GA_3 or kinetin + GA_3 increased the contents of endogenous auxins and gibberellins or gibberellin-like substances in the order: GA_3 more than kinetin + GA_3 more than kinetin more than untreated control. The treatments had no significant effect on the contents of growth inhibitors or endogenous kinetin-like substances in either species. (CAB)

0103

FODA, H.A.; EL-GHOBASHY, A.S.; ABU-TABEIKH, A.T. 1973. Effect of kinetin, gibberellic acid and a combination of both on growth, flowering and fruiting of Phaseolus vulgaris. Egyptian Journal of Botany 16(1/3): 191-203.

In glasshouse trials, treatment of P. vulgaris cv. Simonal with GA_3 or kinetin + GA_3 significantly increased shoot height, number of leaves/plant, leaf area and number of abscissed leaves, whereas kinetin had little effect on any of these characters. Kinetin significantly increased stem thickness and slightly increased branching, whereas GA_3 had no significant effect. GA_3 markedly increased root length, but significantly decreased the number of lateral roots; kinetin tended to have the opposite effect. GA_3 cauaed a marked increase and kinetin a slight increase in the fresh and dry weights of the shoots. Fresh and dry weights of roots were significantly increased by kinetin, whereas GA_3 with or without kinetin had little effect. Kinetin or kinetin + GA_3 induced earlier flowering, while GA_3 delayed it. Fruit characters were generally unaffected by the treatments. (CAB)

0104

* GABRIAL, G.N.; HUSSEIN, L.; MORCOS, S.R. 1974. Some nutritional studies on kidney bean proteins (Phaseolus vulgaris var. Giza 3). Qualitas Plantarum. Plant Foods for Human Nutrition 24(1-2):51-70.

Feeding experiments were carried out on weanling rats, which were fed diets containing 40% kidney bean as the sole protein source or in the presence of wheat or wheat and casein. Animals on 20% casein were the only group which grew up almost normally. Autoclaving of the beans improved the digestibility of the protein and gave a net protein utilization of 58. (AS)

0105

* GHONEIM, M.F.; EL-GHARABLY, G.S.; EL-GIBALY, M.H. 1975. The exudation of certain nutrients from snapbean roots under variable moisture and nutrient levels in the soil. Egyptian Journal of Soil Science. Special. 95-104.

Phaseolus vulgaris cv. Seminol plants were grown with half their roots in deionized water and the other half in silty soil with a m.c. of 30, 60, 75, 90 or 120% field capacity; 0, 7.5, 10, 15, 20, 30 or 45 p.p.m. P, 0, 0.5, 3, 4.5, 6, 9 or 12 mCi ^{32}P and 0, 1.5, 3, 6 or 9 mCi ^{59}Fe were added to the soil in each pot. The concn. of ^{32}P in the water after harvesting the beans increased with increasing m.c. and P levels in the soil and increased with time up to 20 days. The concn. of ^{59}Fe in the water increased with increasing m.c. up to 60-90% field capacity, and with increasing Fe supply and time. (CAB)

0106

* GIBRIEL, A.Y.; ASHMAWI, H.; SOLIMAN, S.A.; ABD-EL AL, A.T.H. 1976. Bacteriological flow sheets and identification of major spore-former contaminants in some Egyptian canned products. Annals of Agricultural Science (Egypt) 5:145-153.

Canned mango juice, guava juice and green beans were bacteriological examined. The anaerobic mesophilic counts/ml on orange agar medium was less than 10 for mango juice. The anaerobic count was 30/ml for guava juice. The anaerobic mesophilic and thermophilic counts were 1.2 x 10^3 and 1.1 x 10^3/ml respectively in preheated canned green beans. (AS)

0107

* GIBRIEL, A.Y.; ASHMAWI, H.; EL-SAHRIGI, A.F.; SOLIMAN, S.A. 1976. Determination of thermal process time of Egyptian canned foods. Annals of Agricultural Science (Egypt) 5:155-161.

The improved general method was used for calculating thermal process time for the canned products; orange juice, mango juice, guava juice, tomato concentrate, green beans, peas, okra, horse beans, and white beans. The holding times for canned green beans on the basis of B. megaterium and B. stearothermophilus resistances were 12.6 and 152 minutes respectively at 240°F. The holding times for other canned vegetables, peas, okra, horse beans, and white beans were 34, 47, 23 and 27 minutes respectively at 248°F. The holding times for canned, peas, okra, horse beans, and white beans were 45 minutes at 248°F. The holding time for canned green beans was 45 minutes at 240°F. (AS)

0108

* GOMAA, M.H. 1980. Morphological and physiological changes of some legume vegetable fruits during development. Egyptian Journal of Horticulture 7(1):71-78.

Two experiments were performed to study the developmental changes in fruits and seeds of asparagus bean and kidney bean. Five hundred flowers were labelled at anthesis every four days by interval to get fruit of 3, 7, 11, 15, 19 and 23 days old of cowpea and 5, 12, 16, 20, 24, 28, 32 and 36 days old of kidney bean. The morphological studies of fruits and seeds suggest that the favourable data for green picking lies between 11 and 15 days after anthesis of asparagus bean fruits and 20 to 24 days after anthesis for kidney bean fruits. Results of the physiological changes., i.e. fresh and dry weight of fruits and seeds and their different parts and viability of seeds, confirmed the findings of the morphological studies. (AS)

0109

HABIB, S.A.; EL-ATTA, O.K.; EL-HAMMADY, M. 1981. Interaction between bean common mosaic virus and bean yellow mosaic virus in relation to morphological character of bean plants. Cairo, Egypt, Ain-Shams University. Faculty of Agriculture. Research Bulletin no. 1606. pp.1-14.

Bean common mosaic virus (BCMV) and bean yellow mosaic virus (BYMV) either alone or together reduced the height of bean plants, the number of leaves, flowers, seeds and weight of seeds, and the chlorophyll and carotenoid contents. An antagonistic effect between the 2 viruses was detected. (AS)

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.

0111

* HAMMAD, S.M. 1978. Pests of legumes and their control in Egypt. In Singh, S.R.; Van Emden, H.F.; Ajibola Taylor, T., eds. Pests of grain legumes: ecology and control. New York, Academic Press. pp.135-137.

0112

HEIKAL, M.M.; AHMED, A.M.; ZIDAN, M.A. 1979. Some physiological responses of Phaseolus vulgaris to different levels of sodium chloride. Bulletin of the Faculty of Science (Egypt) 8(18):159-165.

0113

HUSSEIN, H.A.S. 1982. A mutation breeding programme for improving some grain legume crops in Egypt. In Research Co-ordination Meeting on the Use of Induced Mutations for Improvement of Grain Legumes Production in South East Asia, 2nd., Chiang Mai, Thailand, 1981. Proceedings. Vienna. FAO/IAEA Division of Isotope and Radiation Applications of Atomic Energy for Food and Agricultural Development. pp.19-27.

A mutation induction experiment using gamma rays and several chemical mutagens aims at mutants of Phaseolus vulgaria and Vicia faba with improved yield characteristics and resistance to pests. A number of promising mutants have been selected and are being examined in advanced generations. (AS)

0114

* HUSSEIN, H.A.S.; DISOUKI, I.A.M. 1976. Mutation breeding experiments in Phaseolus vulgaris (L.). I. EMS and gamma-ray-induced seed coat colour mutants. Zeitschrift für Pflanzenzüchtung 76:190-199.

Seeds of 5 bean var. were treated by different gamma ray doses or ethyl methanesulfonate concn. The mutagens effects on M_1 germination, survival and fertility are briefly reported. Varietal differences in mutagen sensitivity were found. A no. of seed coat color mutants were selected during the M_2-generation. Repeated simultaneous selection for characters of practical values within and between the mutants was practiced from M_3 and onwards. Nine new mutants with breeding value were continued through self-fertilization to the M_6. The 9 mutants were evaluated for yield and protein content during 2 successive generations (M_5 and M_6). Some of the mutants surpassed their parental lines in yield and protein. (AS)

0115

* KREAMAN, M.F.; ABDEL-GHAFFAR, A.S.; ELGABALY, M.M. 1970. [Inhibitory effect of bean seeds on rhizobia]. Agrokemia es Talajtan 19(4):546-558.

Laboratory tests were carried out on 15 strains of Rhizobium phaseoli and 7 strains of R. trifolii. Seeds or various preparations of seed extracts were added to Rhizobium cultures in a jar. It was shown that there were thermolabile and water-soluble, as well as thermostable and water-insoluble toxic compounds in Phaseolus vulgaris but not berseem seeds which inhibited the Rhizobium. Much or all of the toxic material was contained in the

seed-coat. There were significant bean x strain of Rhizobium interactions as regards degree of toxicity. Inoculation of seedlings at 8 or 18 days after sowing reduced the toxic effects. The results help to explain the unsatisfactory yield of P. vulgaris in Egypt and point to future possible solutions. (CAB)

0116

MANSOUR, M.A.; DIAB, M.A.; ABOU-EL-SEOUD, I.A.; ABD-EL-GALLEEL, A.E. 1981. Effect of naphthalene acetic acid, ethrel and maleic hydrazide on the total soluble carbohydrates and its individual sugars of Phaseolus vulgaris L. Cairo, Egypt, Ain-Shams University. Faculty of Agriculture. Research Bulletin no. 1490. 17p.

0117

MANSOUR, M.A.; DIAB, M.A.; ABOU-EL-SEOUD, I.A.; ABD-EL-GALLEEL, A.E. 1981. Nucleic acids and protein in snap bean plants effected by some growth regulators as foliar spray. Cairo, Egypt, Ain-Shams University. Faculty of Agriculture. Research Bulletin no. 1481. 16p.

0118

MANSOUR, M.A.; DIAB, M.A.; ABOU-EL-SEOUD, I.A.; ABD-EL-GALLEEL, A.E. 1981. The free amino acids of Phaseolus vulgaris [var. Giza 3] affected by some growth regulators as foliar spray. Cairo, Egypt, Ain-Shams University. Faculty of Agriculture. Research Bulletin no. 1482. 15p.

0119

METWALLY, S.M.I.; ABD EL-RAHIM, W.A.; ABD EL-RAHMAN, I.; DRAZ, K.A. 1979. Damage occurs to some leguminous crops by the green stink bug, Nezara viridula (L.) (Hemiptera, Pentatomidae). Tanta Journal of Agricultural Research (Egypt) 5(2):255-262.

0120

MIDAN, A.A.; EL-BAKRY, A.M.; OMRAN, A.F.; MALASH, N.M. 1980. Effects of phosphate, as localized or foliar applications, and nitrogenous fertilizers along with their interaction on snap bean plants. II. Intake rate and efficiency of utilization of phosphate and nitrogen. Monoufeia Journal of Agricultural Research 3:339-353.

P uptake by Phaseolus vulgaris cv. Giza 3 decreased gradually towards maturity and was increased by soil application of P_2O_5 but decreased by foliar applications. N uptake was lowest 50-60 days after sowing and was decreased by application of 100 kg N/feddan. P and N utilization efficiency decreased with plant age. P_2O_5 application increased P utilization efficiency but N fertilizer did not affect the N utilization efficiency. (CAB)

0121

MIDAN, A.A.; MALASH, N.M.; OMRAN, A.F.; EL-BAKRY, A.M. 1980. Effects of phosphate, as localized or foliar applications, and nitrogenous fertilizers along with their interaction on snap bean plants. III. Yield and yield components. Monoufeia Journal of Agricultural Research 3:355-368.

Soil application of P_2O_5 had no effect on seed yield or yield components of Phaseolus vulgaris cv. Giza 3. Foliar application increased seed yields in 1979 from 464.00 to 580.17 kg/feddan with 1% P_2O_5. Application of 100 kg ammonium sulphate/feddan increased yields from 474 to 652 and from 484.33 to 592.33 kg/feddan in 1978 and 1979, resp. There was no significant interaction between the fertilizers. 100-seed wt. was only increased by N fertilizer. (1 feddan = 0.42 ha). (CAB)

0122

MOHAMED, A.H.; ALI, A.M.; DESOUKI, I.A. 1979. Characteristics of the F2 and F3 hybrid progenies derived from intergeneric hybridization between cowpea and French bean. Cairo, Egypt, Ain-Shams University. Faculty of Agriculture. Research Bulletin no. 1057. 16p.

0123

* MOHAMED, H.A.; ABDELAL, H.R.; SHATTA, H.A.; FADL, F.A.; NAGI, I. 1983. Chemical control of kidney bean rust. Cairo, Egypt, Al-Azhar University. Faculty of Agriculture. Al-Azhar Agricultural Research Bulletin no.75. 8p.

Six fungicides were tested to determine their effect on germination of uredospores of Uromyces phaseoli and rust severity, and on bean yield under field conditions at Kafr El-Zayat, Egypt. Oxycarboxin, triforine, and benomyl inhibited uredospore germination at 100 ppm while thiophanate-methyl inhibited uredospore germination at 1000 ppm. Carbendazim and elemental S did not inhibit germination even at the highest concn. (1000 ppm). The most effective fungicides in decreasing % of infection were oxycarboxin, triforine, and benomyl followed by thiophanate-methyl and elemental S. Carbendazim was the least effective in controlling rust. All fungicides significantly increased seed production. Highest seed yield was obtained when oxycarboxin, triforine, and benomyl were sprayed followed by thiophanate-methyl, elemental S, and carbendazim which gave the lowest yield in the sprayed plots. (AS)

0124

MOURSI, M.A.; NOUR-EL-DIN, N.A.; SHARABASH, M.T.M.; EL-BAKRY, A.M.I. 1980. Effect of gamma rays on snap bean plant. Cairo, Egypt, Ain-Shams University. Faculty of Agriculture. Research Bulletin no. 1392. 19p.

0125

* MOURSI, M.H.; NOUR-EL-DIN, N.A.; MANSOUR, M.A. 1975. Flowering and fruit set of bean (Phaseolus vulgaris L.) as influenced by ammonium sulphate and calcium superphosphate. Egyptian Journal of Horticulture 2(1):23-37.

In field trials in Egypt, the effects of 0, 100 or 200 kg calcium superphosphate (15% P_2O_5) and 0 or 100 kg ammonium sulphate (20.5% N)/feddan on P. vulgaris were examined. Ammonium sulphate had no marked effect on the time of flowering, the percentage of fruit set or the total number or percentage of abscised flowers. It also decreased the percentage of fruit abscission and increased the total number of flowers and fruits/plant, the yields of pods and seeds, the number of seeds/pod length and the pod diam. Calcium superphosphate accelerated flowering, increased flowering capacity, increased the percentage of fruit set, increased the total number of abscised flowers and fruits/plant, but decreased the percentage abscission of both flowers and fruits. Calcium superphosphate also increased the yields of seeds and pods and the number of seeds/pod. Ammonium sulphate and calcium superphosphate both acted independently on the various characteristics of bean plants. (1 feddan = 0.42 ha). (CAB)

0126

* NADI, M.A.E.; HAMDI, Y.A.; LOFTI, 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.

In pot trials, seeds of 9 cultivars of Phaseolus vulgaris were inoculated with R. phaseoli strains D-400, 402, 403, 404 or 405 at sowing and grown in sterile silt soil for 50 days. Numbers of nodules/5 plants ranged from 0 to 22.3 for cv. Resistant Tender Green + 405, 22.6 for Contender + 402 and 33.0 for Regalfin + D-400. Average numbers of nodules/5 plants were 7.8,

1.7, 4.4, 13.9 and 17.0 for 402, 403, 404, 405 and D-400, respectively, and ranged from 1.4 for Seminole to 12.7 for Regalfin and 13.7 for Contender. Average DM yields/5 plants were similar for all strains. Regalfin gave the highest yield, followed by Seminole, Resistant Tender and Tender Long. (CAB)

0127

* NASSAR, S.; HAMDI, Y.A.; EL-NADY, M.A.; LOFTI, M.; FARIS, F.S. 1972. Nodulation failure of Phaseolus vulgaris in the vegetable-cropped soils of Egypt. Agricultural Research Review (Egypt) 50(2):95-101.

In a pot trial, seeds of Phaseolus vulgaris cv. Seminol were sown in sterilized or non-sterilized Nile silt (pH 7.8), sand (pH 5.3) or soil cropped with vegetables for 15 years (pH 8.3). Seeds were either left untreated or were inoculated at sowing or 7 days after germination with a mixture of Rhizobium phaseoli strains 404, 405 and D-400. Plants were grown for 50 days. Mean numbers of nodules/plant in sterilized and non-sterilized soils were 6.3 and 4.9 for silt, 9.4 and 8.6 for sand, and 0.6 and 0.09 for vegetable soil. The corresponding yields of DM/plant (units not stated) were 1.24 and 1.06, 1.35 and 1.54 and 1.39 and 0.98, respectively. Non-inoculated plants contained less N than inoculated plants, and plants grown in sterile soil contained more N than those grown in non-sterile soil. (CAB)

0128

* NASSAR, S.H.; ABDEL FATTAH, M.A.A.; HANAFY, M.S.N. 1974. Evaluation of some snap bean varieties. B. Morphological and chemical characters of the pod. Agricultural Research Review (Egypt) 52(3):125-139.

Field trials were conducted to study the effects of 3 planting dates (Sept. 1, Oct. 1, and Nov. 1) and 2 planting methods (planting on one or both sides of the ridge) on 3 French, 2 American and 1 local variety. Effects of the treatments on the morphological characters and chemical composition of the pods are discussed. (RTI)

0129

* OMAR, R.A.; EL-KHADEM, M.; DIEF, A.A. 1978. Studies on a seed-borne bean common mosaic virus. I. Identification of the virus. Egyptian Journal of Phytopathology 10(1):3-48.

Host range of BCMV was restricted to leguminous host, namely Phaseolus vulgaris L. (varieties Suisse, Giza 3, Mont Calm, Kentucky Wonder and Stringless Refugee), Vicia faba, and Vigna sineases. It induced mild mosaic on Giza 3, while severe mosaic, vein banding and leaf deformation were noticed on Suisse Blanc. Symptoms obtained here are identical to those induced by BCMV described by other workers. The virus was inactivated by heating at 57-58° for 10 min and dilution up to 1:1000. The virus lost its infectivity in vitro at room temperature (24°) after 48 hr. The virus was transmitted by infectious sap, by Myzus persicae Sulz, and by bean seeds. Pollen grains of infected bean plants played an important role in virus transmission to new borne seeds. Electron microscopy of leaf extracts and pollen grains of bean plants, infected with the virus showed the presence filiform virus particles measure 750 micromoles. These particles were absent in extracts of healthy bean plants. (AS)

0130

* OMAR, R.A.; EL-KHADEM, M.; DIEF, A.A. 1978. Studies on a seed-borne bean common mosaic virus. II. Prevalence and factors affecting seed transmission. Egyptian Journal of Phytopathology 10(1):49-62.

BCMV was present in the different parts of flowers sepals, petals, stamens, and pistils. Pistils of the infected bean plants contained the highest virus infectivity was detected in pod components, i.e. and embryo of immature seeds but not in the cotyledons. The virus disappeared in seed coats of mature dried seeds. Neither pod position on bean plant nor position of seeds in pod had a significant influence on virus transmission through seeds. Seed transmission of BCMV was influenced by the stage of growth at which the plant was infected. Plants infected with the virus at an early stage produced up to 57% of their seeds carrying virus. Seed transmission of BCMV was also influenced by bean variety. Seeds of different bean varieties differed in their ability to transmit the virus. A correlation was found between imbibition of seed-coat and virus transmission through seeds. Our results indicated that quick swelling seeds of bean contained a considerable percentage of virus carrying seeds. Small and deformed bean seeds were found to transmit the virus in a relatively high percentage. (AS)

0131

* OMAR, R.A.; EL-KHADEM, M.; DIEF, A.A. 1978. Studies on a seed-borne bean common mosaic virus. III. Effect of the virus on yield, biological and chemical characters of bean seeds. Egyptian Journal of Phytopathology 10(1):63-70.

Infection with bean common mosaic virus reduced the yield of bean seed by 24%. The virus had no influence on seed germinability, while specific weight and seed index of bean significantly reduced as a result of infection with BCMV. No significant differences were recorded in mineral constituents (NPK) of bean seeds as a result of infection with BCMV. (AS)

0132

OMAR, S.M.A. 1977. Effect of GA3 on the major biochemical compounds of Phaseolus. M.Sc. Thesis. Cairo, Ain-Shams University. Faculty of Agriculture. 110p.

0133

RAAFAT, A.; ABDEL-HALIM, M.A.; AMER, M.A.; EL-HADIDY, M.F. 1977. Growth and physiological responses of (French) bean plants to some herbicides, insecticides and their combination. Annals of Agricultural Science (Egypt) 20(2):141-150.

Pentanochlor slightly reduced the germination of bean seeds and diphenamid reduced the plant height and the dry wt. of the shoots. Diphenamid decreased the N content along with an increase in leaf respiration. Trifluralin reduced the total N content and increased oxygen consumption whereas EPTC increased both total N content and oxygen consumption. EPTC and pentanochlor slightly reduced the chlorophyll a and b and carotenoid contents. The insecticide disyston counteracted the suppressive effect of pentanochlor or EPTC on pigment content. (CAB)

0134

* RIZK, S.G.; HAMOUDA, F.M.; GOBRIAL, W.M.; HARCUN, A.F.T.; LOTFI, M. 1978. Some factors affecting dry weight and nitrogen content of bean. Agricultural Research Review (Egypt) 56(5):199-205.

Greenhouse pot experiments were carried out on bean to study the effect on the dry weight and nitrogen content of the plants through treating the seeds by pre-soaking in water, mixing with charcoal and use of various rhizobial strains in unsterilised and pre-sterilised Nile silt soil. The results obtained point to that the highest dry weight of plants and nitrogen content can be achieved through planting of bean under the normal conditions i.e. in unsterilised soil and inoculating the seeds with the

foreign rhizobial strain no. 404 and the exclusion of soaking process and addition of charcoal as a means of depressing the harmful effect of seed coat diffusate on the rhizobial population. (AS)

0135

SAEID, N.A.; EL-SAID, F.M. 1981. Price analysis studies on some vegetable crops. Cairo, Egypt, Ain-Shams University. Faculty of Agriculture. Research Bulletin no. 1494. 16p.

0136

SALEH, H.H.; FODA, S.A. 1980. Effect of herbicide plus fertilization on productivity of beans (Phaseolus vulgaris). Agricultural Research Review (Egypt) 58(3):89-110.

0137

* SIRRY, A.R.; HIGAZY, M.F.H.; FARAHAT, A.A. 1974. Effect of fertilizers on the incidence of root-rot diseases of Phaseolus vulgaris L. caused by Rhizoctonia solani Kuhn. Agricultural Research Review (Egypt) 52(2): 31-36.

Pot and field trials showed that application of 250 kg ammonium sulphate per ha in combination with 500 kg superphosphate per ha significantly reduced the incidence of root-rot fungus disease infecting the bean var. Swiss Blanc. Application of 35 m^3 organic manure per ha also reduced the incidence of the disease. (RTI)

0138

* SIRRY, A.R.; HIGAZY, M.F.H.; FARAHAT, A.A. 1974. Fungicidal seed-dressing of Phaseolus vulgaris L. in relation to Rhizoctonia root-rot and the plant growth. Agricultural Research Review (Egypt) 52(2):37-46.

In pot experiments, seed of P. vulgaris which were either left untreated or treated with 12 different fungicidal seed dressings were sown in soil infested with R. solani. All seed dressings increased fresh matter and DM yields of plants compared with the untreated control (0.7 g DM/plant), and the highest yields (2.7-2.8 g DM/plant) were obtained with seed dressings of 0.3% Spergon [chloranil], 0.3% Phytonnaget or 0.3% Demosan [chloroneb]. Only quinolate resulted in a significant increase in the DM content of plants. (CAB)

0139

* TAHA, A.H.Y.; YOUSIF, G.M.; OTEIFA, B.A. 1977. Strategies of nematode control management in newly reclaimed irrigated lands of Egypt. II. Relative susceptibility of common bean varieties and their nodules to root-knot nematodes. Journal of the Association for the Advancement of Agricultural Sciences in Africa (Ethiopia) 4(2):1-8.

Common bean varieties and their nodules were infected with more than one species of Meloidogyne, but their reactions differed quantitatively and qualitatively. Tendergreen variety (tolerant) supported the highest nematode population and produced the highest yield. Conversely, Contender variety (relatively resistant), which had the lowest nematode population as that of Monte Calme (susceptible), produced the same yield as that of Tendergreen. Monte Calme produced the lowest yield. Seminole and Giza 3 varieties occupied the intermediate status. Meloidogyne infection drastically reduced the number of nodules of all common bean varieties. Histologically, giant cells developed in vascular bundles and with a proliferation of the cortical cells resulting in hypertrophy and hyperplasia of the nodular cortex. (AS)

0140

TAHA, E.M.; KHALAF, S.M. 1981. Studies on production of some vegetable crops in Sina. Cairo, Egypt, Ain-Shams University. Faculty of Agriculture. Research Bulletin no. 1474. 13p.

0141

TOHAMY, M.R.A. 1977. Studies on bacterial blight of bean. M.Sc. Thesis. Egypt, Zagazig University. Faculty of Agriculture. 175p.

0142

WAHDAN, H.A. 1981. Physioanatomical studies on the effect of some growth regulators on growth and differentiation in some seedlings in Egypt. Ph.D. Thesis. Shebin-El-Kom, Menoufia University. Faculty of Agriculture. 230p.

0143

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

0144

* YOUSSEF, Y.A.; MANKARIOS, A.T.; SHADI, M.R.A. 1975. Root exudates from Phaseolus vulgaris and their effects on spore germination and growth of Fusarium solani (Mart.) Sacc. Journal of the Indian Botanical Society 54(1/2):26-34.

Data are given on amounts of glucose, fructose, sucrose, galactose, gluconate, oxalate, citrate, malonate, 18 amino acids and 13 categories of lipids in root exudates of kidney bean cv. Giza 3, Monte Geo and Kontender. Exudates of Giza 3 contained no proline, those of Kontender no oxalate, and those of Monte Geo no malonate, oxalate or proline. Exudates of Giza 3 contained relatively high amounts of phospholipids and free fatty acids. (CAB)

0145

* YOUSSEF, Y.A.; MANKARIOS, A.T. 1975. Tissue degrading enzymes in Fusarium root rot of kidney bean. Egyptian Journal of Phytopathology 7:33-38.

Activities of tissue degrading enzymes (pectic, cellulolytic, and protease) of Fusarium solani (Mart.) Sacc. isolated from diseased Kidney bean roots were studied by means of the "cupplate" diffusion assay method. The fungus was cultivated on a Czapek-Dox liquid medium with varying nitrogen sources or on Czapek-Dox supplemented or not with root exudates or root extracts of one of three susceptible Kidney bean varieties. Fungal culture filtrates were used as sources of the enzymes mentioned above. However, marked differences, were observed in the rate of enzyme production. The incorporation into the medium of root exudates or roots extracts resulted in activating enzyme production. Activation was more pronounced in media supplemented with root extracts than in media with root exudates. (AS)

ETHIOPIA

0146

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

A total of 177 haricot bean lines were assessed at Melkasa, Ethiopia, for their resistance to the bean fly (Ophiomyia phaseoli) and the African bollworm (Heliothis armigera). Eighty-two lines did not show symptoms of bean fly attack. The highest no. of symptoms were observed in Negro 150, Guerrero 9, Veracruz-10, Bountiful No. 181, CCG-B44 (P420), B-7515-1 (81), and Red Lands Autumn Crop. Lines 14, 62, 69, 107, and 118 did not present bean fly attack symptoms nor pupal populations. Line BAT 338-IC was the only line that showed no symptoms of bean fly attack, nor pupae, nor damage caused by the African bollworm. Tables are included on the degree of resistance of the tested lines to both pests, indicating % of infestation, no. of pupae/20 plants, and % pod damage by H. armigera. (CIAT)

0147

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

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

0148

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

An expt. was conducted to compare the attractiveness of 5 possible trap crops and a check to the African bollworm (Heliothis armigera) at the Nazret Research Station of the Institute of Agricultural Research (Ethiopia) in the 1982/83 station. Treatments used were haricot bean (check), Lablab purpureus (Dolichos lablab), lupin maize, pigeon pea, and sunflower. Planting arrangement consisted of 2 rows of each trap crop planted on either side of each plot of the main crop (haricot bean). The expt. was replicated 5 times in a randomized complete block design with 25 x 25 m plots. Adjustments were made on planting dates so that the trap crops would flower at about the same time as the main crop. Samples of H.

armigera eggs and larvae were taken from randomly selected five 1-m rows for each treatment and then on the haricot bean rows adjacent to and 5 and 10 m away from the trap crop at weekly intervals for 7 wk., starting from early flowering. The % of pod damage in haricot bean was calculated by counting the no. of damaged pods in 20 randomly selected plants from the haricot bean rows adjacent to and 5 and 10 m away from the trap crop. Yields were recorded. All trap crops caught more African bollworms than the check. However, lupin, pigeon pea, and L. purpureus resulted in significantly greater catches of H. armigera than the check and sunflower. There was no significant difference between the no. of catches on the sunflower and the check and there was no statistical difference between any of the treatments on haricot bean rows adjacent to the trap crop. At the shortest distance from the trap crop, maize, sunflower, L. purpureus, and lupin (in that order), resulted in statistically lower % pod damage than pigeon pea, which was slightly worse than the check. The highest yield was obtained with maize as trap crop; however, none of the yield means were significant. (CIAT)

0149

* ABATE, T. 1982. Arthropod pests of grain legumes in Ethiopia. Their importance and distribution. Addis Abeba, Ethiopia, Institute of Agricultural Research. 56p.

Most of the grain legumes, especially the so called "lowland pulses", are of recent introduction to Ethiopia and a comprehensive work on the arthropod pest complex of this group of crops was lacking. The results of surveys carried out over the last three years in many of grain legume producing regions of the country are reported. The survey revealed nearly 120 arthropod species, 14 of which are implicated in the transmission of viruses or virus-like diseases elsewhere. Extensive literature surveys were made on as many as possible of the pests observed during the survey. References were made to aid future work on the management of the pests mentioned here. (AS)

0150

* ABATE, T.; NEGASI, A. 1981. Chemical control of American bollworm (Hubner) with ultra low-volume sprays. Ethiopian Journal of Agricultural Science 3(1):49-55.

Experiments consisting of Ultra-Low-Volume (ULV) formulations of endosulfan (500 & 750 g active ingredient (a.i.)/ha), cypermethrin (150 g a.i./ha), fenitrothion (960 g a.i./ha), Selecron 250 ULVAIR (750 g a.i./ha) and an untreated check were conducted for two consecutive years against Heliothis armigera on haricot beans at the Awassa and Nazareth Experiment Stations of the Institute of Agricultural Research (IAR), Ethiopia. The treatments were replicated five times in a randomized complete block design on 20 m by 20 m plots. Of the insecticides used, single application of cypermethrin gave a more consistent and significant control than the check in both seasons at both stations. A new product, Cypermethrin/Profenofos 166^{R}, substituted for fenitrothion at Nazareth in the 1980 season gave promising results to warrant further testing. Endosulfan, a recommended insecticide against American Bollworm in the past, was not as satisfactory as cypermethrin in the control of American Bollworm on haricot beans. (AS)

0151

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

0152

AMARE RETTA 1976. Water requirements of crops in the middle Awash Valley. Ethiopia, Institute of Agricultural Research. Annual Research Seminar. Proceedings no.6. pp.265-286.

0153

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

0154

CHILALO AGRICULTURAL DEVELOPMENT UNIT. 1974. Report on surveys and experiments carried out in 1973. Ethiopia. Publication no. 103. 230p.

Results of agronomic and cultivar trials at several sites, with wheat, barley, maize, sorghum, teff, Phaseolus vulgaris, Vicia faba, peas, soyabeans, lentils, chickpeas, Phaseolus lunatus, oilseed flax, oilseed rape, safflower, castor and potatoes are reported. (CAB)

0155

* GOLATO, C.; MEOSSI, E. 1972. Una grave infezione fogliare del fagliolo (Phaseolus vulgaris L., Papilionaceae) in Ethiopia. Rivista di Agricoltura Subtropicale e Tropicale 66(4-9):135-138.

A serious fungal disease of bean leaves in the region of Caffa and the Awash Valley, Ethiopia, is described. Based on symptomatology and morphological characteristics, the pathogen was identified as Cercospora columnaris Ellis & Everhart. (CIAT)

0156

IMRU ASEFA 1980. "Lowland" pulses: An introduction. Ethiopian Grain Review 6(1):16-22.

0157

* JACKSON, T. 1972? Report on progress of experiments on-bean growing in Awash Valley of Ethiopia. Ethiopia. 14p.

Objectives, exptl. design, plot size, treatments, and field operations carried out during the following expt. on bean in Ethiopia are given: effect of planting date and plant population on weed population and yield; fertilizer trials with N, P, K, S, and their combination; determination of optimum irrigation interval; seedbed preparation under irrigation. Selection work and haricot seed production are also discussed. Studies included Rhizobium inoculation of different pulse species. Regarding crop protection, testing was carried out for resistance to Uromyces phaseoli and BCMV. Soil treatments to control Meloidogyne spp., Sclerotium rolfsii, and Macrophomina phaseoli are described. (CIAT)

0158

* OHLANDER, L.J.R. 1980. Research on haricot bean (Phaseolus vulgaris L.) production in Ethiopia 1972-1976. Uppsala, Sweden, Swedish University of Agricultural Sciences. Department of Plant Husbandry. Report no. 82. 288p.

Research on haricot (Phaseolus vulgaris) in Ethiopia from 1972-76 is summarized. In field trials, yields 3 times the present av. agronomic yield of 0.7 t/ha were obtained using suitable cv. and cultural practices. The doubling of agronomic yield by modifying traditional technology was envisaged. Variation in disease resistance and disease attack were responsible for the differences in yield shown by the cv. tested. Variation in rainfall affected yield in arid areas. The reduction of runoff by soil management to improve soil infiltration is suggested. A suitable environment for growing

P. vulgaris was 1400-2000 m alt.; av. max. temp. 30-32°C; av. min. temp. 10-12°C; and 350-500 mm rainfall in the 1st 70-100 days of growth, followed by dry weather. Hand weeding 25-35 days after sowing was usually sufficient. The application of 40-70 kg P_2O_5 and 20 kg N/ha in the humid areas was adequate. Rhizobium inoculation gave no positive effects unless Phaseolus beans had not been grown in the soil previously. The optimum crop density was 300,000 plants/ha. Harvesting was successful after 70% of the pods had yellowed until 10 days after all the seeds had hardened. The no. of hard-shelled beans which did not readily imbibe water was increased by early harvesting. Early sowing of P. vulgaris in the main rainy season gave the highest yield. (CAB)

0159

* OHLANDER, L.J.R. 1977. Pulses in Ethiopia: agricultural importance and research results. Tropical Grain Legumes Bulletin 8:53-66.

Pulse crops are grown on 13-15% of the cropped area, which is estimated in about 800,000 ha. Five species dominate among pulse crops: chick pea, horse bean, field pea, lentil, and haricot bean. Of these, haricot beans have been grown mostly for export. In total, at least 19 pulses are grown in Ethiopia. Data are presented on number of holdings reporting cropping, area under crop, quantity of pulses exported as well as information on cultivation methods, status of pulse research, consumer preference and research results. Some of the constraints to greater production include lack of adequate transport facilities, land tenure system, fluctuation in export prices, extension services, and poor cultural practices. Future research areas for haricot bean include training of research staff, a small breeding program mainly to improve yield, disease resistance, seed quality, and cooperation with CIAT. Yield data are included haricot bean varieties Ethiopia 10, Tengeru 16, Mexican 142, and Black Dessie. (CIAT)

0160

* ROUANET, G. 1972. Avantages et inconvenients de l'utilisation d'un herbicide prelevee (metobromuron) dans la culture du haricot a Awassa (Ethiopie). Agronomie Tropicale 27(2):239-248.

Proliferation of weeds is a particular problem in Phaseolus vulgaris crops in this region of S. Ethiopia. A crop of cv. Canallini grown in the wet season of 1967 and given 3, 4 or 5 kg metobromuron/ha yielded 0.87, 0.82 and 0.89 t dry beans/ha compared with 0.49 t/ha for the unweeded control. In an experiment in the dry season, 1.25 kg metobromuron/ha caused slight phytotoxicity and higher rates killed some plants; the crop was destroyed by frost, a recurrent risk in this area, and it was found possible to resow the sprayed areas without further tillage. In a varietal trial, the Michigan-type cv. MPBT showed 50% survival with 1.25 kg metobromuron/ha and 5% survival with 2.5 kg; plants of cv. Canallini, SATINP and HLN all survived the high rate of herbicide but with slight yellowing of the first leaves. In the wet season of 1969, cv. SATINP yielded 1.03 t/ha unweeded, 1.1 t/ha when hand-weeded once, 1.25 t/ha when hoed once, and 1.44 and 1.61 t/ha with 1 and 2 kg metobromuron/ha. (CAB)

0161

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

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

var., yields obtained in planting date trials and in 2 chemical weed control trials are given. (CIAT)

0162

* VERHAY, E.W.M. 1973. A herbicide trial in green beans Ethiopia, Horticultural Project H.V.A. Research Report no.6. 4p.

Treflan and Planevin incorporated before sowing, and Preforan, Patoran, Tribunil and Aresin Combi, applied before germination, were tried on sprite and on 3 other varieties in comparison with handweed controls. Treflan, Planevin, Preforan and Patoran all checked weed growth appreciably, although most plots badly needed a weeding by the time the trial was completed (approx. 70 days after treatment). Differences among these products and between varying application rates of each product were rather erratic presumably due to an unfavourable grouping of the replications. Weed control by Tribunil and Aresin Combi was inadequate. None of the products caused clear symptoms of crop damage on any of the 4 cv. Yields were in the order of 10 ton/ha; the control lagged behind with a yield of 8.5 ton/ha, suggesting that the single handweeding had come too late to saveguard yield. As the results of one timely handweeding could have been equally good as those of the best herbicides, it is concluded that for the time being chemical weed control is uneconomical. (AS)

0163

* WESTPHAL, E. 1974. Phaseolus vulgaris L. In _____. Pulses in Ethiopia, their taxonomy and agricultural significance. Wageningen, Centre for Agricultural Publishing and Documentation. Agricultural Research Reports 815. pp.159-176.

GHANA

0164

* DANSO, S.K.A. 1977. The ecology of Rhizobium and recent advances in the study of the ecology of Rhizobium. In Ayanaba, A.; Part, P.J., eds. Biological nitrogen fixation in farming systems of the tropics. New York, Wiley. pp.115-125.

Low pH and high soil temperatures are unfavourable for the persistence and growth of rhizobia in soil. Drought does not significantly alter the decline of Rhizobium population in soil, unless the soil had a very low colloidal content. Competition for nutrients is suggested to be relatively unimportant in the saprophytic existence of the root-nodule bacteria in their natural habitat. Rhizobium survives better in sterile than in non-sterile soil, suggesting that biological agents are responsible for the fall in numbers of rhizobia. Bdellovibrio strains have been isolated which are capable of killing large numbers of cells of the root-nodule microsymbiont. However, many cells remain alive despite the presence of the parasite. Although evidence has shown that protozoa are responsible for the initial decline in the abundance of rhizobia in soil, many cells survived their attack. (AS)

0165

DOKU, E.V. 1976. Grain legume production in Ghana. In Doku, E.V., ed. Symposium on Grain Legumes in Ghana, Legon, Ghana. 1976. Proceedings. Legon, University of Ghana. pp.1-6.

Cowpea is the most widely grown grain legume in Ghana, followed by groundnut, Bambara groundnut (Voandzeia subterranea) and Lima beans. Cowpea is subject to severe insect attack and av. seed yields are 300-500 kg/ha. Where insecticides have been applied, yields have been increased 3-fold. V. subterranea is traditionally grown in areas of less than 30 in. rainfall, either intercropped with cereals or yam, or as a pure stand. The local cv. used show little response to N application and yield 2.0 t seed/ha when sown at 60 x 15 cm. Lima bean is grown in areas of high rainfall, usually as an intercrop; perennial forest types have a protracted fruiting period. Other potentially useful legumes include Kerstingiella geocarpa, Phaseolus vulgaris and winged bean (Psophocarpus tetragonolobus). (CAB)

0166

* ENYI, B.A.C. 1975. Effect of plant population on grain yield, production and distribution of dry matter in beans (Phaseolus vulgaris). Ghana Journal of Science 15(2):159-169.

The influence of varying plant densities on growth and yield of beans var. Canadian Wonder was investigated during the 1972 growing season. Total crop DM and LAI increased with increase in plant density. Grain yield/ha at final harvest increased by about 27, 50 and 48%, respectively, and pod no./ha increased by about 24, 57 and 99%, respectively, when plant population was increased from 74,000 to 111,000; 222,000; and 444,000 plants/ha. The ratio of stem to pod wt. at final harvest decreased with increasing plant density. Mean CGR increased with increasing plant density but NAR and RGR decreased with increasing plant density. The quantity of light intercepted increased with the increase in LAI and NAR decreased with the increase in the amount of light intercepted by the upper leaves. HI was higher at low than at high plant densities. (AS)

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.

0168

* BEANS. 1962. Kenya, Kenya Government Extension Note. 1p.

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

0169

BREUKELEN, E.W.M. VAN 1979. Latent period as a tool for selecting bean varieties with partial resistance to bean rust.
Paper presented at the Symposium on Grain Legume Improvement in East Africa. Kenya, University of Nairobi, 1979. 1p.

0170

* BROMFIELD, A.R.; HANCOCK, I.R.; DEBENHAM, D.F.; 1980. Soil and crop sulphur relationships in Kenya. I. The effect of gypsum and elemental-S given to beans (Phaseolus vulgaris) grown after natural vegetation and pastures in western Kenya, on yield, percentage S and the recovery of S from the fertilisers. In Kenya. Ministry of Agriculture. Soil and crop sulphur research project (R.3375); published papers December 1974-March 1980. Kenya, Agriculture Research Department. pp.1-15.

Fertilizer trials at eleven sites using gypsum and elemental-S as S sources and beans as test crop, gave dry matter responses at three sites in the first harvest but none in the second. Seed yield ranged from 1,327 to 3,028 (mean 2,245) kg/ha in the first and from 503 to 2,261 (mean 1,345) kg/ha in the second harvest. Concentration of S in seed was increased at the most deficient sites. Pod and haulm S concentration was increased more frequently at the second harvest than the first. Apparent fertilizer-S recovery ranged from 0.8 to 2.1 kg S/ha for individual sites and harvests; there were no differences between the two S sources. Sites carrying natural vegetation and old pastures which had not previously received fertilizer-S were the most S deficient. (AS)

0171

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

Maize and beans grown at eight sites in western Kenya were given 20 kg/ha radio-active elemental-S and gypsum as S sources. Bean yields were not affected by the sources except at one site where gypsum depressed yield. Maize grain yield was increased by elemental-S at one site and stover

increased by both sources at a second. At a third site both sources reduced stover yield. At maize thinning every plant sampled was radioactive and true recovery from gypsum was superior to that from elemental-S. At final harvest five of the eight maize crops and all the bean crops for both harvests contained more S from gypsum than from elemental-S. True recovery of S ranged from 0.2 to 2.8 for maize and 0.08 to 2.1 kg S/ha for beans. Apparent recoveries ranged from 2.2 to 8.1 for maize and 0.08 to 2.2 kg S/ha for beans. After allowance for atmospheric-S but not leaching losses the S deficit for maize given no fertilizer-S was 9-12 kg S/ha annually at the best sites. (AS)

0172

BURGWIN, W.A. 1969. A spacing and fertilizer trial with Mexico 142 beans. Kenya Sisal Board Bulletin 69:22-23.

This trial has indicated that both higher plant density and the use of fertilizers could increase the yield and profitability of the Phaseolus vulgaris var. Mexico 142 on red loam soils in Kenya. The following treatments were included: (1) spacing of 10 x 70 cm, which is the commonly practised spacing, with no fertilizer; (2) spacing of 10 x 70 cm with P applied at planting and top-dressed with N; (3) spacing of 10 x 30 cm with no fertilizer; and (4) spacing of 10 x 30 cm with P applied at planting and top-dressed with N. Both P and N were applied at the rate of 100 kg/ha. (RTI)

0173

BURUCHARA, R.A.; GATHURU, E.M. 1979. Preliminary information on a severe strain of Common bean mosaic virus isolated in beans (Phaseolus vulgaris L.) in Kenya.
Paper presented at the Symposium on Grain Legume Improvement in East Africa. Kenya, University of Nairobi, 1979. 2p.

0174

* COMBES, R.G. 1983. Why are GLP seeds not planted more often? Kenya Farmer. August 1983 (Special issue: Food beans in Kenya). p.27.

0175

* DOUTHWAITE, R.J. 1978. Some effects of weather and moonlight-trap catches of the armyworm, Spodoptera exempta (Walker) (Lepidoptera:Noctuidae), at Muguga, Kenya. Bulletin of Entomological Research 68:533-542.

The effects of wind speed, wind direction, strong moonlight and rainfall on hourly light-trap catches of adult Spodoptera exempta (Wlk.) made at Muguga, Kenya, between Jan. and June in 1970-71 were investigated. The highest catches occurred in winds of 2-3 m/s, but generally fewer moths were caught as wind speed increased. In totally dark hours the geometric mean catch at wind speeds of 5-6 m/s was about 1/10 that at 0-1 m/s. The relationship between catch and wind speed changed between Jan. and June. Wind direction and change in direction were not significantly related to catch. The geometric means of catches made in strong moonlight were about 1/10 those in total darkness at comparable wind speeds. Rainfall was associated with higher catches in 7 out of 8 months, but the differences were significant in only 2. Recognition of the association between light winds and large numbers of S. exempta should assist forecasting, but a fuller understanding of the relationship between light-trap catch and population requires a method of population assessment that is independent of the effects of weather and moonlight. (AS)

0176

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

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

0177

EIJNATTEN, C.L.M. VAN 1975. Report on a literature review and field study of agriculture in Kirinyaga District with special reference to beans (Phaseolus vulgaris) Kenya, University of Nairobi. Technical Communication no. 13. 37p.

A literature study of Kirinyaga District made by 15 post-graduate students of the Department of Crop Science, Faculty of Agriculture, University of Nairobi was followed by individual visits to 42 farmers distributed equally over the main agricultural zones. During these visits, available information was collected on all aspects of bean cultivation and bean marketing. (RTI)

0178

ESELE, J.P.E. 1980. Seed-borne pathogens of important grain legumes grown by small scale farmers in Kenya. In Kenya, University of Nairobi. Faculty of Agriculture. Plant Protection Program. Report no. 3, Dec. 1980. pp.121-128.

0179

* FISHER, N.M. 1980. The effect of time of planting on four bean (Phaseolus vulgaris) genotypes in Kenya. Journal of Agricultural Science 95(2):401-408.

Four Phaseolus vulgaris genotypes were compared at 3 sowing dates during the 1st season (April-June 1976) and 4 sowing dates during a 2nd season (Nov. 1976-Jan. 1977). Yield declined with delay in sowing in both seasons, but in the 2nd season yields were lower at the 1st sowing and declined less rapidly. Canadian Wonder was the most stable-yielding genotype and had the highest mean seed yield though it may have been inferior to other genotypes at the 2 most favorable sowings. Its stability was attributed to drought escape and good field resistance to drought and disease. Mexican 142 was the least stable genotype. A black-seeded landrace yielded well in dry conditions in spite of its long duration. The most important components determining sowing date effects on yield were no. of pods/plant and seeds/pod. Canadian Wonder had markedly more stable no. of pods than any other genotype. Cooler temp. in July and Aug. retarded crop development in the 1st season. For 1 sowing of the 2nd season, flowering was retarded by 7-10 days in all genotypes and this was apparently an effect of water shortage. No effect of water was apparent on the time taken from flowering to maturity. (AS)

0180

FISHER, N.M.; HASSELBACH, O.E. 1979. Mixed cropping of maize and beans in Kenya: results of the bean general culture trials in 1975 and 1976. In Thika, Kenya, National Horticultural Research Station. Grain Legume Project. Interim Report no. 15. Long Rains 1979. 8p.

In 4 trials in 1975-6, beans (Phaseolus vulgaris) intercropped with maize did not decrease maize grain yields significantly compared with pure stands at sites in W. Kenya, but in 1 of 3 trials in E. Kenya intercropped maize yields showed some decrease. When beans were intersown at the same time as

maize, mixed cropping showed an advantage in land use over pure stands, with relative yield totals (RYT) of 1.22-1.78 in W. Kenya and 1.06-1.25 in E. Kenya. Seed yields of intercropped beans were 14-73% of those of pure stands. Sowing beans more than 1 wk after maize greatly decreased bean yields. When maize was grown according to recommendations, beans could be intersown in single alternate rows with plants spaced at 10-15 cm within the row. (CAB)

0181

* FISHER, N.M. 1979. Studies in mixed cropping. III. Further results with maize-bean mixtures. Experimental Agriculture 15:49-58.

In contrast to earlier results, a clear advantage from mixed cropping of maize and beans was found in the long-rain seasons (Mar. to Sept.) of 1976-77. Pure stand yields were low due to drought in 1976 and excessive rainfall in 1977. These and other results for long-rain seasons in Kenya suggest that mixtures are more efficient where pure stand yield levels are low, but there is little difference between cropping systems where levels are high. Light interception by maize leaves was quite small until late in the life of the bean crop. (AS)

0182

* FISHER, N.M. 1977. Studies in mixed cropping. I. Seasonal differences in relative productivity of crop mixtures and pure stands in the Kenya highlands. Experimental Agriculture 13:177-184.

An experiment is described in which the productivity of maize-bean and maize-potato mixtures in alternate rows was compared with pure stands of the component species in 4 cropping seasons. In seasons with low rainfall, yield from the mixtures fell short of that from pure stands, but in one exceptionally wet season a yield advantage was found for maize-bean mixtures. The poor performance of mixtures in low rainfall seasons appeared to result from large reductions in maize yield attributable to competition from potatoes or beans. In the one high-rainfall season, no such reduction in maize yield occurred. An implication of these findings for farming systems with mixed cropping is discussed. (AS)

0183

* FISHER, N.M. 1977. Studies in mixed cropping. II. Population pressures in maize-bean mixtures. Experimental Agriculture 13:185-191.

An experiment at the Kabete Field Station of the University of Nairobi compared maize-bean mixtures with pure stands of the 2 crops at 3 plant densities. Although the mixtures gave an apparent yield advantage over pure stands, this could be explained solely by the increased population pressure in the mixtures. The implication of this finding for other published work with cereal-legume mixtures is discussed, and a distinction is drawn between those sites in East Africa where a conclusive yield advantage from mixed cropping has been found and those where any apparent advantage might be explained by the higher population pressure. (AS)

0184

* FISHER, N.M. 1976. A limited objective approach to the design of agronomic experiments with mixed crops. 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. pp.47-49.

It is suggested that agronomists will need to study means of optimising the management of mixed crops. Some difficulties of designing experiments are discussed and an approach is suggested which holds constant the competi-

tively dominant crop according to existing recommendations and varies the culture of the recessive crop according to conventional factorial combinations of the treatments. To illustrate this approach, some data from maize-bean mixtures in the West of Kenya is presented and discussed. Time of planting of the beans relative to the maize was found to be the most important factor in bean culture. (IRAT)

0185

* FISHER, N.M. 1976. Experiments with maize-bean and maize-potato mixed crops in an area with two short rainy seasons in the highlands of Kenya. 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. pp.37-38.

Experiments on mixed cropping at the University of Nairobi are described. In one experiment, maize-potato mixtures yielded less than the pure stand comparisons in two seasons and was no different in a third. Maize-bean mixtures were not significantly different in two seasons, significantly worse in one low-rainfall season and significantly better in one relatively high-rainfall season. A second experiment indicated that even in the season when maize-bean mixtures showed an advantage, this could be explained by the higher population pressure in the mixtures rather than the intrinsic value of mixing the species. Light measurements suggested that mixtures could be more efficient in light interception. Soil water profiles toward the end of the cropping season showed the capability of maize-bean mixtures to extract water more completely from the rooting zone. (AS)

0186

FISHER, N.M.; LAYCOCK, D.; MASYANGA, B.S.K.; OWUOR, J.O. 1976. Report of mixed cropping experiments the West of Kenya during the 1975 season. Kenya, University of Nairobi. Faculty of Agriculture. Department of Crop Science. Technical Communication No. 16. 10p.

In trials during 1975 at three sites in the West of Kenya, the yield of maize grown at the recommended plant spacing was not affected by interplanting with beans or by any difference in cultural practice applied to the beans. Bean yields were small or negligeable if planted at the first weeding of the maize and considerably lower than in pure stands when planted at the same time. Mixed beans did not give an economic response to phosphate fertilizer applied in addition to the standard maize fertilizer. A higher density of mixed beans than that which is achieved by planting one row of beans between 75 cm maize rows with seeds spaced 15 cm in the row is not worthwhile unless the maize crop is very poor. The increase in returns to land from mixtures compared with pure stands was positive but small at the site with highest maize yields and progressively increased at sites with lower maize yields. (AS)

0187

* FISHER, N.M. 1975. Investigations into the competitive relations of maize and beans in mixed crops. Kenya, University of Nairobi. Faculty of Agriculture. Department of Crop Science. Technical Communication no. 15. 16p.

An experiment at the Kabete Field Station of the University of Nairobi compared maize-bean associations with pure stands of the 2 crops at 3 plant densities. Although intercropping gave an apparent yield advantage over pure stands, this could be explained solely by the increased population pressure in the former. The implication of this finding for other published work with cereal-legume associations is discussed, and a distinction is drawn between those sites in East Africa where a conclusive yield advantage from intercropping has been found and those where any apparent advantage

can be explained by the higher population pressure. Low yields of beans in association are attributed to increased pod abscission, which appears to overcompensate for the reduction in photosynthetic performance. (AS)

0188

FISHER, N.M. 1975. Mixed cropping research at Kabete. Kijani 1:59-61.

0189

FISHER, N.M. 1975. Seasonal differences in the relative productivity of crop mixtures and pure stands at Kabete. Kenya, University of Nairobi. Faculty of Agriculture. Department of Crop Science. Technical Communication no. 14. 15p.

An experiment is described in which the productivity of maize-bean and maize-potato mixtures in alternate rows was compared with pure stands of the component species in four cropping seasons. In seasons with low rainfall, the yield from the mixtures fell short of that from pure stands but in one exceptionally wet season a yield advantage for maize-bean mixtures was found. The poor performance of mixtures in the low rainfall seasons appeared to result from large yield reductions in maize attributable to competition from the potato or bean. In the one high rainfall season no such reduction in maize yield occurred. An implication of these findings for farming systems with mixed cropping is discussed. (AS)

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.

0191

FISHER, N.M. 1974. Possible designs for mixed cropping experiments with maize and beans. Kenya, University of Nairobi. Faculty of Agriculture. Department of Crop Science. 13p.

0192

FISHER, N.M. 1973. The performance of eight cultivars of bean (Phaseolus vulgaris) in pure stand and in mixed crop. Kenya, University of Nairobi. Department of Applied Plant Science. Research Report no. 2.

0193

FLOOR, J. 1983. Report on a pot experiment on Rhizobium inoculation and fertilizer application. Thika, Kenya, National Horticultural Research Station. Grain Legume Project. Internal Report.

0194

FLOOR, J. 1983. Report on the results of plant tissues analysis of dry beans. A review of the nutrient status of whole bean leaves and bean seeds. Thika, Kenya, National Horticultural Research Station. Grain Legume Project. Legume Project Experiment (1977-1983). Internal Report.

0195

FLOOR, J.; OKONGO, A.O. 1982. Dry beans (Phaseolus vulgaris) response to single and triple superphosphate. Thika, Kenya, National Horticultural Research Station. Grain Legume Project. Internal Report.

0196

FLOOR, J. 1982. Report on a pot experiment on Rhizobium inoculation and fertilizer application of beans. Thika, Kenya, National Horticultural Research Station. Grain Legume Project. Internal Report.

0197

FLOOR-DREES, M.M. 1983. Investigations on drought-resistance of beans developed by the Grain Legume Project. Phaseolus Beans Newsletter for Eastern Africa no.1.

0198

* FLOOR-DREES, E.M. 1982. Research on drought resistance in dry beans (Phaseolus vulgaris). In Kenya. Ministry of Agriculture. Grain Legume Project. Four years progress report: April 1978 - April 1982. Thika, National Horticultural Research Station. pp.52-62.

A proposal to investigate and develop an adequate screening procedure of dry bean var. for drought resistance is given. The relationship between moisture stress and plant behavior is analyzed. The objectives, exptl. design, materials and methods, and observations are included for each of the following expt. carried out in Kenya: yield and yield reduction of several Phaseolus vulgaris cv. and one of P. acutifolius in relation to moisture stress (under both lab. and field conditions); growth rate and yield reduction in relation to moisture stress, seedling resistance to drought and ability to recover; root growth in relation to moisture stress. (CIAT)

0199

GATHECHA, F.; LAMMERS, T.R.; SCHOONMAN, J.L. 1974. Brief report of recognition trip. Thika, Kenya. Bean Research Project.

0200

* GATHEE, J.W. 1982. Farming systems economics: fitting research to farmer's conditions. In Keswani, C.L.; Ndunguru, B.J., eds. Symposium on Intercropping in Semi-arid Areas, Morogoro, Tanzania, 1980. Proceedings. Ottawa, Canada. International Development Research Centre. pp.136-140.

Appreciation of the farmers production environment has been shown to be of importance in trying to bridge the gap between the research recommendations and the needs of the small scale farmers. Various systems of intercropping maize and beans are compared. The recommended method is compared with the farmers present methods taking into account not only the inputs and outputs but also physical, economic and social factors. Pure stands of maize and beans are also included in the comparison. The recommended method is found to require too much planting labour for the small scale farmers in the semi-arid area of Machakos, Kenya, where timely planting is crucial in view of the short growing period. (AS)

0201

GATHURU, E.M.; MUKUNYA, D.M. 1980. Identification of some viruses affecting food crops grown by small scale farmers in Kenya. II. Bean common mosaic virus. In Kenya, University of Nairobi. Faculty of Agriculture. Plant Protection Program. Report no. 3, Dec. 1980. p.32.

0202

GERLAGH, M. 1982. Report of a consultancy mission to the Grain Legume Project. Thika, Kenya. National Horticultural Research Station. May 14-28. 1982.

0203

GICHUKI, J.J. 1979. Extension problems in grain legume production in Nyanza Province, Kenya.
Paper presented at the Symposium on Grain Legume Improvement in East Africa. Kenya, University of Nairobi, 1979.

0204

GOMEZ, M. 1979. Processing of some varieties of Kenya beans for increased nutrient availability in monogastric diets.
Paper presented at the Symposium on Grain Legume Improvement in East Africa. Kenya, University of Nairobi, 1979.

0205

* GROOT, W. DE 1982. Density of dry beans (Phaseolus vulgaris) interplanted with maize (Zea mays). Summary. In Keswani, C.L.; Ndunguru, B.J.; eds. Symposium on Intercropping in Semi-arid Areas. Morogoro, Tanzania, 1980. Proceedings. Ottawa, Canada. International Development Research Centre. pp.63-64.

0206

* GROOT, W. DE; KITIVO, D.K.; LIMO, J.K.; NYANGIRI, E.N.; TIAMBATI, H.M. 1981. Effect of time of weeding on yields of foodbeans in Kenya. Thika, Kenya, National Horticultural Research Station. Technical Bulletin no. 1. 7p.

Weeding trials were carried out during 3 consecutive seasons at 4 agricultural stations in Kenya to determine the min. no. and optimum timing of hand weedings required for good bean yields. Bean var. Mwezi Moja was used at Katumani and Rose Coco K74 at Embu, Kisii, and Kakamega. The no. of plants/plot was recorded 2 wk. after emergence and at harvest. The 1st expt. consisted of 12 treatments replicated 4 times in a randomized block design. Treatments varied from 0-4 weedings at intervals of 10, 15, or 20 days. Treatments in the following 2 planting seasons were reduced to 8 and the no. of replications increased to 6. A first weeding at 20 days after crop emergence was found to be required in all areas. In areas with medium to high rainfall and a crop growth period equal to or greater than 100 days, a 2nd weeding approx. 20 days after the 1st one proved to be necessary. Recommendations to farmers are based on these results, bearing in mind that as a 1st step of good weed control, planting should be done in a weed-free environment. (AS)

0207

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

Most foodbeans in Kenya are grown in mixed stands with maize. It has been shown that planting both crops of the association at the same day increases yields markedly. In the traditional system weeding operation were spread over a longer period due to the late planting of the beans. The present results show that the critical period for weed competition in a simultaneously planted maize/bean association is from 20-30 days after crop emergence. One weeding at 3 weeks after planting should suffice in the association as compared with at least two weedings for pure stand beans. (AS)

0208

* GROOT, W. DE 1980. Density of dry beans (Phaseolus vulgaris) interplanted in maize (Zea mays). In Kenya, Ministry of Agriculture. Grain Legume Project. Thika, Kenya, National Horticultural Research Station. Interim Report no. 16. Short Rains 1979/80. pp.1-16.

In two sets of experiments the optimal density for interplanted beans in maize was investigated. When planting maize at the recommended density for Kenya, interplanting beans proved to be advantageous in all bean growing

areas in Kenya. Densities of beans of 178,000 plants per ha planted in 2 rows at 15 cm intrarow are recommended. (AS)

0209

GROOT, 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. Kenya, University of Nairobi, 1979.

0210

GROOT, W. DE et al. 1979. Effect of time of weeding on food beans in Kenya. Thika, Kenya, National Horticultural Research Station. Technical Bulletin no. 1.

0211

GROOT, W. DE 1979. Review of results of weed control experiments in dry beans in Kenya. Kenya, Ministry of Agriculture. Grain Legume Project. Paper presented at the Eastern Africa Weed Control Conference, 7th. Nairobi, Kenya, 1979.

0212

* HASSELBACH, O.E.; NDEGWA, 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. Morogoro, Tanzania, 1980. Proceedings. Ottawa, Canada. International Development Research Centre. p.68.

0213

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

Late planting of beans relative to maize resulted in lower bean yields, whereas the maize was insignificantly affected. GLP-X.92 was superior in yield to GLP-2 and appeared - provided a sufficiently high density - not as sensitive for the plant arrangement as the latter, hence, if not labour, maize yields could be decisive in selecting an arrangement. With no time studies being available as yet, on a basis of yields only, the treatment with multiple hill planting of maize (90 cm intrarow) and interplanted beans in and between the maize rows, resulted in the best overall returns per unit area of land. (AS)

0214

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

No conclusion can be made from the results obtained as to the most suitable area for french bean seed production could be obtained in the tow seasons available. The two seasons had two locations in common: it could not be said which of the two was best. Emergence has been poor. Of the cultivar which was poorest in this respect, it could be proved that too old seed has been sold. It is suggested that yield levels were suppressed by and cultivar yields were confounded with poor emergence. One season produced markedly cleaner seed than the other. The uselfuness of trials as meant above is questioned. If any purpose is served, a wider, long term approach is required. More and simpler trials are prefered to fewer and large trials. (AS)

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.

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.

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.

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.

0219
HASSELBACH, O.E. 1979. Fertilizer responses in various trials. Thika, Kenya, National Horticultural Research Station. Grain Legume Project. Internal Note.

0220
HASSELBACH, O.E. 1978. The effect of some treatments in maize interplanted beans at Thika. Thika, Kenya, National Horticultural Research Station. Grain Legume Project. Internal Report no.GLP-18/147-151.

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.

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.

0223
HASSELBACH, O.E. 1977. The effect of some treatments in maize interplanted beans (III). Thika, Kenya, National Horticultural Research Station. Grain Legume Project. Internal Report no.GLP-18/108.

0224
HASSELBACH, O.E. 1977. Time of planting and the influence of organic manure on bean yields at Thika. Thika, Kenya, National Horticultural Research Station. Grain Legume Project. Internal Report no.GLP-18/118-123.

0225
* HERINGA, R.J. 1973. Bean research project. General Report, Short Rain Trials 1972-1973. Thika, Kenya, Ministry of Agriculture. 6p.

Research results are given of trials carried out in Thika and Njoro (Kenya) on bean planting density; N and P fertilization, both applied alone and combined; selection work; and assessment of food bean and Leakey materials.

The characteristics of the cv. found to be resistant to rust (Uromyces appendiculatus) are described. (CIAT)

0226

* HOWLAND, A.K.; MACARTNEY, J.C. 1966. East African bean rust studies. East African Agricultural and Forestry Journal 32(2):208-210.

Laboratory screening of bean rust isolates in East Africa resulted in 8 races being identified. Importations of small white dry beans produced varieties suitable for the canning trade that are also rust resistant. (AS)

0227

HOWLAND, A.K.; STOREY, H.H. 1965. Rust disease of beans (Phaseolus vulgaris L.). In Kikuyu, Kenya, East African Agriculture and Forestry Organization. Record of Research. Annual Report 1964. pp.73-74.

0228

HOWLAND, A.K.; STOREY, H.H. 1964. Rust disease of beans (Phaseolus vulgaris L.). In Kikuyu, Kenya, East African Agriculture and Forestry Research Organization. Record of Research. Annual Report 1963. pp.57-58.

0229

HOWLAND, A.K. 1963. Progress report on bean rust. Contribution. Meeting of the Specialist Committee on Agricultural Botany, 10th. Nairobi, Kenya.

0230

HOWLAND, A.K.; STOREY, H.H. 1963. Rust diseases of beans (Phaseolus vulgaris L.). In Nairobi, Kenya, East African Agriculture and Forestry Research Organization. Records of Research 1962. pp.44-47.

0231

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

0232

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

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

0233

* KAISER, W.J.; RAMOS, A.H. 1980. Occurrence of Pseudomonas syringae on bean and soybean in Kenya. Plant Disease 64(6):593-595.

A bacterial disease of unknown etiology affected the foliage of bean and soybean plants in the highlands of Kenya. The bean and soybean bacterial strains were indistinguishable in cultural, morphologic, and physiologic properties and in their pathogenicity to various legume species. In greenhouse inoculation tests, bean and soybean bacterial strains produced brown, angular lesions on the foliage of bean, cowpea, lima bean, soybean, and tepary bean (P. acutifolius) in 3-4 days. Symptoms on bean leaves were identical to those incited by Pseudomonas syringae, the causal organism of bacterial brown spot of bean. Both bacterial strains were seedborne in bean. Based on bacteriological tests, pathogenicity studies, and symptomatology, Kenyan bean and soybean bacterial strains are considered to be strains of P. syringae. (AS)

0234

* KAISER, W.J. 1976. Important diseases and pests of bean (Phaseolus vulgaris), lima bean (Phaseolus lunatus) and pigeon peas (Cajanus cajan) in Africa. African Journal of Plant Protection 1:97-102.

Beans, lima beans and pigeon peas are important food crops that often provide a major source of protein in the diets of inhabitants of many countries of Africa south of the Sahara. Diseases and pests are important factors contributing to the erratic, low yields and poor quality. Beans are adversely affected by several pests and pathogens at various stages of plant development, which seriously reduce seed yields and quality. Important bean diseases are anthracnose (Colletotrichum lindemuthianum), rust (Uromyces phaseoli), angular leaf spot (Isariopsis griseola), halo blight (Pseudomonas phaseolicola), common and fuscous blights (Xanthomonas phaseoli and X. phaseoli var. fuscans), and BCMV. Pests include Acanthoscelides obtectus, Zabrotes subfasciatus, Maruca testulalis, Heliothis spp. and Agrotis spp. Control of the diseases and pests limiting the cultivation of these legumes in Africa is essential if yields and quality are to be increased. Different control measures presently being utilized are discussed. Breeding and selection of var. that are resistant to one or more of the important pests and pathogens of these crops appear to offer the most attractive means of control for the long term. (CIAT)

0235

* KENYA. MINISTRY OF AGRICULTURE. 1982. Germplasm collection. Thika, National Horticultural Research Station. Grain Legume Project. 77p.

The bean germplasm collection gathered by the Grain Legume Project at the National Horticultural Research Station in Thika, Kenya, during 1972-82 is listed. The list is divided into 2 parts, the first containing 1680 accessions and the second, 1123. The identification no., year, name of introduction, country of origin, and formulas for describing seed characteristics are given for each one. (CIAT)

0236

* KENYA. MINISTRY OF AGRICULTURE. 1982. Grain Legume Project. Four years progress report; April 1978-April 1982. Thika, National Horticultural Research Station. 67p.

Research and development programs carried out at the National Horticultural Research Station, Kenya, from April 1978 to April 1982 are described. The agronomy program studied the effect of planting time on yield of beans in monoculture and intercropped with maize and the competition in mixed cropping for nutrients, light, water, space, and weeds. The effectiveness of various commercial herbicides in controlling weeds in beans in monoculture and in association was determined. Labor requirements, especially for planting, were assessed. Fertilization trials with simple and triple superphosphate and diammonium phosphate and expt. with Rhizobium

inoculation were also conducted. No differences were found between rates of single and triple superphosphate. The efficiency of the Rhizobium strain used was measured by nodule counts and N analysis of the beans and the additional effect of N fixation by observing the growth of maize plants. The breeding program tested var. at different sites and selected material resistant to major diseases, namely anthracnose (Colletotrichum lindemuthianum), BCMV, halo blight (Pseudomonas phaseolicola), rust (Uromyces phaseoli), and angular leaf spot (Isariopsis griseola), and to drought conditions. At the Tebere Cotton Research Station, Mwea, improved seed of var. GLP-2, GLP-24, GLP-1004, and GLP-X.92 was produced. This seed was supplied to various seed firms for its multiplication and distribution to the farming community. Seed storage conditions were assessed. The inheritance of halo blight resistance, cotyledon and hypocotyl characters, and male sterility were also studied. The economic importance of diseases in Kenya is analyzed. A collection of slides of all the bean diseases in Kenya is being established. The farming system economics program includes the identification of research problems, interpretation of research results from the farmers' point of view, and testing the most promising methods for extension trials. An appendix with a proposal to investigate drought resistance in dry beans is also included. (CIAT)

0237

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

The Short Rains 1980/81 programme was somewhat reduced in scope and size due to the fact that more than half of the research staff of the Grain Legume Project was on courses. Drought was harmful to the Katumani crops, the other stations were favoured by fair weather. Farm yard manure application at 10 tonnes per hectare would seem the most economical treatment to obtain substantially higher yields and even lower tonnages might be considered. Trials to determine the most economical one of three types of phosphorus fertilizers (single superphosphate) (20% P_2O_5), triple superphosphate (46% P_2O_5) and diammonium phosphate (46% P_2O_5 + 18% N) revealed no significant differences between ssup and tsup. Single dose furrow application of DAP at high and uneconomical rates of over 200 kg per hectare proved often harmful to seed germination and reduced the number of plants and often yields. Results from chemical weed control trials were variable; bean yields and actual weed control by the different chemicals could not always be related. Trials on maize and bean ratios and time of planting effects in mixed stands failed due to labour shortages and disease problems. During the previous season multiple hill planting of maize at 90 cm intrarow distance and interplanted beans in and between the maize rows gave the best overall returns per unit area of land. Major diseases during the Short Rains 1980/81 were rust at Thika and Kakamega, angular leaf spot at Kakamega, and bean common mosaic at Kisii and Kakamega. Blackroot occurred only to a small percentage in blocks planted with a variety that possesses the dominant I gene, both at Kisii and Kakamega, while Embu and Thika were almost or totally free from blackroot. Rust screening at Thika failed due to the fact that the early planted screening block had almost no rust symptoms. The results of the National Bean Performance Trial, carried out at six stations, confirmed the high yield potential of both GLP-X.92 and GLP-X.380, under mono-cropping as well as under mixed cropping. GLP-X.92 is resistant to halo blight, but susceptible to BCMV Another bean that performed reasonably well is GLP-X.806, a zebra bean type. The backcross programme to incorporate anthracnose resistance into different types of local bean cultivars was continued successfully. About 200 entries were added to the germplasm collection. More data were collected on the selections from the 1976 crossing programme. The Shamba bean programme at Kakamega met adverse conditions due to late planting, but was

continued. For the new Phase III Breeding and Selection Programme F_1's of 1980 crosses were raised of which 17 were retained for further selection. Drought resistant F_7 and F_8 populations were one generation advanced, while from the F_7 population also single plant selections were made. A Red haricot variety trial was started with the aim of identifying material suitable for future release. Longevity of bean seed is 3-4 years under room conditions at Thika, but under low humidity by storing under silica gel even after 5 years the seeds still germinated for about 50 percent. Breeders' Seed was given out for advance multiplication pending official release. (AS)

0238

* KENYA. MINISTRY OF AGRICULTURE. 1980? Grain Legume Project. Thika, National Horticultural Research Station. Interim Report no. 16. Short Rains 1979/80. 50p.

Research work carried out during the short rains 1979/80 in Kenya, aimed at increasing bean production, is discussed. Studies include NP fertilizer trials and expt. on nodulation; weed control through herbicides (trifluralin, penoxalin, linuron, propachlor, alachlor) mixed cropping with maize; effect of planting time in mixed cropping; weed control in mixed cropping; crop protection against different diseases caused by Uromyces phaseoli, Isariopsis griseola, Pseudomonas phaseolicola, Sclerotinia sclerotiorum, BCMV, Elsinoe phaseoli, Erysiphe polygoni, Sclerotium rolfsii, and Xanthomonas phaseoli. Cv. GLP-16 was tested for BCMV resistance. Adverse climatic conditions affected breeding and selection trials; however, disease incidence facilitated effective screening and enabled useful observations. Backcrossing is used to incorporate resistance to Colletotrichum lindemuthianum. Selection was carried out in local farms in monocrops and intercrops and the germplasm collection was evaluated for disease resistance. Crossbreeding expt. as well as pedigree and bulk selection were conducted. Research results are given in table form. (CIAT)

0239

KENYA. MINISTRY OF AGRICULTURE. 1980. Grain Legume Project. Thika, National Horticultural Research Station. Interim Report no. 15. Long Rains 1979. 55p.

0240

KENYA. MINISTRY OF AGRICULTURE. 1979. Agricultural Research Station, EMBU. In _____. Annual Report of the Scientific Research Division 1975. Nairobi. pp.179-185.

Investigations reported include: effects of N, P and FYM on maize yields in a long-term fertilizer trial; overall and maize yields from a long-term rotation trial; spacing for intercropped maize and beans (Phaseolus vulgaris); effect of frequency of application of FYM on maize yields; spacing for maize at a constant plant population; and the effects of sowing date, harvesting date, NPK rates and weeding patterns on bean yields. (CAB)

0241

KENYA. MINISTRY OF AGRICULTURE. 1979. Beans (Phaseolus vulgaris). Kenya. Advisory Sheet no.10.

0242

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

0243

KENYA. MINISTRY OF AGRICULTURE. 1979. National Horticultural Research

Station, Thika. In _____. Annual Report of the Scientific Research Division 1975. Nairobi. pp.111-118, 125-128.

In trials on beans [Phaseolus vulgaris] the effects of plant density and spacing, sowing dates, NPK rates and hand weeding regimes were studied. Growth characteristics and yields of 16 sunflower cv. were compared at Thika, Embu and Mtwapa; the growth characteristics of cv. Peredovik GRO-104 introduced from the UK were studied at Thika. Data are given on growth characteristics of 6 soyabean cv. at Thika and Embu. In sunflower agronomy trials, plant population and spacing, dates of NPK applications, sowing dates and ploughing depth x P rate were studied. The growth characteristics, fibre contents and yields of 12 kenaf cv. were compared at Thika. (CAB)

0244

* KENYA. MINISTRY OF AGRICULTURE. 1977. Bean Research Project. Thika, General Report. Short Rain Trials 1973-1974. 13p.

Results of the short-rain trials, carried out in Kenya during 1973-74 in close collaboration with the Ministry of Agriculture and the Bean Research Project, are reported. Approx. 200 ac of bean were planted in the Nakuru area for bean seed production. New materials were also added to the germplasm collection. Satisfactory screening of cv. for disease resistance was difficult due to drought conditions. Several crosses were made among cv. to introduce resistance to anthracnose (Colletotrichum lindemuthianum). In K fertilization trials in Thika and Njoro significant differences were found between treatments (P = 0.05 and P = 0.01, resp.) and in Embu, there were no significant differences among treatments. When N was applied and/or Rhizobium was inoculated, there were no significant differences in yield among treatments. Higher yields can be obtained with adequate cultural practices (early planting, application of 40 kg each of N and P/ha, use of 50 kg certified seed/ha, and weed control). (CIAT)

0245

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

0246

* KENYA. MINISTRY OF AGRICULTURE. 1976. Grain Legume Project. Thika, National Horticultural Research Station. Interim Report no. 9. Long Rains 1976. 36p.

Experimental work of the Grain Legume Project (Kenya) during the long rains in 1976 is reported. Beans did not show a yield response to fertilizers. Earlier planting resulted in better yields. Plant arrangement - except at Kakamega where square planting outyielded rectangular planting by 23% - did not significantly influence yield. Optimum densities for all stations were well above 300,000 plants/ha, taking into account considerable losses in stand. Beans kept weed free from 10 to 50 days postemergence yielded best. GLP-2, GLP-24 and Mwezi Moja were the most promising cv. for the wet, moderately dry and dry areas, respectively. GLP-3 was a generally good-yielding cv. Backcross breeding programs to transfer anthracnose and halo blight resistance into local cv. continued. 529 single plant selections were made in local farmers' fields; 360 cv. were tested for suitability in mixed cropping. When intercropped, beans showed less halo blight and virus but more rust and insect incidence than when monocropped. The germplasm collection has 707 entries, 202 of which were evaluated. Crossbreeding for pedigree selection started with 595 crosses, of which 178 were successful. (AS)

0247

* KENYA. MINISTRY OF AGRICULTURE. 1975. Grain Legume Project. Thika, National Horticultural Research Station. Interim Report no. 8. Short Rains 1975/76. 28p.

Experimental work of the Grain Legume Project (Kenya) on beans during the short rain period 1975-76 is reported. No significant yield differences were obtained at densities varying from 50,000-600,000 plants/ha, if a fixed row distance of 50 cm was used. Where sowing was done in a random fashion at densities ranging from 80,000-200,000 plants/ha, yields decreased at denser planting. Planting date trials at Embu, Katumani, Kisii and Thika failed to show significant yield differences. At Kakamega a delay of planting till Sept. 17 resulted in a significant yield reduction. NPK fertilizer trials at 5 locations showed little response, except at Thika, where 40 kg N/ha gave a yield increase of 63%. In weeding trials, satisfactory control was achieved with weeding at 10 and 20 days postemergence. In screening the germplasm collection for resistance to halo blight and anthracnose, some local cv. showed some resistance to the Colletrotrichum lindemuthianum strains used. In a trial evaluating different fungicide sprays, benomyl was best in reducing anthracnose incidence and increasing yield. At Thika, 332 entries of the germplasm collection were grown. Characteristics of 11 cv. selected for testing during the long rains are tabulated; their yields range from 1075-2706 kg/ha. (AS)

0248

KENYA. MINISTRY OF AGRICULTURE. 1974. Bean Research Project. Recommendations for growing Mexican beans on large scale farms. Thika. Extension Leaflet 2nd version.

0249

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

0250

KENYA. MINISTRY OF AGRICULTURE. 1971-1980. Grain Legume Project. Thika, National Horticultural Research Station. Interim Reports nos.1-14.

0251

* KEYA, S.O.; BALASUNDARAM, V.R.; SSALI, H.; MUGANE, C. 1982. Multilocational field responses of Phaseolus vulgaris to inoculation in Eastern Africa. In Graham, P.H.; Harris, S.C., eds. Biological Nitrogen Fixation Technology for Tropical Agriculture, Cali, Colombia, 1981. Papers presented. Cali, Centro Internacional de Agricultura Tropical. pp.231-234.

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

0252

KEYA, S.O.; MUKUNYA, D.M. 1979. The influence of phosphorus and micronutrients on nodulation of Phaseolus vulgaris L. at Kabete, Kenya. Paper presented at the Symposium on Grain Legume Improvement in East Africa. Kenya, University of Nairobi, 1979. 19p.

0253

* KEYA, S.O. 1976. Nodulation and nitrogen fixation in East Africa. In

Ayanaba, A.; Dart, P.J., eds. Biological nitrogen fixation in farming systems of the tropics. New York, Wiley. pp.233-243.

As a result of inoculation and nodulation, substantial increases in yields of certain legumes can be ascribed to N_2 fixation under field conditions in east Africa. Phaseolus vulgaris and Medicago sativa can fix 55 kg N/ha per 120 days and 180 kg N/ha/year, respectively. The inclusion of pasture legumes with grass has brought about a yield increase equivalent to the application of 187 kg N/ha/year. The net gain of N and other nutrients such as P and K in the soil benefited the subsequent crops. The presence of a legume in pasture improved the chemical composition of the sward, crude protein content, herbage yield and grazing days. Nodulation of uninoculated indigenous and exotic legumes is erratic. Although P. vulgaris is poorly nodulated, bean yields have not been increased by inoculation except on soils where beans have not been grown before. While uninoculated cowpea plants are very well nodulated, inoculation is considered essential for introduced cultivars such as soybean and lucerne. Application of P has accelerated the rate of establishment, persistence, productivity and nodulation of legumes. Phosphate and N also improved yields and N and P content of the herbage. Other factors limiting nodulation and N_2 fixation have been the lack of well-adapted local legume cultivars and appropriate inoculants suited to acid soil conditions. (AS)

0254

* KHAMALA, C.P.M. 1978. Pests of grain legumes and their control in Kenya. In Singh, S.R.; Van Emden, H.F.; Ajibola Taylor, T., eds. Pests of grain legumes: ecology and control. New York, Academic Press. pp.127-134.

0255

* KINYUA, G.K.; MUKUNYA, D.M.; BREUKELEN, E.M. VAN 1981. Studies on genetic resistance of beans to Pseudomonas phaseolicola in Kenya. In Lozano, J.C., ed. International Conference on Plant Pathogenic Bacteria, 5th., Cali, Colombia, 1981. Proceedings. Cali, Colombia, Centro Internacional de Agricultura Tropical. pp.352-357.

Halo blight of beans caused by Pseudomonas phaseolicola is one of the most important diseases of beans in Kenya. It is widely distributed, resulting in very low yields from early infected beans. Thirty isolates of P. phaseolicola were obtained from 12 bean-growing districts. Seven belonged to Race 1 while 23 belonged to Race 2. The predominating Race 2 caused severe drooping of primary leaves in Red Mexican UI 3 seedlings. Two lines, GLP 16 and GLP x92 resistant to Race 2, were crossed with susceptible lines and their F_2 progeny analyzed for resistance of susceptibility reactions. Resistant bean seedlings reacted mainly with necrotic spots and partial chlorosis to P. phaseolicola Race 2. Large water-soaked lesions and entire chlorosis constituted the major symptoms on leaves of susceptible seedlings. Resistance to P. phaseolicola Race 2 in GLP 16 and GLP x92 was found to be governed by one recessive gene. A ratio of 1 (resistant) to 3 (susceptible) was obtained in the F_2 seedlings. (AS)

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. Kenya, University of Nairobi, 1979.

0257

KINYUA, G.K; OMUNYM, 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.

0258

* KINYUA, G.K. 1979. The occurrence of race alpha of Colletotrichum lindemuthianum in Kisii District Kenya. Thika, Kenya, National Horticultural Research Station. 3p.
Paper presented at the Symposium on Grain Legume Improvement in East Africa. Kenya, University of Nairobi, 1979.

In a cv. trial conducted in Kisii, Kenya, red haricot bean GLP-3 showed typical symptoms of bean anthracnose (Colletotrichum lindemuthianum) on pods. Previously this var. had been tested several times in the lab. and had proved to be resistant to the lambda race of C. lindemuthianum. A pure culture of C. lindemuthianum was obtained from infected GLP-3 pods. By using different bean var. (Canadian Wonder, Processor, Dark Red Kidney, Perry Marrow, Kaboon, Double White Princess, Cornell 49-242, Evolutie, Pepita) to distinguish the races of C. lindemuthianum, the Kisii isolate was found to be an alpha race. In most areas where beans are grown, GLP-3 is found to be resistant to bean anthracnose, indicating the absence of this race in these areas. (AS)

0259

* KULKARNI, H.Y. 1973. Notes on East African plant virus diseases. IV. Bean common mosaic virus. East African Agricultural and Forestry Journal 39(1):72-76.

A sap and aphid transmissible 750 nm. filamentous virus causing dark green vein-banding, crinkling and blistering in leaves of bean (Phaseolus vulgaris L.) was identified morphologically and serologically as bean common mosaic virus (BCMV). In a representative sample of aphids trapped in bean plots in the Kenya Highlands, 61 per cent were known vectors of BCMV and 39 per cent vectors of bean yellow mosaic virus (BYMV); BYMV, however, was not found in bean in East Africa during extensive surveys. One preliminary screening test indicated that four out of ten imported American bean varieties may have useful resistance to the virus. (AC)

0260

KULKARNI, H.Y.; WAINDI, E.; WAMAGATA, F. 1971. Bean (Phaseolus vulgaris) viruses. In Nairobi, Kenya, East African Agriculture and Forestry Research Organization. Records of Research 1970. pp.73-75.

0261

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

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

0262

LAMMERS, T.R. 1971. Interim report on the period 1st Nov.-15th Dec. 1971. Thika, Kenya. Bean Research Project.

0263

LAYCOCK, D.; ALLAN, A.Y.; WERE, A.; WAFULA, A. 1975. Intercropping maize with beans. In Kitale, Kenya, National Agricultural Research Station. Annual Report 1974. Kitale. 80p.

0264

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

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

0265

LIMA, C.P.F. DE 1976. 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. 31p.

0266

* LIMO, J.K.A.; SCHOONMAN, J.I. 1973. Interim report, short-rains 1972-1973. Thika, Kenya, Bean Research Project. 12p.

General information on the trials carried out by the Bean Research Project during the short-rain season, 1972-73, at the Plant Breeding Station in Njaro, Nakuru (Kenya) is given. Cultural practices carried out before the fertilization trials, planting distances, and selection are discussed. In the 1st trial there was no clear response to N and optimum rates of P were estimated at 20-80 kg/ha. A plant density of 25 plants/m^2 is optimum. Local sources of resistance to Uromyces appendiculatus var. typica and Xanthomonas phaseoli were selected among 118 lines. Future research is outlined and the project plans to include other grain legumes such as soybean, groundnut, and broad bean. (CIAT)

0267

* LUKANDO, N.F. 1978. Susceptibility of grain and legume crops to storage pests. In Kenya, University of Nairobi. Faculty of Agriculture. Department of Crops Science. Technical Communication no.21. pp.19-27.

Susceptibility of maize, sorghum, wheat, chickpea, and haricot bean to storage pests is discussed. Regarding haricot bean, research is conducted on factors affecting its susceptibility to Acanthoscelides obtectus. According to preliminary results, it was found that var. differences exist and that for a given var., resistance is due to a no. of factors that act alone or in combination: (a) thickness of testa; (b) presence of Ca oxalate crystals in the testa, and (c) presence of alkaloids or other chemicals which repel bruchids. It was also found that the roughness of the testa increases susceptibility. (CIAT)

0268

McDONALD, J. 1936. A revised list of plant diseases in Kenya Colony. East African Agricultural Journal 1:463-468.

0269

* MAHATANYA, E.T. 1977. The response of food beans (Phaseolus vulgaris L.) to spacing and phosphorous application. East African Agricultural and Forestry Journal 43(2):111-119.

Canadian Wonder and Leakey 138.139 were grown in the field under three levels of P application and two levels of plant density. The results show that plant height, LAI, pod number, pod weight, seed yield per plant and seed yield/M^2 increased with the levels of P. An increase in seed yield per plant was attributed partly to an increased pod number and partly to a larger LAI, which were positively and significantly correlated with seed yield. It was, therefore, suggested that in an endeavour to increase bean yields more attention should be directed towards treatments which might promote a greater accumulation of pods per plant. Low plant density had a greater effect on all the above mentioned characters per plant than high plant density, except on plant height when the reverse was true. However, high plant density was significantly greater than low plant density with respect to seed yield/M^2 because of the greater number of plants per unit area of land. High plant density outyielded low plant density with respect to seed yield/M^2 and the effect of high plant density was even greater when phosphorus was added to the soil. This shows that a competition for nutrients existed at this plant density. (AS)

0270

* MAHATANYA, E.T. 1976. The effect of phosphorus and copper on the bean plant (Phaseolus vulgaris L.). Mysore Journal of Agricultural Science 10(2):214-225.

Canadian Wonder was sown in the field and treated with 3 rates each of P and Cu in factorial combination. After 20, 42, 55 and 77 days from planting, samples were taken. P and Cu increased plant height, total dry wt/plant, LAI and P content/plant. Seed yield/plant also increased with P levels because of the positive effect of P application on yield components. However, Cu treatment had no significant effect on seed yield despite having significantly promoted greater vegetative growth of the plants compared to the controls. Seed yield was positively and significantly correlated with pod no., P content/plant and LAI. The reduction in yield in the relatively dry short rains was least at high P application, suggesting that P may have improved the water use efficiency. (AS)

0271

* MAHATANYA, E.T. 1976. The effect of seed irradiation on growth and development of food beans (Phaseolus vulgaris L.). Ghana Journal of Science 16(1):25-33.

Leakey 138.139, a Uganda hybrid line, was irradiated with 5, 10, 15 or 20 kR of Cobalt-60 at an intensity of 2.2 kR/min. Increasing doses resulted in reduced germination, plant height, total fresh wt, leaf area/plant, pod length and consequently mean pod fresh wt/plant. At 5 kR, however, there was a slight incremental effect on all these characters, except fresh pod wt, a phenomenon that is difficult to explain. Leaf area was found to be significantly correlated to pod fresh wt. (CIAT)

0272

MUEKE, J.M. 1979. Seasonal abundance and problems of controlling bean fly in Kenya.
Paper presented at the Symposium on Grain Legume Improvement in East Africa. Kenya, University of Nairobi, 1979.

0273

* MUIGAI, S.G.S. 1983. Breeding better beans. Kenya Farmer. August 1983 (Special issue: Food beans in Kenya). pp.20-21.

0274

* MUIGAI, S.G.S.; RHEENEN, H.A. VAN 1982. Screening for mixed cropping. Thika, Kenya. National Horticultural Research Station. Grain Legume Project. 11p.
Paper presented at the Biennial Conference of the Bean Improvement Cooperative, Gainesville, Florida, 1982.

From 1977 to 1981 a no. of trials were carried out in Kenya to evaluate different var. under 2 cropping systems (monocropping and mixed cropping). A split-plot design was used with the 2 systems corresponding to the main plot and the different var. randomly distributed in the subplots. Correlation coefficients of yields of the different systems were calculated. The av. r-value equals 0.260 ± 0.024. Tables are included with the correlation found. A variance analysis was carried out, indicating that interactions between cropping system and var. occur. (CIAT)

0275

MUIGAI, S.G.S. 1979. Male sterility in beans. Thika, Kenya, National Horticultural Research Station.
Paper presented at the Symposium on Grain Legume Improvement in East Africa. Kenya, University of Nairobi, 1979.

0276

* MUKUNYA, D.M.; MUTHANGYA, P.M.; ESELE, J.P. 1981. Bacterial blight of beans (Phaseolus vulgaris L.) in Kenya. In Lozano, J.C., ed. International Conference on Plant Pathogenic Bacteria, 5th., Cali., Colombia, 1981. Proceedings. Cali. Centro Internacional de Agricultura Tropical. pp.3-8.

Pseudomonas phaseolicola (Burk.) Dows., Xanthomonas phaseoli (Smith) Dows., and X. phaseoli var. fuscans (Burk) Dows. were isolated from blighted bean plants collected during an extensive survey in small scale farms in Kenya. The blights were severe and widely distributed in all major bean growing areas. The symptoms of the three blights were similar, with leaves and pods showing water-soaked spots in all cases. Halo blighted beans sometimes showed characteristic halos, but common and fuscous blights showed irregular necrotic patches surrounded by yellow to brown margins. Brick-red longitudinal lesions were found on stems with water soaking at the nodes. Seed samples were tested for the presence of the seed-born bacterial pathogens; X. phaseoli occurred more frequently in bean samples than P. phaseolicola. Percent incidence per sample, however, was higher for P. phaseolicola (20-36%) wherever it was found than for X. phaseoli, which ranged from 8 to 24%, and 32% in only one sample. The implication of farmers using their own seed for planting is discussed in the light of the high seed infection and the widespread occurrence of these blights in the field. (AS)

0277

MUKUNYA, D.M.; GATHURU, E.M. 1980. The effect of mixed cropping of beans and maize on yield and incidence of common diseases of associated crops. In Kenya, University of Nairobi. Faculty of Agriculture. Plant Protection Program. Report no. 3, Dec. 1980. pp.8-29.

0278

MUKUNYA, D.M.; KEYA, S.O. 1979. Effects of seed borne inoculum on disease development and yields of a Canadian Wonder selection at Kabete. Kenya, University of Nairobi. 14p.

Paper presented at the Symposium on Grain Legume Improvement in East Africa. Kenya, University of Nairobi, 1979.

0279

* MUKUNYA, D.M.; KEYA, S.O. 1978. Yield performance and selection for resistance in beans (Phaseolus vulgaris L.) to common diseases in Kenya. East African Agricultural and Forestry Journal 43(4).390-396.

A collection of 1250 indigenous and introduced Phaseolus bean accessions was evaluated for yield and resistance to important bean diseases under field and greenhouse conditions for a period of 3 yr at the Kabete Faculty of Agriculture Field Station, Nairobi (Kenya). Considerable variation was found among the lines regarding yield and reactions to anthracnose (Colletotrichum lindemuthianum), halo blight (Pseudomonas phaseolicola), and rust (Uromyces phaseoli). Anthracnose and halo blight resistance seemed to be consistently associated with the small black and small red bean types. Most collections which fell among the large or variegated seed types were found to be highly susceptible to anthracnose and halo blight. Except for some introduced lines which showed high susceptibility to rust, many lines, particularly those of local origin, contained considerable resistance to rust. The best performing lines constituting 5% of the total collection have been reported. Of these, NB16, NB84, NB86, NB248, NB278, NB563, NB627, NB259, NB649, and NB1181 combine a high yield potential with resistance to the 3 diseases. (AS)

0280

MUKUNYA, D.M.; KEYA, S.O. 1977. Yield performance and selection for resistance in beans (Phaseolus vulgaris L.) to common diseases in Kenya. Kenya, University of Nairobi. 15p.

0281

MUKUNYA, D.M.; KEYA, S.O. 1975. Phaseolus bean production in East Africa. Kenya, University of Nairobi. 71p.

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.

0283

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

0284

MUKUNYA, D.M. 1971. Results of inoculation tests using isolates of Colletotrichum lindemuthianum on a set of differential varieties. In 2nd progress report of the bean project to the University of Nairobi Deans' Committee. 12p.

0285

* MURIITHI, C.N. 1982. On-farm experiments: some experiences. In Keswani, C.L.; Ndunguru, B.J., eds. Symposium on Intercropping in Semi-arid Areas, 2nd., Morogoro, Tanzania, 1980. Proceedings. Ottawa, Canada, International Development Research Centre. pp.141-145.

0286

MUTHANGYA, P.M. 1980. A survey of bacterial blights in Kenya. In Kenya, University of Nairobi. Faculty of Agriculture. Plant Protection Program. Report no. 3, Dec. 1980. pp.111-121.

0287

MUTITU, E.W.; MUSYIMI, A.B. 1980. Bean diseases in central and eastern provinces of Kenya. In Kenya, University of Nairobi. Faculty of Agriculture. Plant Protection Program. Report no. 3, Dec. 1980. pp.44-72.

0288

MUTITU, E.W.; MUKUNYA, D.M. 1979. Epidemiology and control of bean scab (Elsinoe phaseoli Yenkins) in Kenya.
Paper presented at the Symposium on Grain Legume Improvement in East Africa. Kenya, University of Nairobi, 1979. 16p.

0289

MUTURI, S.N. 1976. Strategy for intensified bean production in Kenya. Paper presented to PDA/SRO staff meeting on 30 July 1976. 21p.

0290

MUTURI, S.N. 1975. Grain Legume Research Working Group. Suggested strategy for research. 12p.

0291

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

0292

* MWAKHA, E. 1980. Intercropping. dry beans in high density arabica coffee. II. Response to bean rows and nitrogen fertilizer. Kenya Coffee 45(536):319-324.

Coffee trees, cv. SL 28, after being stumped and every other row uprooted so as to leave the stand at a spacing of 2.0 x 1.0 m, were interplanted with 0, 2, 4, or 8 rows of beans, and N was applied at 0, 80, or 160 kg/ha. During the 2nd and part of the 3rd yr, 3 consecutive dry bean crops showed significant yield increase with increasing bean rows and N fertilizer rates. Responses were more pronounced in the 1st than in the subsequent bean crops. No significant interactions between dry bean rows and N were found for both dry bean and clean coffee yields. (AS)

0293

* NADAR, H.M. 1982. Intercropping under marginal rainfall conditions in Kenya. In Keswani, C.L.; Ndunguru, B.J., eds. Symposium on Intercropping in Semi-arid Areas. Morogoro, Tanzania, 1980. Proceedings. Ottawa, Canada, International Development Research Centre. pp.50-55.

0294

* NADAR, H.M.; RODEWALD, G.E. 1982. International between agronomic research and agricultural economic analysis to develop successful dryland cropping systems. In Keswani, C.L.; Ndunguru, B.J., eds. Symposium on Intercropping in Semi-arid Areas, 2nd., Morogoro, Tanzania, 1980. Proceedings. Ottawa, Canada, International Development Research Centre. pp.146-154.

0295

* NADAR, H.M.; RODEWALD, G.E. 1981. Relay cropping and intercropping: an approach to maximize maize yield in the marginal rainfall areas of Kenya. In International Workshop on Intercropping, Hyderabad, India, 1979. Proceedings. Patancheru, International Crops Research Institute for the Semi-Arid Tropics. pp.86-97.

An expt. was conducted to study maize yield response to 2 planting methods (1 or 2 plants/site), 3 row spacings (60-, 75-, or 90-cm), and 2 cropping

systems (relay cropping and intercropping with beans), in a marginal rainfall area of Kenya with bimodal rainfall pattern. Results from this expt. and the economic survey of the farming systems employed by the farmers in the study area indicated that the maize yields in the long rainy season can be greatly improved by minor modification of the technologies presently used by farmers. Planting date was one of the major critical factors determining maize yield during the long rainy season. Delay in planting beyond the 1st wk. of March resulted in substantial yield losses. Relay cropping was found to be a means of planting maize early in the long rainy season. In intercropping with beans, bean yield was found to be almost the same under maize row spacings of 60-, 75-, and 90-cm, while maize yield was significantly reduced in the 75-cm row spacing. An effort made to determine the effect of introducing a new technology on net farm income by using 3 linear programming models developed from the survey data is discussed. (AS)

0296

* NGUNDO, B.W. 1977. Screening of bean cultivars for resistance to Meloidogyne spp. in Kenya. Plant Disease Reporter 61(11):991-993.

Of 23 local and imported bean cultivars screened for resistance to Meloidogyne incognita and M. javanica, 7 were resistant but none was immune. Small galls and scattered mature female nematodes with egg masses were found on the roots of all 7 cv. PI 165426, reported to be highly resistant to M. incognita, was susceptible to a mixed population of these 2 nematodes. (AS)

0297

* NGUNDO, B.W.; TAYLOR, D.P. 1975. Comparative development of Meloidogyne incognita and M. javanica in six bean cultivars. East African Agricultural and Forestry Journal 41(1):72-75.

Six bean cultivars were inoculated with 200 larvae of Meloidogyne incognita and M. javanica. Development was determined after 10, 20, 30 and 40 days at day and night temperatures of 30 and 25°C, respectively. Infective larvae developed to sexually differentiated nematodes most rapidly in Mexico 142 for M. incognita and M. javanica, and in Masterpiece for M. javanica; but larvae of both species had developed to the adult stage in all cultivars by the 20th day. Almost all larvae of both species developed into females that laid eggs within 20 days after inoculation. In all cultivars, the life cycle was completed and a 2nd generation was developing within 30 days. Under optimum temperature conditions at least 3 generations are possible during a growing season. (AS)

0298

* NGUNDO, B.W.; TAYLOR, D.P. 1975. Comparative histopathology of six bean cultivars infrected with Meloidogyne incognita and M. javanica. East African Agricultural and Forestry Journal 41(1):76-80.

Six bean cultivars were inoculated with larvae of Meloidogyne incognita and M. javanica and the histopathology studied after 10, 20, 30 and 40 days. All 6 bean cultivars were highly susceptible to both nematode species. Nematodes fed in the vascular area, causing the formation of multinucleate giant cells around a single female. While most of the giant cells occurred in the vascular cylinder in all cultivars, they were also observed in the cortex or between the pericycle and endodermis in Mexico 142, Canadian Wonder and Premier. Development of abnormal xylem was associated with giant cells, but no nuclear division was observed. (AS)

0299

* NGUNDO, B.W.; TAYLOR, D.P. 1975. Some factors affecting penetration of

bean roots by larvae of Meloidogyne incognita and M. javanica. Phytopathology 65:175-178.

In a greenhouse experiment 6 varietiea of Phaseolus vulgaris were exposed for 48 h to Meloidogyne incognita and M. javanica (300 freshly hatched larvae/seedling). The 2 species entered the root tips of all varieties except Mexico 142. (CAB)

0300

* NGUNDO, B.W.; TAYLOR, D.P. 1974. Effects of Meloidogyne spp. on bean yields in Kenya. Plant Disease Reporter 58(11):1020-1023.

Nematicides were applied to a dark-red friable clay soil heavily infested with root-knot nematodes, Meloidogyne incognita and M. javanica, at Kenya Canners Plantation Ltd., and Kuraiha Estate, Thika. It was found that application of 1,3-dichloropropene and 1,2-dichloropropane (DD) as a broadcast and a row treatment, and ethylene dibromide (EDB) applied as a broadcast treatment, significantly reduced the number of M. incognita and M. javanica larvae in the soil. EDB row treatment did not reduce larval populations. Significant yield increases (45-60%) were obtained with 'Kikara' and "Mexico 142" beans with broadcast and row application of DD, and broadcast application of EDB. This is consistent with observed larval population decreases in these treated plots. Nematicides did not increase the yield of 'Marathon' green bean. Yields of this variety were uniformly low, presumably because the soil type was not conducive to good growth. In the second field experiment at Kuraiha Estate, DD in the row did not significantly increase the yield of Kikara but a significant yield increase (32%) was obtained with Mexico 142. These results indicate that heavy infestations of root-knot nematodes can reduce bean yield in Kenya by up to 60%. (AS)

0301

NUGUNDO, B.W. 1973. Host parasite relationships of the root-knot nematodes Meloidogyne incognita and M. javanica on beans (Phaseolus vulgaris L.). Ph.D. Thesis. Kenya, University of Nairobi. 221p.

0302

* NJUNGUNAH, S.K.; NDEGWA, A.M.M.; RHEENEN, H.A. VAN; MUKUNYA, D.M. 1981. Bean production in Kenya. In Regional Workshop on Potential for Field Beans in Eastern Africa, Lilongwe, Malawi, 1980. Proceedings. Cali, Colombia, Centro Internacional de Agricultura Tropical. Series 03EB-1. pp.35-53.

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

0303

* NKUNGA, G.F.M. 1972. Short rains trials 1972 at Thika. Thika, Kenya, National Horticultural Research Station. 6p.

A brief description is given of the objectives, sites, cv., exptl. design, spacing, plant density, plot size, fertilizers, planting and harvesting

date, and the cultural practices (land preparation, soil sampling, seed dressing, weed, pest, and disease control) carried out in expt. conducted in Thika (Kenya) in order to determine optimum plant population in relation to yield and the effect of N and P fertilizer applied alone or combined on the yield of bean var. Mexican 142. (CIAT)

0304

OKINGA, A.; KHAMALA, C.P.M. 1979. Beanfly (Agromyzidae, Diptera) infestation of bean fields, their influence on the performance of Phaseolus vulgaris L. and some aspects of their control in Kenya.
Paper presented at the Symposium on Grain Legume Improvement in East Africa. Kenya, University of Nairobi, 1979.

0305

OKIROR, M.A.; GUPTA, V.K.; BREUKELEN, E.W.M. VAN 1982. Genetic and physiological variation among bean lines resistant and susceptible to bean anthracnose. Theoretical and Applied Genetics 62(4):355-359.

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

0306

OKONGO, A.O. 1981. Planning and supervision of outreach research stations. Thika, Kenya, National Horticultural Research Station.
Paper presented at Eastern and Central Africa, CIMMYT Workshop. ILRAD, Kenya, 1981.

0307

OKONGO, A.O. 1979. Fertilizers in Phaseolus bean in Kenya. In Thika, Kenya, National Horticultural Research Station. Grain Legume Project. Interim Report no. 15. 9p.

Results of fertilizer trials with Phaseolus vulgaris by (a) FAO in 1969-73 on farms in the Central and E. provinces of Kenya and by (b) the Grain Legume Project team in 1976-9 at 5 research stations are reported. Application of 40 kg each of P_2O_5 and K_2O/ha increased seed yields in (a) compared with 0 or 40 kg P_2O_5. In (b), N as well as P and K increased seed yields, and application of 200 kg diammonium phosphate/ha at sowing was recommended. In mixed crops, P. vulgaris seed yields were 30% lower than in pure stands. Application of diammonium phosphate at sowing in addition to the fertilizer recommendation for the maize crop increased bean seed yields. (CAB)

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.

0309

OMAR, G.G.; KEYA, S.O. 1979. Preliminary strain testing of indigenous Rhizobium phaseoli at the University of Nairobi.
Paper presented at the Symposium on Grain Legume Improvement in East Africa. Kenya, University of Nairobi, 1979. 14p.

0310

OMUNYIN, M.E. 1983. Viral diseases of beans in Kenya and their possible remedies. Phaseolus Beans Newsletter for Eastern Africa no.1.

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, Dec. 1980. pp.139-149.

0312

OMUNYIN, M.E. 1979. Screening for resistance to bean common mosaic virus in food beans. Thika, Kenya, National Horticultural Research Station.
Paper presented at the Symposium on Grain Legume Improvement in East Africa. Kenya, University of Nairobi, 1979.

0313

OMUNYIN, M.E. 1978. Screening for resistance to bean common mosaic virus. In Thika, Kenya, National Horticultural Research Station. Interim Report no. 14. Short Rains 1978/79. Thika. Appendix. 9p.

0314

PERE, W.M.; MAGOYA, J.K. RHEENEN, H.A. VAN 1982. Stop bean weevil infestation with sunflower oil. Kenya Farmer no.8:18-19.

0315

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

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

0316

QRESHI, J.N. 1979. NAL/SSC/3-01/78: Critical levels of N and P in bean leaves and the removal of some major and minor nutrients by a bean crop. Nairobi, Kenya, National Agricultural Laboratories. Progress Report 1979. 3p.

0317

* RHEENEN, H.A. VAN; MUIGAI, S.G.S. 1983. Control of bean common mosaic by

deployment of the dominant I gene. Thika, Kenya, National Horticultural Research Station. Grain Legume Project. 18p.

The deployment of the dominant I gene for the control of bean common mosaic predisposes a bean crop to the danger of death by black root if one or more recessive genes to prevent the hypersensitive plant reaction are lacking. However, during 3 years in Kenya black root occur exceptionally to a percentage of more than 10, and in such cases the yields from crops having the dominant I gene exceeded significantly those from mosaic susceptible crops. The use of dominant resistance factor in Kenya is therefore recommended, but continued caution and monitoring of the disease situation are required. Broadening the resistance basis by adding recessive genes to control black root is advisable. (AS)

0318

* RHEENEN, H.A. VAN 1983. Kenya's past, present and future. Kenya Farmer. August 1983 (Special issue: Food beans in Kenya). pp.17-18.

0319

* RHEENEN, H.A. VAN 1983. Oil treatments for protection against insects. Thika, Kenya, National Horticultural Research Station. Grain Legume Project. 9p.
Paper presented at the International Workshop in Integrated Pest Control for Grain Legumes, Goiania, Brazil, 1983.

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

0320

RHEENEN, H.A. VAN; PERE, W.M.; MAGOYA, J.K. 1983. Protection of stored beans against bruchids (Acanthoscelides obtectus). FAO Plant Protection Bulletin 31(3):

0321

* RHEENEN, H.A. VAN 1982. Bean production in monoculture and in association with maize: The effect of disease and pest incidence. In Keswani, C.L.; Ndunguru, B.J., eds. Symposium on Intercropping in Semi-arid Areas, 2nd., Morogoro, Tanzania, 1980. Proceedings. Ottawa, Canada, International Development Research Centre. pp.115-116.

0322

RHEENEN, H.A. VAN 1982. Bean research in Eastern Africa. Thika, Kenya, National Horticultural Research Station. Grain Legume Project. 17p.
Paper presented at the Biennial Conference of the Bean Improvement Cooperative, Gainesville, Florida, 1982.

Bean production data, mejor producing areas, climatic aspects (rainfall and temp.), and type of beans cultivated in Burundi, Kenya, Malawi, Rwanda, Tanzania, Uganda, and Zambia are given. Factors limiting production in these East African countries are briefly analyzed: climatic, soil, biological, cultural, economic, commercial, and technical factors. Advances of the different research programs are discussed. Local var. and imported material are being collected. Disease control trials have been carried out on anthracnose (Colletotrichum lindemuthianum), rust (Uromyces phaseoli), halo blight (Pseudomonas phaseolicola), and angular leaf spot (Isariopsis

griseola). Research priorities are listed, namely soil conditions (pH and fertility), resistance to diseases, pests, and drought, and Rhizobium activity. (CIAT)

0323

* RHEENEN, H.A. VAN 1981. Information storage and retrieval for beans by means of punched cards. Bean Improvement Cooperative. Annual Report 24:2-3.

0324

* RHEENEN, H.A. VAN; HASSELBACH, O.E.; MUIGAI, S.G.S. 1981. The effect of growing beans together with maize on the incidence of bean diseases and pests. Netherlands Journal of Plant Pathology 87:193-199.

Compared with monocultures, beans grown in association with maize generally showed less incidence of the following diseases and pests in Kenya: halo blight (Pseudomonas phaseolicola), bean common mosaic, anthracnose (Colletotrichum lindemuthianum), common blight (Xanthomonas phaseoli), scab (Elsinoe phaseoli), black node disease (Phoma exigua var. diversispora), mildew (Erysiphe polygoni), bollworm (Heliothis armigera) and to a lesser extent, angular leaf spot (Phaeoisariopsis griseola). For white mold (Sclerotinia sclerotiorum) and the black beetle Systates the opposite was observed. Rust (Uromyces appendiculatus var. appendiculatus) and aphids (Aphis fabae) were erratic in this respect. Apparently a kind of cultural control of the major bean diseases in Kenya is effected by growing beans in association with maize. (AS)

0325

* RHEENEN, H.A. VAN 1979. A sub-lethal combination of two dominant factors in Phaseolus vulgaris L. Bean Improvement Cooperative. Annual Report 22:67-69.

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, Centro International de Agricultura Tropical, 1979.

0327

* RHEENEN, H.A. VAN 1979. Diversity of food beans in Kenya. Economic Botany 33(4):448-454

In order to have the consumers' preferences in Kenya in beans (Phaseolus vulgaris L.) more clearly outlined and to survey the variation existing in local food bean material, 997 seed samples from plants selected in farmers' fields and from agricultural shows were investigated and classified on the basis of colour, size and shape. For the classification a new number system was used to enable easy data transfer to punch cards. This exercise was primarily carried out to aid in setting the goals for a breeding and selection programme. Of the 997 samples the ten most common types were identified, and among those the Rose cocos occurred most frequently with 36.5%, second were the Canadian wonder types with 13.1%, followed by a Red haricot with 9.2%, Mwezi moja with 9.0% and Mwitemania with 2.4%. The types differed considerably, indicating that consumers' preferences are very flexible. Personal communications lead to the same conclusion. Therefore a breeding and selection programme has, within certain wide limits, allowance to rank characters like disease and drought resistance higher in importance than seed type. (AS)

0328

* RHEENEN, H.A. VAN; MUIGAI, S.G.S.; KITIVO, D.K. 1979. Male sterility in beans (Phaseolus vulgaris L.). Euphytica 28:761-763.

Male sterile bean plants were discovered at the Embu Agricultural Research Station, Kenya. The character is controlled by one recessive gene. (AS)

0329

* RHEENEN, H.A. VAN; GICHUHI, B. 1978. Artificial pollination and pod development of beans. Michigan Dry Bean Digest 2(3):6-7.

Studies were made of flower bud and pod development and pollen shedding of artificially pollinated pot-grown Phaseolus vulgaris beans, cv. Kenseed 20. Pollen shedding occurred 1-2 days before the flowers opened; all the largest buds, but none of the smallest buds, were affected. The time at which artificial pollination was done made little difference to pod set, which amounted to only 18%, 3 weeks later. (AS)

0330

* RHEENEN, H.A. VAN 1978. Crossing of food beans (Phaseolus vulgaris L.). I. Influence of environment and pollination technique. East African Agricultural and Forestry Journal 44(2):126-133.

Experimental work of the Grain Legume Project (Kenya) during the short rains in 1976-77 is reported. At Thika, beans responded to 10 and 30 t FYM/ha, yields increasing by 38 and 90%, respectively. In general earlier planting resulted in better yields. Weeding twice 10-40 days postemergence gave best yields although in some areas one weeding sufficed. Results from density trials were irregular; however, 100,000 plants at Katumani and 200,000 plants elsewhere tended to be optimal. Different aspects of intercropping with maize are discussed. A survey of diseases revealed the presence of halo blight (the most serious), rust, bean common mosaic, southern blight, Sclerotinia rot, leaf spot caused by Cercospora, Alternaria and Ascochyta, angular leaf spot, bean scab, Fusarium root rot and anthracnose. Of 73 cv. tested for resistance to anthracnose, only 3 were resistant. Results are given of regional trials for wet and intermediate rainfall areas. The breeding program, which emphasizes breeding for resistance to anthracnose and halo blight, is discussed, and 2 crossing methods (hooking and rubbing) are compared. (AS)

0331

* RHEENEN, H.A. VAN 1978. Crossing of food beans (Phaseolus vulgaris L.). II. Influence of hormone treatment, relative humidity and flower bud removal. East African Agricultural and Forestry Journal 44(2):134-139.

Two bean cv. GLP-11 and GLP-707 were crossed during 4 subsequent days using the rubbing method. Application of the chemicals lanolin + potassium gibberellate + naphthalene acetamide to a little cut in the calyx, and of potassium gibberellate solution to the stigma, as well as surrounding the flower buds and flowers with moist glass wool failed to improve crossing results; but removal of flower buds and flowers not used for crossing increased pod set and seed no. produced by 138 and 135%, respectively. (AS)

0332

* RHEENEN, H.A. VAN 1977. Diversity of food beans in Kenya. Thika, Kenya, National Horticultural Research Station. Grain Legume Project, 9p.

In order to determine consumer preferences for beans in Kenya and to survey the variation existing in local bean material, 997 seed samples from plants selected in farmers' fields and from agricultural fairs were investigated and classified on the basis of color, size and shape among the 10 most

common types identified, the Rose Cocos occurred most frequently with 36.5%; 2nd were the Canadian Wonder types with 13.1%, followed by a Red Haricot with 9.2%, Mwezimoja with 9.0% and Mwitemania with 2.4%. The types differed considerably, indicating that consumer preferences are very flexible. Therefore, a breeding and selection program can rank characters such as disease and drought resistance higher in importance than seed type. (AS)

0333

ROBINSON, R.A. 1960. Notes on Kenya agriculture. VIII. Important plant diseases. East African Agricultural Journal 25:131-146.

0334

ROOSJE, G.S.; HUBBELING, N. 1977. Grain Legume Project. Report of a consultancy mission to the government of Kenya. Thika, Kenya, National Horticultural Research Station. 12p.

0335

SAVILE, A.H.; WRIGHT, W.A. 1958. Notes on Kenya agriculture. III. Oil seeds, pulses, legumes and root crops. East African Agricultural Journal 24(1):1-9.

0336

SCHONHERR, S.; MBUGUA, E.S. 1976. Bean production in Kenya's Central and Eastern Provinces. Kenya, University of Nairobi. Institute for Development Studies. Occasional Paper no. 23. 69p.

0337

SINGH, J.P.; MUKUNYA, D.M. 1980. Effect of pesticidal seed treatment on beans and maize as mixed crops. In Kenya, University of Nairobi. Faculty of Agriculture. Plant Protection Program. Report no. 3, Dec 1980. pp.37-43.

0338

SMIT, J.J. 1983. CIAT's Phaseolus bean research network in Eastern Africa. Phaseolus Beans Newsletter for Eastern Africa no.1.

0339

* SMIT, J.J.; OKONGO, A.O.; FLOOR, J. 1983. Dry bean agronomy. Kenya Farmer. August 1983 (Special issue: Food beans in Kenya). pp.18-20.

0340

SMIT, J.J.; OKONGO, A.O.; FLOOR, J. 1983. Improvement of dry bean farming practices through agronomic research. Kenya Farmer no.25.

0341

SMIT, J.J.; 1983. Prospects for exporting beans and bean seeds from Kenya. Phaseolus Beans Newsletter for Eastern Africa no.1.

0342

SMIT, J.J. 1983. The USAID bean collaborative research support program for Kenya. Phaseolus Beans Newsletter for Eastern Africa no.1.

0343

SOMEREN, G.C. VAN 1956. Notes on the bean fly (Agromyza phaseoli) and a trial with insecticidal seed dressing for control. Nairobi, Kenya, Fison's Pest Control (East Africa) Ltd. 4p.

0344

* SOUZA, D.I.A. DE 1969. Legume nodulation and nitrogen fixation studies in Kenya. East African Agricultural and Forestry Journal 34:299-305.

Nodulation studies carried out on an extensive scale showed that none of the introduced legumes were able to nodulate effectively without the aid of inoculation; hence it is clear that these legumes must be inoculated. It is advisable to use selected effective strains of inoculant bacteria with such species a Trifolium semipilosum and Glycine max. Certain indigenous genera such as Crotalaria spp. and Dolichos spp. need not be inoculated. Different agronomic techniques are used to evaluate N fixation in legumes that nodulate naturally and those that do not. In a field trial with Lucerne, a legume that does not nodulate naturally, it was estimated that the plant fixed the equivalent of about 50 lb N in 120 days. Field trials designed to evaluate symbiotic N fixation by profusely nodulated Phaseolus vulgaris beans have shown that this legume can fix adequate N to meet its nutritional requirements. In traditional bean-growing areas, inoculation of seed is unnecessary. (AS)

0345

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

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

0346

* SSALI, H. 1981. The effect of level of $CaCO_3$, inoculation and lime pelleting on the nodulation and growth of beans in five acid soils. Plant and Soil 62(1):53-63.

In greenhouse trials with Phaseolus vulgaris cv. Canadian Wonder grown on 5 acid soils of pH 3.9-5.1, nodule wt. decreased with increasing percentage soil C, and at 5.60% C no nodules were observed. In soils with low OM and low exchangeable Al and Mn, inoculation increased nodule wt., DM yield and percentage N especially at the lowest pH level. Where seeds were not inoculated, nodule wt. and DM yield increased with soil pH. Lime pelleting had no apparent advantage. In soils with low OM and substantial amounts of Al and/or Mn, liming increased nodule wt. and DM yield, and lime pelleting was superior to inoculation in increasing nodule wt. particularly at low lime rates. In soils with relatively high OM, high lime rates decreased DM yield. (CAB)

0347

* STOETZER, H.A.I.; OMUNYIN, M.E. 1983. Controlling bean pests and diseases. Kenya Farmer. August 1983 (Special issue: Food beans in Kenya). pp.22-24.

0348

* STOETZER, H.A.I. 1981. Diseases of beans in Kenya. Thika, Kenya, National Horticultural Research Station. Grain Legume Project. 5p.
Also in: Phaseolus Beans Newsletter for Eastern Africa no.1. 1983.

The Grain Legume Project of the National Horticultural Research Station in Thika, Kenya, is carrying out investigations on major bean diseases: BCMV, halo blight (Pseudomonas syringae pv. phaseolicola), anthracnose (Colletotrichum lindemuthianum), angular leaf spot (Phaeoisariopsis griseola), and rust (Uromyces appendiculatus). Control measures are given, especially those feasible for smallholders which include the use of resistant cv., disease-free seed, seed treatment, crop rotation, and field sanitation. So far, 3 cv. have been released which are not fully resistant

to the mentioned diseases, although a new cv., GLP-X,92, is very resistant to P. syringae pv. phaseolicola. Resistant cv. with commercially acceptable seed types are being tested. (CIAT)

0349

SUTTIE, J.M. 1969. The butter beans (Phaseolus vulgaris L.) in Kenya. East African Agricultural and Forestry Journal 35(2):211-212.

Butter beans are grown as a commercial crop in parts of Nakuru and Nyandarua districts, Kenya, between 2,000 and 2,600 m above sea level. The Kenya butter bean is a white seeded variety of Phaseolus coccineus and not of P. lunatus. (RTI)

0350

THAIRU, D.M. 1979. Grain legume production in East Africa with special reference to Kenya.
Paper presented at the Symposium on Grain Legume Improvement in East Africa. Kenya, University of Nairobi, 1979.

0351

WAMOCHO, L.S. 1973. Notes of field diseases of beans. Thika, Kenya, National Horticultural Research Station. Bean Research Project. 15p.

0352

* WANGATI, F.J. 1972. Lysimeter study of water use of maize and beans in East Africa. East African Agricultural and Forestry Journal 38(2):141-156.

Hydraulic lysimeters were used to study the evapotranspiration Et for maize (hybrid H511) and field beans (Phaseolus vulgaris, var. Canadian Wonder) at Mwes Irrigation Settlement, Kenya. Advection effects were minimized by working downwind of extensive rice fields under furrow irrigation. Observations covering the entire growth period from planting to harvest were made in two seasons for maize and one season for beans. Penman estimates of open water evaporation, Eo, were calculated for five-day periods from meteorological observations at the site. A maximum Et/Eo ratio of 1.3-1.4 was recorded for the bean crop which was grown in the long rains season. A ratio of 1.6 was recorded for the first maize crop at the tasselling-silking stage in a period of heavy rainfall. In the second maize crop grown in the dry season with sprinkler irrigation, a maximum ratio of 1.2 was recorded at the onset of heavy rain during crop senescence. Values of the internal canopy resistance r_s derived from records of Et suggest that if the canopy is frequently wetted by rain or irrigation, especially during the period of maximum ground cover, the resulting reduction in r_s can be an important determinant of seasonal water use, especially for a maize crop which has low aerodynamic resistance r_a. (AS)

0353

WANGATI, F.J. 1970. A study of water use efficiency in field crops of maize and beans. Ph.D. Thesis. University of East Africa. 183p.

0354

WAWERE, J.N. 1974. Bean production in Central Province: communications in bean files. Nyeri, Kenya, Ministry of Agriculture. Central Province.

0355

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

0356

ZOEBL, D. 1983. Beans in the Kenya press. Phaseolus Beans Newsletter for Eastern Africa no.1.

0357
* ZOEBL, D. 1983. Scope for GLP seeds. Kenya Farmer. August 1983 (Special issue: Food beans in Kenya). pp.24-25.

LIBYA

0358

AL-RUBEAL, M.A.F. 1981. Radiosensitivity of dormant Phaseolus seeds. Environmental and Experimental Botany 21(1):71-74.

The radiosensitivity of P. vulgaris cv. Kentucky Wonder and Contender and wild types V1441 and V1438, P. aborigineus and P. coccineus seeds was compared after exposure to gamma-rays at 2.8 kR/min. Factors associated with radiosensitivity were growth habit and seed size and differences in dose-reaponse were most noticeable at 18640 R. Growth of P. coccineus was completely inhibited and Kentucky Wonder only had a 2% survival rate. Growth was depressed by 74% in Contender and 40% in P. aborigineus. Wild types were only depressed by 0-8%. (CAB)

MALAGASY REPUBLIC

0359

* DENARIE, J. 1968. Inoculation de legumineuses a Madagascar; resultats experimentaux. Annales Agronomiques 19(4):473-496.

In tropical arid soils, generally poor in organic matter, N is the principal limiting factor in agricultural production. In Madagascar an increase in agricultural production depends on 2 factors: (1) an increase in cultivated area by making use of virgin soils rich in Fe in the highlands and the sandy soils of the Southwest and (2) a better utilization of lands already under cultivation where water is not a limiting factor; i.e., planting other crops in rice-growing areas between the rice crops. In both cases the growing of legumes would improve the soil N; however, since there is poor nodulation in these areas, these soils may not contain a sufficient quantity of specific strains of Rhizobium. For this reason isolations of local Rhizobium strains were made from nodules of various legumes from tropical and temperature climates (peanuts, beans, soybeans and forage plants), and a series of field inoculation trials were conducted to determine for which plants and in which types of soil the absence of Rhizobium constituted a limiting factor in nodulation and to what extent Rhizobium could improve nitrogenous nutrition. Using Bonnier's method, 62 Rhizobium strains were isolated for use in these trials, carried out during the dry and rainy seasons in the aforementioned soils. It is concluded that inoculation increases N fixation in (1) all legumes in rice-growing areas, (2) in soybeans and beans in highlands planted for the 1st time, and (3) in soybeans and peanuts in sandy soils deficient in organic matter. Inoculation also increases the number of nodules in perennial tropical legumes such as Desmodium intortum and Phaseolus atropurpureus. (CIAT)

0360

* HUU HAI, V.; ANDRIAMANANTENA, S. 1970. Inoculation des legumiueuses, resultats de l'experimentation 1968. Agronomie Tropicale 25(6-7): 596-603.

In tropical soils with little organic matter, lack of N is often a limiting production factor. Import of N fertilizers is expensive; therefore, the growing of legumes can be of considerable help. In Madagascar, groundnuts, soya beans and beans were inoculated with Rhizobium strains. It appeared that for groundnuts the introduced Rhizobium was less efficient than the local strains; beans and soya beans inoculations, however, highly increased nodulation and yield. Rhizobium together with manure gave the most significant increases. (AS)

0361

* AYONOADU, U.W.U. 1974. Races of bean anthracnose in Malawi. Turrialba 24(3):311-314.

Sixteen isolates of anthracnose (Colletotrichum lindemuthianum) from infected bean (Phaseolus vulgaris) pods collected from 3 sites in Malawi were tested on a set of 7 differential varieties used by Schreiber; Goth and Zaumeyer, and Leaky and Simbwa-Bunnya. Results showed that the gamma race group was most abundant and that 3 new races were present. Inoculations of isolates, representing the alpha, beta, gamma and delta race groups on 40 determinate and indeterminate small and large-seeded cultivars did not show any consistent pattern in the reaction of the cultivars to the 4 race groups. (AS)

0362

* AYONOADU, U.W.U.; MORRINGTON-DAVIES, J.; EDJE, O.T.; MUGHOGHO, L.K. 1974. Weed control and its effects on yield of Phaseolus vulgaris beans in Malawi. Journal of Agricultural Science 82(2):283-286.

A number of herbicide treatments involving the use of trifluralin, preforan and igran were compared together with hand weeding as methods for the control of weeds in a cultivar of Phaseolus vulgaris sown on 19 January 1972. Favourable increases in yield of beans were obtained by combinations of preforan and igran which were associated with an increase in the number of pods produced per plant. Hand weeding failed to give a significant increase in final yield. Within 14 days from sowing there was an appreciable weed cover in the control and hand-weeded plots but little evidence of weeds in the herbicide-treated plots. At 41 days there were still no significant differences between the control and the plots to be hand weeded. There was, however, a considerable reduction in percentage cover of weeds on the herbicide treated plots. Trifluralin and preforan were equally effective in reducing weed cover. (AS)

0363

* AYONOADU, U.W.U.; EDJE, O.T.; MUGHOGHO, L.K. 1973. Seed size as a factor in navy bean production. Bean Improvement Cooperative. Annual Report 16:64-65.

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.

0365

* AYONOADU, U.W.U.; MUGHOGHO, L.K.; EDJE, O.T. 1971. The breeding and genetic improvement of Phaseolus vulgaris beans. Lilongwe, Malawi. Bunda College of Agriculture. Research Bulletin no. 2. pp.10-14.

The progress made during 1970-71 with regard to mass selection of promising lines added to the collection is summarized. Hybridization used 74 lines and var. in crosses and recripocal crosses, selecting 64 to obtain F_1s. For F_2s, 75 lines were planted under irrigation, using a compound fertilizer, and harvested individually. Date of maturity, growth habit, no. of pods/plant, seeds/pod, seed wt/plant and changes in the seed coat color, were used as parameters. The 10 highest yielding plants were continued in the F_3. In 1971-72, selection was based on resistance to rust (Uromyces appendiculatus), anthracnose (Colletotrichum lindemuthianum) and bacterial blight (Xanthomonas spp.), and on seed size. (CIAT)

0366

CHIYENDA, S.S; EDJE, O.T. 1976. Effect of plot size and number of replicates on the relative efficiency of the randomized complete block design in determinate bean experiment. Lilongwe, Malawi, Bunda College of Agriculture. Research Bulletin no. 7. pp.59-71.

The effects of number of replicates and plot size, defined as the middle ridge only, 1 outer ridge + the middle ridge or the whole plot (3 ridges), on the relative efficiency of the randomized complete block design were investigated in an experiment with the determinate Phaseolus vulgaris cv. 253/1. Greatest relative efficiency in terms of least variation and lowest values of the standard deviation expressed as a percentage of the mean was observed for data based on the whole plot. This was clearly demonstrated by a decrease in the range of this index from 9.0-21.3% for the middle ridge only to 8.5-15.8% for the whole plot. Relative efficiency also increased as the number of replicates increased from 2 to 5. (CAB)

0367

* EDJE, O.T. 1983. Effects of planting maize and beans in monoculture and in association at relative dates. Bean Improvement Cooperative. Annual Report 26:93-95.

The effect of planting maize with two dwarf bean cv. (Nasaka and P402) at 3 relative dates in monoculture or in association on seed yield was invertigated. All maize treatments were planted on the same day. Beans were sown at 2 weekly intervals 10 Dec. 1981 (T1), 24 Dec. 1981 (T2) and 7 Jan. 1982 (T3). Seed yields of bean in monoculture, pooled over cv. were 2764, 2808, and 3060 kg/ha for T1, T2, T3, resp. Bean yield in association with maize averaged 484, 377, and 139 kg/ha for T1, T2, T3, resp. (CIAT)

0368

* EDJE, O.T. 1982. Effect of frequency of irrigation on dry bean yields. Bean Improvement Cooperative. Annual Report 25:28-29.

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. Morogoro, Tanzania, 1980. Proceedings. Ottawa, Canada. International Development Research Centre. pp.69-70.

0370

* EDJE, O.T.; MUGHOGHO, L.K.; RAO, Y.P.; MSUKU, W.A.B. 1981. Bean production in Malawi. In Regional Workshop on Potential for Field Beans in Eastern Africa, Lilongwe, Malawi, 1980. Proceedings. Cali, Colombia, Centro Internacional de Agricultura Tropical. Series 03EB-1. pp.54-97.

Aspects on the importance, types, introduction, distribution, and the results of research on the production of beans, the major food crop, in Malawi are discussed. Beans grown are mixtures (70% climbing beans) and are grouped according to their use in dry beans, snap beans, and canning beans (the latter produced under irrigation). Soil and climatic conditions are given for the crop and the production systems used (mixed cropping, ridge intercropping, relay cropping, double cropping, time of planting, plant population, fertilizers, weed control, irrigation, harvesting, and threshing) are described in detail. There is no data collected on the area planted to beans or on the total production. The internal market is dominated by the Agricultural Development and Marketing Corporation (ADMARC) which is responsible for the purchase of the surplus sold by farmers. The central region of the country produces over 70% of the bean crop. Local names of different bean dishes are also included. Major

constraints include irregular rainfall, diseases (a total of 23 of which anthracnose is the most important), pests, lack of suitable var.; research and extension workers, and the need of adequate seed production and distribution. The objectives of the bean improvement program are given along with information on the collection of bean germplasm and future plans. (CIAT)

0371

* EDJE, O.T. 1981. Effect of planting pattern and plant density on bean yield. Bean Improvement Cooperative. Annual Report 24:101-103.

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.

0373

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

The effects of 3 levels of nitrogen and leaf removal treatments on seed yield of Phaseolus beans were investigated during two seasons. Additional N increased seed yield significantly in both seasons. The removal of bean leaves at the pre-flowering stage had a less drastic effect on seed yield than when they were removed later in the season. Leaf removal caused a reduction in seed yield, but the combined monetary value of seeds and plucked fresh leaves was generally higher than that of seeds from unplucked plants. (RTI)

0374

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

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

0375

* EDJE, O.T. 1981. Response of sorghum and beans in monoculture and in assocciation. Luso: Journal of Science and Technology (Malawi) 2(1):3-13.

Sorghum (Sorghum bicolor L.) and beans (Phaseolus vulgaris L.) were grown in monoculture (pure stand) and in association (in mixture) at Bunda College of Agriculture, Lilongwe, Malawi. Both crops were planted simultaneously on ridges which were 91 cm apart. Plant stand of each crop in monoculture or in association was the same, being 109,900 and 219,800 plants/ha for sorghum and beans, respectively. Sorghum yields were not significantly affected when grown in association with beans. Bean yields were, however, reduced by 33.2% on the average when grown in association with sorghum because of the competitive advantage of sorghum over the associated bean crop. Despite the yield reduction of beans when grown in

association with sorghum, the mixed cropping system provided a more efficient use of land, producing a land equivalent ratio of 1.50, and a better economic return with an income equivalent ratio of 1.51. (AS)

0376

* EDJE, O.T. 1981. Studies on bean and groundnut in monoculture and in association. Bean Improvement Cooperative. Annual Report 24:96-98.

0377

* EDJE, O.T. 1980. Bean research programme in Malawi. Lilongwe, University of Malawi. Bunda College of Agriculture. 64p.

A bean improvement program was initiated in Malawi in 1969. The objectives and research areas, namely germplasm collection and evaluation, breeding, agronomy (production systems), crop protection (diseases, pests, and weeds), and crop physiology are included. Results of several expt. conducted during 1970-77 are analyzed. A total of 557 determinate and 1501 indeterminate materials have been assessed for yield and various agronomic characteristics. Agronomic aspects studied included: var. trials, time of planting, irrigation, plant density (bush and climbing beans), size of ridge, soil fertility (NPKS), N sources and rates, split application of N, seed inoculation, plucking of leaves for use as vegetable, method of support for climbing beans, crop rotation, time of planting intercrops, genotype x var. interaction, fertilizer requirements and plant density in maize/bean intercropping, simultaneous polycropping, relay cropping, disease and pest control. Physiological studies included growth analysis, shading expt., sink source relationship, apical and lateral bud removal, and breeding. Resulting data are included in table form. (CIAT)

0378

* EDJE, O.T.; RAO, Y.P. 1980. Response of climbing beans to staking height. Bean Improvement Cooperative. Annual Report 23:61-62.

Two climbing bean cv. (336 and 1039) and 4 trellis heights (0, 1, 2, and 3 m) were used to evaluate the effect of trellis height on crop yields at the Bunda College of Agriculture, Malawi, during the 1978/79 crop season. Plants were planted on 91 cm ridges and 15 cm between plants. All treatments received compound NPK fertilizer 20-8.7-0 at a rate of 300 kg/ha at planting. Yield increased significantly (P = 0.01) with the increase in trellis height. Treatments with 1, 2, and 3 m heights yielded 108, 140, and 154%, resp., more than the check without trellis. There were no significant differences between av. yields of cv. 336 and 1039 (2444 and 2280 kg/ha, resp.). Trellis height improved seed quality and pod frequency was 2, 4, 5, and 6 seeded pods for treatments 0, 1, 2, and 3 m, resp. Other characteristics such as DM, LAI, leaf senescence, and physiological maturity of the crop were also affected by the treatments. Results are given in table form. (CIAT)

0379

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

0380

EDJE, O.T.; MUCHOGHO, L.K.; RAO, Y.P. 1979. Effects of intercropping maize with beans on yield. Lilongwe, University of Malawi. Bunda College of Agriculture.
Paper presented at the Symposium on Grain Legume Improvement in East Africa. Kenya, University of Nairobi, 1979.

0381

* EDJE, O.T.; RAO, Y.P.; MUGHOGHO, L.K. 1979. Seed, energy and protein yields in maize and beans. Bean Improvement Cooperative. Annual Report 22:28-30.

0382

EDJE, O.T.; MUGHOGHO, L.K.; RAO, Y.P. 1978. Bean improvement programme: 1976/77 and 1977/78 rain-fed and 1976 irrigated crop experiments. Lilongwe, Malawi. Bunda College of Agriculture. Research Bulletin no. 9. pp.76-94.

Results of field trials with Phaseolus vulgaris in the rainy seasons of 1976-7 and 1977-8 and the dry season of 1976 are presented. Seed yields were generally lower in 1977-8 than in 1976-7. In cv. trials the highest yields were given by cv. 1309 (2.52 t/ha), 125 (2.27 t), 1230 (2.56 t) and 1290 (2.91 t). The effects of mixed cropping with maize, staking ht., application of N, P, K and S, irrigation, spacing and plant density, fungicide treatment, depodding and defoliation are also reported. (CAB)

0383

* EDJE, O.T.; MUGHOGHO, L.K. 1978. Effect of staking on yield and quality of indeterminate beans. Turrialba 28(1):51-55.

Indeterminate beans were grown on 91-cm ridges for 3 seasons in Malawi to compare the effects of no staking, vertical and horizontal staking on seed yield and quality. Seed yields, for no staking, vertical and horizontal staking methods averaged 1178, 2069 and 2061 kg/ha, respectively, indicating that both vertical and horizontal methods of staking had comparable results. It was easier to train vines on rougher than on smoother stakes and on vertical than on horizontal stakes. Staking also produced higher quality seeds because of higher pod clearance above the ground, which resulted in fewer pods resting on the ground with staked than with unstaked plants. (AS)

0384

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

0385

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

0386

EDJE, O.T. 1978. Response of Phaseolus beans to overseeding and stand reduction. Lilongwe, University of Malawi. Bunda College of Agriculture. Research Bulletin no. 9. pp.8-15.

The effects of sowing excess seed followed by thinning on the yield of determinate P. vulgaris cv. 253/1 and 1196 were studied in the rainy season of 1975-6. Initial populations of 50 plants/m^2 were thinned (a) 1 or (b) 2 wk before or (c) at full flowering to give 22 plants/m^2, or initial plant populations of (d) 25 and (e) 50 plants/m^2 were thinned 1 wk after emergence to give 22 and 44 plants/m^2, resp. In both cv., LAI, LAR, specific leaf area, specific leaf wt. and DM yield/m^2 increased with each delay in thinning. None of the thinning treatments affected seed yields but the mean yield from cv. 1196 (2.36 t/ha) was twice that from 253/1. Doubling the population to 44 plants/m^2 did not affect seed yield. Correlation coeff. between yield and the number of filled pods/m^2 or of filled pods/plant were 0.84 and 0.92, resp. These yield components were not sensitive to interplant competition in (a), (b) and (c), but were sensitive in (e).

0387

EDJE, O.T.; MUGHOGHO, L.K.; RAO, Y.P.; MSUKU, W.A.B. 1976. Bean improvement programme: 1975/76 experiments. Lilongwe, University of Malawi. Bunda College of Agriculture. Research Bulletin no. 7. pp.72-117.

Results of several field trials aimed at producing a package practice for Phaseolus vulgaris production and carried out in different ecological areas in Malawi under rainfed and irrigated conditions in the 1975-6 crop season are reported. (CAB)

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.

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.

0390

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

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.

0392

EDJE, O.T.; MUGHOGHO, L.K.; RAO, Y.P. 1975. Bean improvement programme: 1974/75 experiments. Lilongwe, University of Malawi. Bunda College of Agriculture. Research Bulletin no. 6. pp.51-100.

In variety trials in different areas of Malawi, Phaseolus vulgaris cv. 499/5 gave the highest seed yields (2.52 t/ha). Pure stands of maize and beans produced 10.35 t grain and 2.62 t seed/ha, respectively, whereas a mixed crop produced 10.50 t/ha. Dusting of 3 bean cultivars with S increased yield from 7.34 t/ha to 10.01 t and the highest yield over all sites was given by 60 kg N + 25 kg S/ha. Daconil [chlorthalonil] was the most effective fungicide tested, increasing seed yield from 1.43 t/ha to 1.87 t. Competition from weeds reduced yields during the first 21-28 days after sowing. Although removal of 6 fully-expanded young leaves reduced seed yield by 9.4%, the total value of seed and fresh leaves was higher in defoliated plants than in untreated controls. Under irrigation, it was found that there was no advantage in sowing more than 1 seed/hill. Developmental and physiological patterns were studied under irrigated and rainfed conditions. (CAB)

0393

* EDJE, O.T.; MUGHOGHO, L.K.; AYONOADU, U.W.U. 1975. Bean yield and yield components as affected by fertilizer and plant population. Turrialba 25(1):79-84.

Dry bean (Phaseolus vulgaris) cv. 253/1 and 298/2 were sown at rates of (a) 111,000, (b) 222,000 or (c) 444,000 plants/ha in Jan. 1973 and given 0, 400 or 800 kg 4:7.8:12.5 NPK/ha. Average seed yields of 253/1 and 298/2 were 1.60 and 1.34 t/ha, respectively, and were highest (1.92 and 1.69 t/ha, respectively) with (c) at the highest fertilizer rate. Yields increased by 25 and 10% on increasing NPK rates from 0 to 400 kg and 400 to 800 kg/ha,

respectively, and by 19 and 13% on increasing plant population from (a) to (b) and (b) to (c), respectively. The highest yield/plant, number of pods/plant, number of seeds/pod and number of branches/plant were obtained with (a). Yield was positively correlated with seed size, plant height and pod length. Height of first pod was greatest with (c). (CAB)

0394

* EDJE, O.T.; MUGHOGHO, L.K.; AYONOADU, U.W.U. 1975. Responses of dry beans to varying nitrogen levels. Agronomy Journal 67(2):251-255.

In field trials in 1972-3, average seed yields of irrigated beans (Phaseolus vulgaris) cv. Canadian Wonder given 0, 40, 80, 120, 160 or 200 kg N/ha were 2.2, 2.7, 3.0, 3.1, 3.4 and 3.8 t/ha, respectively. Seed yield/plant, number of pods/plant, pod length, seed CP content, LAI and plant height and size but not specific leaf area or leaf area/g total plant material were closely related to N rate. Number of pods/plant was positively and significantly correlated with seed yield/ha. (CAB)

0395

* EDJE, O.T.; MUGHOGHO, L.K. 1974. Agronomy experiments on Phaseolus beans. Lilongwe , University of Malawi. Bunda College of Agriculture. Research Bulletin no. 5. pp.69-97.

Results are given of 1973-74 field evaluations of bean germplasm, varietal performance trials and experiments on production systems, fertilizers, plant populations and physiology, conducted under rain-fed conditions in several ecological zones of Malawi. Evaluation of the germplasm bank indicated that many bean lines had high yield potential despite heavy incidence of diseases such as anthracnose, angular leaf spot and blights (halo, bacterial and southern). Mixed cropping (beans/maize) was more efficient in use of land, especially when adequate plant population were maintained. In monoculture maize and beans yielded 4843 and 2152 kg/ha, respectively (mean, 3498 kg/ha), whereas a mixed crop yielded 6206 kg/ha. As in previous years, staked beans yielded ca. 100% more than unstaked beans, and there was no significant difference between vertical and horizontal staking. Removing 3, 6 or 9 fully expanded succulent leaves from determinate bean var. reduced seed yield 8, 49 and 63%, respectively. However, the mean value of seeds from undefoliated plots was comparable to that of seeds and fresh leaves from plots where a total of 9 leaves had been removed (Kwacha 96.91 and 100.46, respectively). In the experiment on N sources and rates, treatments with sodium nitrate gave best yields and ammonium sulfate, the lowest. A fertilizer/plant population trial showed that increasing fertilizer levels from 0 to 400 kg/ha increased seed yield 26% as compared to 24% for 800 kg/ha. With increasing plant populations, seed yield increased with mean yields (pooled over fertilizer levels) of 2042, 2323, 2411 and 2812 kg/ha at 56, 111, 222 and 444 thousand plants/ha, respectively. Of 6 fungicides evaluated, triphenyltin hydroxide (Du-Ter) was the most effective in controlling diseases, especially anthracnose. Studies on the photosynthetic efficiency of the different zones of the bean plant (zone defoliated 21 and 35 days after planting) showed that the middle and basal third were the most and least efficient, respectively. The middle zone was more efficient when the top zone was present than when the basal and middle zone were both present. Studies on the different stages of growth showed that the plants emerged 7-8 days after planting, began flowering in 27 days, reached full bloom in 36 days and pods were visible about 11 days after onset of flowering. Flowering continued for about 32 days, perhaps because of prolonged rainfall. (AS)

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.

0397

* EDJE, O.T.; AYONOADU, U.W.U.; MUGHOGHO, L.K. 1974. Response of indeterminate beans to varying plant populations. Turrialba 24(1):100-103.

5 indeterminate P. vulgaris cultivars (Nos. 139/1, 336, 499/5, 698/1 and 1200) were sown by hand 45, 30 or 15 cm apart on ridges 90 cm apart to give densities of (a) 24 690, (b) 37 040 or (c) 74 074 plants/ha, respectively. Seed yields ranged from 1.32 t in 698/1 to 2.53 t/ha in 499/5 (mean of all densities) and averaged over all cultivars were 1.62, 1.84 and 1.97 t/ha for (a), (b) and (c), respectively. Yield/ha was positively correlated with number of seeds/pod and shelling percentages and negatively with pod length. (AS)

0398

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

0399

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

0400

EDJE, O.T.; MUGHOGHO, L.K.; AYONOADU, U.W.U. 1972. Effect of leaf removal on the yield of Phaseolus beans. Malawi Journal of Science 1:10-14.

0401

EDJE, O.T.; AYONOADU, U.W.U.; MUGHOGHO, L.K. 1972. Effects of row width and plant spacing on the yield of canning beans. Lilongwe, University of Malawi. Bunda College of Agriculture. 44p.
Paper presented at the Annual Meeting. American Society of Agronomy, 64th, 1972.

0402

EDJE, O.T.; AYONOADU, U.W.U. 1972. Effect of seed size on the yield of canning beans. Malawi Journal of Science 1:37-40.

0403

EDJE, O.T.; MUGHOGHO, L.K.; AYONOADU, U.W.U.; RAO, Y.P. 1971-1977. Phaseolus bean experiments. Lilongwe, Malawi. Bunda College of Agriculture. Research Bulletin no. 2-7.

0404

* INTERNATIONAL SERVICE FOR NATIONAL AGRICULTURAL RESEARCH. 1982. A review of the agricultural research system of Malawi. The Hague, Netherlands. Report to the Covernment of Malawi. ISNAR R8. 88p.

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.

0406

MUGHOGHO, L.K.; EDJE, O.T.; RAO, Y.P. 1979. Improvement of Phaseolus beans in Malawi. Lilongwe, University of Malawi. Bunda College of Agriculture. Paper presented at the Symposium on Grain Legume Improvement in East Africa. Kenya, University of Nairobi, 1979.

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.

0408

MUIGAI, S.G.S. 1979. Male sterility in beans. Paper presented at the Symposium on Grain Legume Improvement in East Africa. Kenya, University of Nairobi 1979. 3p.

0409

* NGWIRA, L.K.H.; EDJE, O.T. 1974. Leaf area index ratio, dry matter distribution and yield of beans at varying plant populations. Bean Improvement Cooperative. Annual Report 17:60.

0410

PEREGRINE, W.T.H.; SIDDIGI, M.A. 1972. A revised and annotated list of plant diseases in Malawi. Kew, Surrey, England, Commonwealth Mycological Institute. Phytopathological Paper no. 16.

0411

* PEREGRINE, W.T.H. 1971. A preliminary note on chemical control of bean anthracnose in Malawi. Pans 17(1):47-50.

Results of trials on chemical control of bean anthracnose are presented, and a recommendation for the use of fentin hydroxide at the rate of 1.52oz a.i./50 gal of water per acre is made on research stations, where production of good quality seed is of great importance.

0412

* RAO, Y.P.; EDJE, O.T.; MUGHOGHO, L.K.; MSUKU, W.A.B. 1980. Field evaluation of bean (Phaseolus vuglaris) germplasm for disease resistance. Bean Improvement Cooperative. Annual Report 23:72-73.

0413

* RAO, Y.P.; MUGHOGHO, L.K.; EDJE, O.T.; MSUKU, W.A.B. 1977. Disease filtration in beans. Bean Improvement Cooperative. Annual Report 20:54-57.

0414

* SAKA, V.W. 1982. International Meloidogyne Project report in Malawi. In Research Planning Conference on Root-Knot Nematodes, Meloidogyne spp., 3rd., Regions IV and V. Ibadan, Nigeria, 1981. Proceedings. Ibadan, International Institute of Tropical Agriculture. pp.31-36.

Since the Nematology Section at Bvumbwe Research Station, Malawi, started to cooperate with the International Meloidogyne Project in 1978, work has concentrated on root and soil sample collection and testing of both local and foreign cultivars against M. javanica. Nematode were collected from Bvumbwe on banana, from Kwenengwe on beans (Phaseolus vulgaris L.), tomato, and celery; and from Ngabu on cotton. Pathogenicity tests have shown that all cotton varieties, Chloris gayana var. Katambora and Manihot esculenta var. Masangwi are immune to M. javanica and are recommended for crop rotations. (CIAT)

0415

SEYANI, J.H.; EDJE, O.T. 1974. Photosynthetic efficiency of different zones of Phaseolus beans. Lilongwe, University of Malawi. Bunda College of Agriculture. Research Bulletin no.5. pp.48-58.

Leaves of P. vulgaris cv. 1199 were or were not removed in (a) the top third, (b) the middle third and (c) the bottom third of the plants at (d) 21, (e), 35 or (f) 49 days after sowing. Mean seed yields were 0.96, 0.82

and 0.78 t/ha in (d), (e) and (f), respectively. The highest seed yield (1.08 t/ha) was produced when all zones were undefoliated. Removing leaves from (a), (b) and (c) decreased seed yields by 17.2, 10.6 and 0.9% and from (a) + (b), (a) + (c), (b) + (c) and (a) + (b) + (c) by 34.3, 11.2, 26.1 and 69.3%, respectively, compared with the undefoliated control. Zone (b) was the most photosynthetic-efficient zone when only that zone was undefoliated, whereas (c) was the least efficient. All zones functioned below their photosynthetic efficiency when other zones were present.

0416

* SPURLING, A.T. 1973. Field trials with Canadian Wonder beans in Malawi. Experimental Agriculture 9(2):97-105.

In a series of trials during 6 years at Bvumbwe (1150 m altitude) with beans (Phaseolus vulgaris) cv. Canadian Wonder, seed yield was markedly decreased by delay in sowing after the 1st rainfall of the wet season. Spraying with 3.5 g zineb/l at 1-week intervals increased yields from 1.12-1.63 t dry seeds/ha in unsprayed plots to 1.83-1.97 t. Intercropping maize with beans did not decrease the grain yield of the maize and produced an economically worthwhile yield of bean seeds. In a spacing trial with beans sown at plant densities in the range 5876-47,009 plants/ha, density had little effect on yields when conditions for growth were good, but when conditions were unfavourable, yields were highest at the highest density. In a fertilizer trial, there was a yield response to 11 kg N/ha, but not to higher rates of N or to P, K or seed inoculation. (CAB)

MAURITIUS

0417

* BEAN CULTIVATION in Mauritius. Mauritius, Department of Agriculture. Bulletin no. 96. pp.1-4. 1965.

Several dwarf varieties of French beans (Phaseolus vulgaris) are grown in Mauritius as a green vegetable or a pulse. This brief guide to their cultivation recommends, inter alia: drilling at a spacing of 75 x 10-15 cm or planting at 38 x 38 cm with 2 seeds per hole, using seed treated with a fungicide; application of 140 kg single superphosphate (or 56 kg triple superphosphate) plus 56 kg potassium sulphate per ha at planting, followed 15 days later by top-dressing with 56 kg ammonium sulphate per ha on poor soils. Yields of 7,800 kg green pods or 900 kg beans per ha are common. Beans may be planted between sugar-cane rows; yields will then attain 25% of the yield of a pure stand. Several fungal diseases should be preventively controlled by weekly sprayings with 0.015% zineb or maneb. The main pests are the bean fly (Melanagromyza phaseoli), the caterpillars of Nacoleia praeteritalis and Maruca testulalis, and red spider mites; insecticidal control of these pests is indicated. (RTI)

0418

VENCATASAMY, D.R.; PEERALLY, M.A. 1981. Effects of certain environmental factors on nodulation and nitrogen fixation in Phaseolus vulgaris L. beans. Revue Agricole et Sucriere de l'Ile Maurice 60(2):61-70.

0419

VENCATASAMY, D.R.; RUHEE, K.C. 1981. Preliminary studies in dry beans production. Revue Agricole et Sucriere de l'Ile Maurice 60(3/4):167-173.

0420

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

In pot trials nodule development, leghaemoglobin buildup, DM production and N accumulation in P. vulgaris cv. Long Tom inoculated with an effective strain of Rhizobium phaseoli were studied. Pink nodules appeared on day 12 after germination, indicating that this cv. was a late nodulator. A steep rise in leghaemoglobin content of nodules occurred from day 12 to day 39 and was followed by a period of c. 10 days when leghaemoglobin content was constant after which it declined. N-fixing activity increased until day 29 (at flowering) and continued until day 39 (at pod filling) and then decreased. Peak N-fixing activity occurred between days 29 and 39. Long Tom had a comparatively short N fixing cycle lasting for about a month. Such a short cycle did not permit the fixation and accumulation of sufficient N in the plant for medium pod production. Hence supplementation with mineral N was necessary after germination and prior to pod filling. (CAB)

0421

VENCATASAMY, D.R.; PEERALLY, M.A. 1980. Application of biological nitrogen fixation in Mauritius. I. Preliminary investigations on the effect of Rhizobium inoculation of the "haricot" bean. Revue Agricole et Sucriere de l'Ile Maurice 59(3):107-114.

Isolation and testing of effective strains of Rhizobium phaseoli on Phaseolus vulgaris are described. Results of pot and field trials to study the effects of various Rhizobium strains on the growth of P. vulgaris are given. (CAB)

0422

VENCATASAMY, D.R.; PEERALLY, M.A. 1980. Application of biological nitrogen fixation in Mauritius. II. A soil-bagasse carrier for the preparation of Rhizobium inoculants. Revue Agricole et Sucriere de l'Ile Maurice 59(3): 115-121.

Soil-bagasse mixtures were as effective carriers for Rhizobium app. as peat. In pot trials with Phaseolus vulgaris, soil-bagasse inoculum provided adequate rhizobia for effective nodulation. In field trials with peas a soil-bagasse inoculum of R. leguminosarum increased nodule and shoot fresh wt. and pod yield compared with uninoculated controls and gave higher pod yields than the treatment given 25 kg N/ha. (CAB)

MOROCCO

0423

KHACHANI, M. 1981. Contribution a l'etude de la response du haricot vert a l'inoculation. Rabat, Morocco. Institut Agronomique et Veterinaire Hassan 2. Memoire (3eme cycle agronomie). 116p.

0424

* LOCKHART, B.E.L.; FISCHER, H.U. 1974. Chronic infection by seedborne bean common mosaic virus in Morocco. Plant Disease Reporter 58(4):307-308.

Infection by seedborne bean common mosaic virus (BCMV) has been identified as one of the principal causes of yield loss in green snap bean production in Morocco. All varieties cultivated locally are highly susceptible to infection. No alternate host of the virus appear to exist, or be necessary in view of the cultivators' practice of seeding successive crops from the previous year's harvest. The virus was readily transmitted by aphids, and samples of seed obtained from growers gave up to 34% infected plants upon germination. (AS)

0425

NEHRI, A. 1980. Essai de fertilisation de la culture du haricot vert. Comparaison de quelques techniques de fumure organique. Rabat, Morocco. Institut Agronomique et Veterinaire Hassan 2. 34p.

NIGERIA

0426

* ADEKUNLE, A.A.; AYENI, O. 1976. Occurrence and distribution of mycotoxic flora in some Nigerian foods. Egyptian Journal of Microbiology 9(1/2):85-95.

The fungal pattern of 15 different kinds of Nigerian foods in Ibadan including some of their products collected from 4 divisional districts markets has been determined. Members of the Aspergillaceae, Cladosporium and Penicillium were the most predominant flora in the survey. Most of the isolated species were shown to have toxigenic potentiality in Wistar rats. (AS)

0427

* AJIBOLA TAYLOR, T. 1981. Distribution, ecology and importance of bruchids attacking grain legumes and pulses in Africa. In Labeyrie, V., eds. International Symposium on the Ecology of Bruchids Attacking Legumes (Pulses). Tours, France, 1980. Proceedings. The Hague, Junk. Series Entomologica v.19. pp.199-203.

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.

0429

* EZEILO, W.N.O. 1979. Intercropping with cassava in Africa. In Weber, E.; Nestel, B.; Campbell, M., eds. Workshop on Intercropping with Cassava, Trivandrum, India, 1978. Proceedings. Ottawa, Canada, International Development Research Centre. pp.49-56.

The role of cassava in the traditional farming system of Nigeria is analyzed. In the south, cassava is often intercropped with cocoyams, yams, maize, okra, melon, and beans. Results of research conducted by the International Institute of Tropical Agriculture (IITA) to determine dominant crop mixtures, planting patterns, practices, and productivity of land and labor in various ecological zones are described. It was concluded that the main combinations of cassava were with maize, yams, and yams + maize. Recent work has produced high-yielding, disease-resistant cassava var. that also have ideal characteristics for intercropping with maize and cowpeas. The National Accelerated Food Production Project (NAFPP) was established in 1973 to increase the production of staple foods such as cassava, by stimulating the use of new technologies, high-yielding planting materials, agrochemicals, improved agronomic practices, credits, storage, and marketing. (CIAT)

0430

* FAWOLE, I.; GABELMAN, W.H.; GERLOFF, G.C. 1982. Genetic control of root development in beans (Phaseolus vulgaris L.) grown under phosphorus stress. Journal of the American Society for Horticultural Science 107(1):98-100.

Genetic control of root development in beans was investigated in the parents, F_1, backcrosses and F_2 obtained from 6 crosses made among 6 lines obtained from an earlier study of efficiency in P utilization. One line produced significantly larger and more vigorous roots and a narrower shoot/root than the other 5 lines, both at stress and at adequate levels of P. Quantitative inheritance patterns and transgressive segregation for root dry weights were observed and high broad sense heritability estimates were

obtained. Dominance variance was more important than additive variance in 4 families. (AS)

0431

* FAWOLE, I.; GABELMAN, W.H.; GERLOFF, G.C.; NORDHEIM, E.V. 1982. Heritability of efficiency on phosphorus utilization in beans (Phaseolus vulgaris L.) grown under phosphorus stress. Journal of the American Society for Horticultural Science 107(1):94-97.

The heritability of efficiency in phosphorus utilization under deficiency stress was investigated using 6 bean families derived from crosses between selected efficient, moderately inefficient, and inefficient lines. Total plant dry weight (DW) was used as an index of efficiency. Epistasis, notably additive by additive and dominance by dominance gene effects, made major contributions to the efficiency in P utilization. Additive and dominance gene effects also made significant contributions. Estimates of broad sense heritability for total plant DW showed that efficiency in P utilization was a highly heritable trait. Narrow sense heritability estimates for total plant DW were high in all families studied. (AS)

0432

HORST, W.J.; MARSCHNER, H. 1978. Einfluss von Silizium auf den Bindungszunstand von Mangan im Blattgewebe von Bohnen (Phaseolus vulgaris). Zeitschrift fur Pflanzenernahrung und Bodenkunde 141(4):487-497.

In sol. culture experiments with P. vulgaris plants the effect of different Mn supply and Si on the chemical state of Mn in the leaf tissue was studied. Water extracted up to 80% of the total Mn from previously frozen or freeze dried leaf tissue. This water-soluble fraction of Mn showed a positive correlation with Mn supply and leaf age. Si had no effect on the Mn extractable by water, KCl or EDTA. The high proportion of Mn in the water extract is probably the result of Mn oxides (MnO_2?) being dissolved during extraction by organic cell constituents e.g. organic acids. Therefore, in vivo, less Mn is water soluble than the amount extractable with water. In contrast to water, methanol extracted less than 10% of the total Mn. Si supplied in the nutrient solution doubled the amount of Mn extracted from the leaves by methanol. This result suggests that by affecting the compartmentation of Mn, Si increases the soluble Mn in vivo, which could partly explain the increase in Mn tolerance of the leaf tissue in presence of Si. (AS)

0433

* HORST, W.J.; MARSCHNER, H. 1978. Effect of silicon on manganese tolerance of bean plants (Phaseolus vulgaris L.). Plant and Soil 50(2):287-303.

The effect of Si on Mn tolerance of bean (P. vulgaris cv. Red Kidney) grown in sol. culture was studied at different levels of Mn supply. Without Si, growth depression and toxicity symptoms occurred at 5×10^{-4} mM Mn in the nutrient sol. After addition of Aerosil (0.75 p.p.m. Si), the plants tolerated 5×10^{-3} mM Mn and, at a higher Si supply of 40 p.p.m., as much as 10^{-2} mM Mn in the nutrient sol. without any growth depression. This increase in Mn tolerance was not caused by a depressing effect of Si on uptake or translocation of Mn but rather by an increase in the Mn tolerance of the leaf tissue. In absence of Si, 100 p.p.m. Mn was toxic for the leaf tissue, whereas with a supply of 40 p.p.m. Si, this critical level in the leaves was increased to more than 1000 p.p.m. Mn. At lower Mn levels in the leaf tissue, a molar ratio Si:Mn of 6 within the tissue was sufficient to prevent Mn toxicity. Above 1000 p.p.m. Mn, however, even a much wider Si:Mn ratio (more than 20) could not prevent growth depression by Mn toxicity. With ^{54}Mn and autoradiographic studies, it could be

demonstrated that, in absence of Si, even at opt. Mn supply (10^{-4} mM), the distribution of Mn within the leaf blades was non-homogeneous and characterized by spot-like accumulations. In presence of Si, however, the Mn distribution was homogeneous in the lower concn. range of Mn and still fairly homogeneous in the high concn. range. This effect of Si on distribution on the tissue level was also reflected on the cellular level. In the presence of Si, a higher proportion of the leaf Mn could be found in the press sap, i.e. had been transported into the vacuoles, than in the absence of Si. The increase in Mn tolerance of bean leaves by Si therefore seems to be primarily caused by the prevention of local Mn accumulation within the leaf tissue which leads to local disorders of the metabolism and, correspondingly, growth depression. (CAB)

0434

INYANG, O.A.; STEELE, W.M. 1966. Beans in Northern Nigeria. Bean Improvement Cooperative. Annual Report 9:24-25.

0435

* OKIGBO, B.N. 1977. Legumes in farming systems of the humid tropics. In Ayanaba, A.; Dart, P.J., eds. Biological nitrogen fixation in farming systems of the tropics. New York, Wiley. pp.61-72.

Leguminous plants, broadly defined, are associated with different farming systems of the humid tropics as wild, protected or semi-wild, and cultivated plants. Their importance in these farming systems is related to their uses as food, forage and conservation crops. In addition, they are also important in various other ways as ornamental, plants and sources of oil, dyes, structural materials and other products. In the humid tropics, their potential uses as sources of food and various products have hardly been realized. With the exception of grain and forage legumes, very little is known about contributions of leguminous plants to N_2 fixation and the maintenance of soil fertility in different farming systems of the humid tropics. (AS)

0436

* OKIGBO, B.N. 1977. Role of legumes in small holdings of the humid tropics of Africa. In Vincent, J.M.; Whitney, A.S.; Bose, J., eds. Exploiting the Legume-Rhizobium Symbiosis in Tropical Agriculture, Hawaii, 1976. Proceedings. University of Hawaii. College of Tropical Agriculture. Publication 145. pp.97-117.

Aspects of legumes grown in the humid tropics of Africa, their uses, their place in farming systems, the nutritional and ethnobotanical interrelationships in their use, and priorities of traditional farming systems in SE Nigeria and developments in research at the International Institute of Tropical Agriculture, Ibadan, are described. (CAB)

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.

0438

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

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.

0440

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

0441

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

REUNION

0442

FRITZ, J. 1968. Essai de fertilisation des haricots aux Colimacons. In Saint Denis, Reunion. Institut de Recherches Agronomiques Tropicales et des Cultures Vivrieres. Rapport Annuel 1967. Saint Denis. pp.125-126.

0443

* MICHELLON, R. 1980. Essais varietaux de haricots rouges. In Saint-Denis, Reunion. Institut de Recherches Agronomiques Tropicales et des Cultures. Vivrieres. Rapport Annuel 1979. Saint-Denis. pp.81-83.

Bean var. trials were conducted at Colimacons and Bretagne, Reunion, to assess the performance of dwarf types (Kidney, Marlat-a selection for Montpellier, 27 RH, Velazco, Dark Red Kidney, and Marlat) and climbing types (Petit Rouge, 890-37R, 1390 MEX, Turrialba 3H, Rojo 70, and Noir). Kidney showed to be superior in terms of its earliness (35 days to flowering) and high yield (21 q/ha) during the dry season in the highlands. Yield of Noir, a var. produced locally, was outstanding (21 q/ha) during the winter on the coast, even though it flowered later. It was more resistant to the leaf miner (Liriomyza trifolii). (CIAT)

0444

MICHELLON, R.; HUBERT DE FRAISSE, C. 1979. Essais varietaux de haricots rouges. In Saint Denis, Reunion. Institut de Recherches Agronomiques Tropicales et des Cultures Vivrieres. Rapport Annuel 1978. Saint Denis. pp.67-68.

0445

* MICHELLON, R. 1978. Essais varietaux de haricots rouges a la Station des Colimacons. In Saint-Denis, Reunion. Institut de Recherches Agronomiques et Tropicales et des Cultures Vivrieres. Rapport Annuel 1977. Saint-Denis. pp.75-77.

Trials were carried out at Colimacons, Reunion, to compare the performance of selected bean introductions of dwarf (Dark Red Kidney, Kidney, Lingot Rouge, Marlat-Montpellier selection, Velazco, and 27 RH) and climbing types (390-37 R, Rojo 70, 1390 MEX, and Turrialba 3H) against the local var. Marlat (dwarf) and Petit Rouge (climbing). Despite of the labor required for trellising, the climbing types are of interest since the climatic conditions favored their production. Trials with dwarf types, conducted under unfavorable edapho-climatic conditions, did not allow their potential to be assessed. (CIAT)

0446
* ABEELE, M. VAN DEN; VANDENPUT, R. 1956. Le haricot (Phaseolus vulgaris L.). In _____: Les principales cultures du Congo Belge. Bruxelles. Ministere des Colonies. pp.565-566.

0447
CAMERMAN, A. 1976. Essai de densite de semis sur le haricot nain Saxa. Rubona, Institut des Sciences Agronomiques du Rwanda. Notes Techniques no.8.

0448
CAMERMAN, A. 1976. Resultats de deux essais camparatifs varietaux, l'un sur haricot nain (RCH 75-77), l'autre sur haricots volubiles (RCH 2 75-77). Rubona, Institut des Sciences Agronomiques du Rwanda. Notes Techniques no.9.

0449
CAMERMAN, A.; HAKIZIMANA, A. 1974. Rhizobium symbiosis. Rwanda legumes. Rubona. Institut des Sciences Agronomiques du Rwanda. Notes Techniques no.6.

0450
CAMERMAN, A. 1972. Food legume inoculation in Rwanda. Rubona. Institut des Sciences Agronomiques du Rwanda. Notes Techniques no.6.

0451
* CAMERMAN, A. 1972. Situation de la recherche sur les plantes vivrieres au Rwanda. Rubona, Institut des Sciences Agronomiques du Rwanda. Notes Techniques no.16.

0452
* EVERAERTS, E. 1939. Monographie agricole du Rwanda-Urundi. Bulletin Agricole du Congo Belge 30(4):581-618.

0453
* FALLON, F. 1930. La multiplication de certains cultures pour combattre la famine au Rwanda-Urundi. Bulletin Agricole du Congo Belge 21(3):882-886.

0454
* FALLON, F. 1930. La multiplication de certaines cultures pour combattre la famine au Rwanda-Urundi. In Congres International d'Agriculture Tropical, V^{e}. Anvers. 1930. pp.595-599.

0455
FISCHER, V. 1978. Essai comparatif varietal de haricots nains et volubiles a Karama. Rubona, Institut des Sciences Agronomiques du Rwanda. Notes Techniques no.2.

0456
* FOCAN, A. 1961. Recherches agronomiques et productivité. Bulletin Agricole du Congo Belge 52(2):236.

0457
GOETEYN, R. 1975. Résultats de quatre années d'essais varietal sur haricot volubile a Rwerere. Rubona, Institut des Sciences Agronomiques du Rwanda. Notes Techniques no.13.

0458

* INSTITUT DES SCIENCES AGRONOMIQUES DU RWANDA. 1982. Cultures associees. Essais cultures associees a Rubona. In _____. Compte rendu des travaux du Department Production Vegetale. Exercice 1981. Rubona. pp.137-140.

0459

* INSTITUT DES SCIENCES AGRONOMIQUES DU RWANDA. 1982. Legumineuses: Essais comparatifs de fongicides contre les champignons maculicolles du haricot. In _____. Compte rendu des travaux du Departement Amenagement du Milieu et du Departement des Laboratoires en 1981. Rubona. pp.20-21.

0460

* INSTITUT DES SCIENCES AGRONOMIQUES DU RWANDA. 1982. Legumineuses: Haricot. In _____. Compte rendu des travaux du Departement Production Vegetale. Exercice 1981. Rubona. pp.4-10.

0461

* INSTITUT DES SCIENCES AGRONOMIQUES DU RWANDA. 1982. Legumineuses: Occurrence des principales maladies et ravageurs dans les stations --Haricot. In _____. Compte rendu des travaux du Departement Amenagement du Milieu et du Departement des Laboratoires en 1981. Rubona. pp.17-20.

0462

INSTITUT DES SCIENCES AGRONOMIQUES DU RWANDA. 1974. Resultats de deux essais comparatifs de haricot volubile avec et sans tuteurage a Karama. Rubona. Resultats d'Essais no.3.

0463

INSTITUT DES SCIENCES AGRONOMIQUES DU RWANDA. 1974. Resultats de quatre essais sur legumineuses vivrieres. Rubona. Resultats d'Essais no.2.

0464

INSTITUT DES SCIENCES AGRONOMIQUES DU RWANDA. 1974. Resultats de quatre essais sur pois, haricot et ble a Rwerere. Rubona, Resultats d'Essais no.4.

0465

INSTITUT DES SCIENCES AGRONOMIQUES DU RWANDA. 1974. Triage de varietees de haricot en culture seche et irriguee a Karama (1971-1974). Rubona. Resultats d'Essais no.1.

0466

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1959. Secteur du Rwanda-Urundi. Station de Recherches Agronomiques de Rubona. In _____. Rapport Annuel pour l'Exercice 1958. Bruxelles. pp.476-493.

0467

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1958. Secteur du Rwanda-Urundi. Station de Recherches Agronomiques de Rubona. In _____. Rapport Annuel pour l'Exercice 1957. Bruxelles. pp.479-496.

0468

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE, 1957. Secteur de Rwanda-Urundi. In _____. Rapport Annuel pour l'Exercice 1956. Bruxelles. pp.502-520.

0469

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1955. Secteur du

Rwanda-Urundi. Station Experimentale de Rubona. In _____. Rapport Annuel pour l'Exercice 1954. Bruxelles. pp.454-465.

0470

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1952. Station d'Essais de Rubona. In _____. Rapport Annuel pour l'Exercice 1951. Bruxelles. pp.397-406.

0471

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1949. Station d'Essai de Rubona. In _____. Rapport Annuel pour l'Exercice 1948. Bruxelles. pp.279-282.

0472

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1943. Stations de Rwanda-Urundi. Station Experimentale de Rubona. In _____. Rapport Annuel pour l'Exercice 1940-1941. Leopoldville. pp.136-140.

0473

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1941. Stations de Rwanda-Urundi. Station d'Essais de Rubona. In _____. Rapport Annuel pour l'Exercice 1939. Bruxelles. pp.281-285.

0474

* IYAMUREMYE, F. 1983. Haricot (Phaseolus vulgaris). In _____. Synthese des acquis scientifiques et techniques de la recherche agricole au Rwanda. Rubona, Institut des Sciences Agronomiques du Rwanda. Rubona. pp-1-14.

0475

KAYUKU, V. 1961. Quelques observations sur la culture du haricot au Rwanda. Bulletin d'Information de l'INEAC 10(6):333-347.

Beans occupy 40% of the total cultivated area in the favourable regions and 10-20% in regions which are less suited to its cultivation. Two different varieties are grown, a climbing one and a dwarf, creeping variety with smaller yields than the former. The cultivation practices of the African growers are described. The research station at Rubona is engaged in the improvement of the crop. Of various varieties, those with black seeds yielding 1,300 kg/ha or more were selected. Improved cultivation methods developed at this station are discussed, such as the growing of mixtures of different varieties. (RTI)

0476

MOSTADE, J.M. 1977. Practical guide for the protection of Rwanda crops. Rubona. Institut des Sciences Agronomiques du Rwanda. Notes Techniques no.9.

0477

MPABANZI, A.; BARAVUGA, N.; GOETEYN, R. 1980. Classification and comparative trials with bush beans during the 1977-1978 season. Rubona, Institut des Sciences Agronomiques du Rwanda. (in press)

0478

MPABANZI, A.; BARAVUGA, N.; GOETEYN, R. 1980. Planting distance trial with climbing bean variety Cajamarca using trellises. 1977-1979. Rubona, Institut des Sciences Agronomiques du Rwanda.

0479

MPABANZI, A.; BARAVUGA, N.; GOETEYN, R. 1980. Resultats d'un essai

d'ecartement de tuteurs sur haricot volubile Cajamarca (1977-1979). Rubona. Institut des Sciences Agronomiques du Rwanda. (in press).

0480

MPABANZI, A.; HABYALIMANA, J.N. 1977. Resultat d'un essai d'ecartement de semis sur haricot volubile var. 54 a Rubona. Rubona, Institut des Sciences Agronomiques du Rwanda. Resultats d'Essais no.10.

0481

NAGANT, D. 1976. Les plantes vivrieres: synthese des recherches. Conclusions - Perspectives (Karama 1961-1975). Rubona, Institut des Sciences Agronomiques du Rwanda. Notes Techniques no.6.

0482

NYABYENDA, P.; MPABANZI, A. 1982. Resultats de densite de semis du haricot en comparaison avec les methodes traditionelles. Rubona, Institut des Sciences Agronomiques du Rwanda.

0483

NYABYENDA, P.; MPABANZI, A. 1982. Resultats de deux essais comparatifs varietaux l'un sur haricot nain (RHC_1, 77-79) l'autre sur haricot volubile (RHC_2, 77-79) a Rubona. Rubona, Institut des Sciences Agronomiques du Rwanda. Resultats d'Essais (in press).

0484

NYABYENDA, P. 1982. Resultats d'un essai comparatif varietal multilocal sur haricots nains. Rubona, Institut des Sciences Agronomiques du Rwanda.

0485

NYABYENDA, P.; MPABANZI, A. 1982. Resultats d'un essai de mutation de la couleur du tegument noir du haricot Wulma. Rubona, Institut des Sciences Agronomiques du Rwanda. Notes Techniques (in press).

0486

NYABYENDA, P. 1982. Resultats d'un essai de semis des haricots nains et semi-volubiles en lignes continues. Rubona, Institut des Sciences Agronomiques du Rwanda.

0487

NYABYENDA, P. 1982. Resultats d'un essai de tuteurage avec differentes longueurs de tuteurs. Rubona, Institut des Sciences Agronomiques du Rwanda.

0488

NYABYENDA, P. 1982. Resultats d'un essai de tuteurage avec differentes sortes de tuteurs. Rubona, Institut des Sciences Agronomiques du Rwanda.

0489

* NYABYENDA, P. 1982. Synthese des resultats de recherche sur haricot au Rwanda durant les 20 dernieres annees. Rubona, Institut des Sciences Agronomiques du Rwanda. 43p.

Results of research carried out in Rwanda on var. selection in bean (hybridization and induced mutation), spacing and planting, use of stakes (types, length, distance), irrigation, intercropping, inoculation, and fertilization are summarized. For intermediate alt. regions var. C10, Urunyumba, Bataaf, Var. 11, Ni 572, and Actoran are recommended; for highlands, var. Urunyumba 3 and 6, C10, Bataaf, and Inyumba, and for lowlands, Var. 54, Bayo 158, Var. 11, and Var. 1/2. Var. P 637 and Kalima (CIAT) have good perspectives. In a multilocal comparative trial carried out in collaboration with CIAT, new var. BAT 1297, Línea 22, and BAT 1230

were outstanding. Bean productivity potential during the 1st planting season (mid-Sept.-Jan.) is 2340 kg/ha in Rubona and 3950 kg/ha in Rwerere, and in Karama during the 2nd planting season (Feb.-July), it is 3790 kg/ha. The use of ethyl methane sulfonate permitted the mutation of the black tegument of var. Wulma, along with a small increase in bean wt. For determinate bean types, continuous lines may be used, spaced at 40 or 30 cm with 15-20 seeds/m. In trials using stakes, climbing bean var. were superior to bush bean. The best stakes were those of wood (1 stake/4 plants), spaced at 40 x 20 cm. Banana tree cords or maize stumps were also used. Branches of Pennisetum purpureum would reduce the cost of using stakes. Coefficients were established to determine bean water stress. Irrigated bean var. Amarillo gave an av. yield of up to 212% compared with the upland var. Bean/sweet potato and bean/sweet potato/maize associated cropping gave good yields (up to 10.8 t/ha). The incidence of anthracnose (Colletotrichum lindemuthianum) was lower in bean intercropped with maize. Research program objectives are included. (CIAT)

0490

* NYABYENDA, P.; SEKANABANGA, C.; NYANGURUNDI, L. 1981. Bean production in Rwanda. In Regional Workshop on Potential for Field Beans in Eastern Africa, Lilongwe, Malawi, 1980. Proceedings. Cali, Colombia, Centro Internacional de Agricultura Tropical Series 03EB-1. pp.98-121.

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

0491

NYABYENDA, P.; MPABANZI, A. 1980. Trial on induction of integument color mutation to bean variety Wulma. Rubona. Institut des Sciences Agronomiques du Rwanda. Notes Techniques no.1.

0492

NYABYENDA, P.; MPABANZI, A. 1980. Comparative trials with nine climbing bean varieties, 1977-1978. Rubona, Institut des Sciences Agronomiques du Rwanda. Result of Trials no.5.

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 Selsko-khozyaistvenooi Akademii 3:15-20.

0494

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

SIERRA LEONE

0495

* EZE, J.M.O. 1973. The vegetative growth of Helianthus annuus and Phaseolus vulgaris as affected by seasonal factors in Freetown, Sierra Leone. Annals of Botany 37(150):315-329.

Sand-culture experiments were carried out in full daylight at successive weekly intervals between Mar. and Dec. 1969, to investigate the effects of seasonal changes in climatic factors on growth of sunflower and Phaseolus vulgaris. Values for a number of growth parameters were calculated from the dry weights of the leaves, stems, and roots, and from the leaf areas. Simultaneously the diurnal changes in climatic factors were recorded. Multiple regressions linking light, temperature, and r.h. with some of the growth parameters were calculated. The total variance accounted for in the regressions of RGR, NAR and leaf weight ratio on light, temperature, and r.h. ranged from 51 to 60% in P. vulgaris. In sunflower r.h. was less important; the percentage proportion of total variance accounted for in the regression of leaf weight ratio (and LAR in both species) on light and temperature was not significant. Results showed that sunflower grew faster than P. vulgaris, but growth of the latter was depressed less by the dull weather of the rainy season. The RGR of both species was positively dependent on light and temperature, while NAR was negatively dependent on r.h. and LAR negatively dependent on light. All parameters used except LAR and leaf area:leaf weight ratio showed seasonal variations corresponding to dry and rainy seasons. The initial and final values of LAR and weight ratios were always different but did not vary in the same direction in both species. Results are discussed in relation to similar work done elsewhere. (CAB)

SOMALIA

0496

GOLATO, C. 1967. Cercosposiosi del fagliolo in Somalia. Rivista di Agricoltura Subtropicale e Tropicale 61(4-6):159-163.

SOUTH AFRICA

0497

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

0498

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

0499

* COERTZE, A.F. 1980. A bush green bean mutant with dark green blistered leaves. Bean Improvement Cooperative. Annual Report 23:77.

0500

* COERTZE, A.F. 1978. Cultivation practices in green bean production. Farming in South Africa. Vegetable Series II. Green Beans and Green Peas G.1/1978. 2p

Some cultural practices of snap bean cultivation are briefly described and recommendations are given to improve cultural operations and increase yields. Among the recommendations given, the following were emphasized: avoid an excessive pulverised condition of the soil that weakens its structure; apply a pesticide against nematodes to the soil; plant at a depth equal to or less than 50 mm; avoid seed damage and cultivating under wet conditions or with dew to prevent disease incidence, and preferably use chemical weed control instead of mechanical. (CIAT)

0501

* COERTZE, A.F. 1978. Irrigation of green beans. Farming in South Africa. Vegetable Series II. Green Beans and Green Peas F.1/1978. 2p.

Some considerations are given on the importance, the amount and method of irrigation that should be used in green bean cultivation. An adequate irrigation increases yields and the no. of pods and produces more vigorous plants; however, it can also contribute favorably to the development of weeds. The effective root depth of green beans is 450 mm. The amount of water needed for germination depends on the type of soil and can vary from 25 mm on a sandy soil to 60 mm on a clayey soil. After emergence, an irrigation of 35 mm is sufficient for a period of 10 days; after flowering, 35 mm/wk. should be provided until the moment of harvest. The total amount of water required for the crop is 355 mm; if the efficiency of the irrigation is taken into account, 450 mm should be provided, this without taking into consideration rainfall. The advantages and disadvantages of sprinkler and flood irrigation are presented. (CIAT)

0502

* COERTZE, A.F. 1978. The picking stage, harvesting, yield and post-harvest handling of green beans. Farming in South Africa. Vegetable Series II. Green Beans and Green Peas I.1/1978. 4p.

Recommendations are given on the collection, handling and storage of green beans, requirements for mechanically reaped cv. and the ideal stage for harvesting. The process of pod formation can be divided into 3 stages: (1) pod development and the initiation of seed development; (2) enlargement of the pods and a rapid enlargement of the seed and (3) thickening of the cell wall, maturing and drying of the pod; drying and hardening of the seed. The 2nd stage is the most acceptable for harvesting since green beans reach their max. yield. Crop yields vary between 6000-10,000 kg/ha under

commercial conditions, depending on the technology and control given to the crop. Optimum temp. for storage varies between 7-10°C. (CIAT)

0503

* COERTZE, A.F. 1977. Climate and soil requirements for green beans. Farming in South Africa. Green Beans and Green Peas no. B.1/1977. 2p.

Edaphoclimatic requirements for snap bean cultivation are described. Optimum daily temp. for growth, quality and yield varies between 16-21°C. Temp. more than 35°C cause flowers to abort and yield decreases. Night temp. less than 5°C cause damage to the seed production in pods. Halo blight, pod rotting caused by Botrytis and anthracnose may occur in wet conditions, which also cause difficulties during harvesting. Dry winds adversely affect pollination. Snap beans require deep, well-drained but water-retaining soils. Optimum pH of the soil varies between 6.0-6.5. The crop presents toxicity in soils with high Bo content. The best results have been found in medium loamy soils and adequate fertilization is important for an excellent production. (CIAT)

0504

* COERTZE, A.F.; JACKSON, D.C. 1977. Fertilization of green beans. Farming in South Africa. Vegetable Series II. Green Beans and Green Peas E.1/1977. 3p.

Recommendations are given on the date and rates of NPK application in green bean crops and Zn, Mn and B deficiencies are described including the rates and ways of applying trace elements for correction. Foliar nutrition and the inoculation of seed with N-fixing bacteria have not given positive results. The crop should not be planted more than once in 3 yr and green peas (Pisum sativum) should not precede or follow green beans to avoid the incidence of pathogens in the soil. (CIAT)

0505

* COERTZE, A.F. 1977. Introductory aspects on the production of green beans. Farming in South Africa. Series: The cultivation of vegetables in South Africa. Green Beans and Green Peas no. A.1/1977. 3p.

Brief information is given on the taxonomic position, plant characteristics regarding consumption, economic importance, and production areas of green beans in S. Africa. Between 1970-73 production was estimated at 27,300 t and for 1975, 9000 t were processed from a total production of 37,000 t. Transvaal and Cape Province, that have green bean processing industries, are the highest producing states; other states of minor importance are Orange Free State and Natal, whose production is for the domestic market. (CIAT)

0506

* DENNISON, C.; STEAD, R.H.; QUICKE, G.V. 1976. A lectin-like toxin from the Natal Round Yellow bean (Phaseolus vulgaris). Agrochemophysica 8(3):51-60.

A fraction containing protein and carbohydrate, which was toxic to mice, was isolated from seeds of P. vulgaris cv. Natal Round Yellow. (CAB)

0507

* DESCHODT, C.C.; STRIJDOM, B.W. 1979. Growing disease-free bean plants from seeds from a sample contaminated with bacterial pathogens. Phytophylactica 11:187-189.

A description is given of a technique used in South Africa to grow disease-free bean plants (Phaseolus vulgaris and P. coccineus) from seeds of a sample containing both healthy seeds and seeds infected with bacterial pathogens. The same technique was used to determine the % of contaminated seeds present in a batch of seed. (AS)

0508

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

0509

ERASMUS, D.J.; NELSON, W.R.; STADEN, J. VAN 1982. Combined use of a selective herbicide and seaweed concentrate. South African Journal of Science 78(10):423-424.

In greenhouse experiments, the 2 primary fully-expanded leaves of Phaseolus vulgaris plants and the 4th leaf of wheat plants at the 5-leaf stage were wetted with 0.25% Tween 20 alone or combined with 1:100 (v/v) Kelpak 66 seaweed concentrate, 1:100 or 1:500 Kelpak 66 alone or distilled water. Immediately after application 1 microliter ^{14}C-MCPA was applied to the wetted leaves. In wheat most of the recovered radioactivity was located in the leaf wash, indicating that the various treatments did not promote MCPA uptake. In P. vulgaris absorbed radioactivity was distributed throughout the plants. The higher Kelpak 66 rate induced a greater relative uptake of MCPA and a combination of Tween 20 and Kelpak 66 gave the highest relative uptake. It was concluded that the selectivity of MCPA was not affected when used in combination with Kelpak 66. (CAB)

0510

* GROBBELAAR, N.; CLARKE, B.; HOUGH, M.C. 1971. The nodulation and nitrogen fixation of isolated roots of Phaseolus vulgaris L. II. The influence of light on nodulation. Plant and Soil (Special):203-214.

Exposure of isolated bean roots to white light immediately before inoculation with nodule bacteria stimulated nodulation during a subsequent 7-day dark period. Strong white light applied to inoculated roots for 3 days or longer suppressed nodulation except when the light was applied immediately after inoculation and the duration of the light period did not exceed 3 days. Alternating periods of 12 h light and 12 h darkness were almost as inhibitory to nodulation as a continuous exposure to light. A combination of blue and far-red light inhibited nodule formation more than a combination of red and far-red light. Light treatments that inhibited nodulation also suppressed the production of lateral roots, but to a lesser extent. The effect of light on nodulation and lateral root formation was not influenced by the presence or absence of an attached hypocotyl segment in the explant. (CAB)

0511

* GROBBELAAR, N.; CLARKE, B.; HOUGH, M.C. 1971. The nodulation and nitrogen fixation of isolated roots of Phaseolus vulgaris L. III. The effect of carbon dioxide and ethylene. Plant and Soil (Special):215-223.

CO_2 at a concentration of 3% completely inhibited nodulation; ethylene at equal to or greater than 0.4 ppm was extremely inhibitory towards nodulation. The gaseous emanations from isolated root cultures, when permitted to accumulate, completely prevented nodulation and also inhibited N fixation in existing nodules. Evidence suggested that ethylene was the active principle of the gaseous emanations. (CAB)

0512

GROBBELAAR, N.; CLARKE, B.; HOUGH, M.C. 1970. The inhibition of root nodulation by ethylene. Agroplantae (South Africa) 2(2):81.

In roots of Phaseolus vulgaris in air containing 0-300 ppm ethylene, nodulation was completely inhibited by concentrations of equal to or greater than 8 ppm and was decreased from 35.3 nodules/plant in ethylene-free air to 3.7 nodules by 0.4 ppm ethylene. (CAB)

0513

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

0514

HUTTON, M.J.; STADEN, J. VAN 1981. Endogenous cytokinins in germinating seeds of Phaseolus vulgaris L. South African Journal of Science 77(7): 326.

Extracts from cotyledons of mature dry P. vulgaris seeds yielded cytokinin-like activity which co-chromatographed with zeatin and ribosylzeatin. Under conditions which stimulated germination and cotyledon expansion, the level of these cytokinins decreased rapidly in intact embryos and excised cotyledons. In the latter the decrease was continuous and very low cytokinin levels were found after 4 days of incubation. When the embryonic axis was present the initial decrease was reversed after 3 days. This suggested that cotyledons do not synthesize cytokinins but that these hormones are imported from the embryonic axis, particularly once radicle growth is well underway. (CAB)

0515

IMMINK, R.J. 1957. Dwarf bean varieties for the Transvaal Middle- and Highveld. Farming in South Africa 33(9):44-45,47.

0516

JOOSTE, J.H. 1979. Comparison of iron uptake by bean root and leaf tissues. Journal of South African Botany 45(3):257-261.

An explanation was sought for the observed difference in uptake between root and leaf tissues of the bean (Phaseolus vulgaris) plant, viz., higher uptake by root tips than by leaf disks in spite of a similar pattern of uptake by the 2 tissues. Although leaf slices absorbed more Fe than leaf disks, the absorption was still considerably lower than by root tips. Fe absorption by enzymically isolated root and leaf cells also reflected the observed difference in uptake between root and leaf tissues. It appeared unlikely that the lower Fe uptake by leaf disks compared with that by root tips was related to structural aspects of the tissues. (CAB)

0517

JOOSTE, J.H.; BRUYN, J.A. DE 1979. Desorption of absorbed iron in bean root and leaf tissues. Journal of South African Botany 45(3):249-256.

The effect of different desorption media on the amount of absorbed Fe (from a sol. of $FeCl_3$ in 0.5 mM $CaCl_2$) retained by leaf disks and excised root tips of bean (Phaseolus vulgaris) plants was investigated. Attempts were also made to determine the effect of desorption on the intracellular distribution of Fe. Desorption in water or an $FeCl_3$ sol. had no pronounced effect on the amount of absorbed Fe retained by either the leaf or root tissues. However, Na_2-EDTA was able to desorb a considerable portion of the absorbed Fe, especially in root tissue. This applied to Fe absorbed from sol. of $FeCl_3$ and Fe-EDDHA. Desorption by the chelate removed Fe from practically all the different particulate fractions of both root and leaf

tissues, but desorption following the longer absorption periods resulted in an increase in the Fe content of the soluble fraction. The possibility that Na_2-EDTA caused an increased permeability of cell membranes seemed likely. The view that removal of Ca by the chelate caused this increase in permeability could not be confirmed. (CAB)

0518

JOOSTE, J.H.; BRUYN, J.A. DE 1979. The dual mechanism of iron absorption in bean root and leaf tissues. Journal of South African Botany 45(3): 243-248.

The possible existence of a dual pattern of Fe uptake in root and leaf tissues of bean [Phaseolus vulgaris] plants was investigated employing a modification of the tea-bag technique. Experimental sol. consisting of $FeCl_3$ in 0.5 mM $CaCl_2$ sol. varied from 0.01-0.5 mM in the low range and from 1-30 mM in the high range. Absorbed Fe was determined by means of atomic absorption spectroscopy and radiometric analysis. The Fe uptake curves for both root and leaf tissues displayed a hyperbolic rise followed by a plateau in the low concn. range, and an exponential increase in the high concn. range. The possibility exists that Fe in the high concn. range is precipitated in the tissues. (CAB)

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.

0520

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

0521

KNOX-DAVIES, P.S. 1965. Pycnidium production by Macrophomina phaseoli. South African Journal of Agricultural Sciences 8(1):205-218.

0522

LAUBSCHER, F.X. 1944. Field beans. Farming in South Africa 19(217):246-248, 254.

0523

MARAIS, E. 1976. Aerial insecticide applications using large droplet sizes. Oesbespuiting Malmesbury, South Africa. pp.269-273.

0524

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

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

disease symptomatology; the method of determining disease rating; and a key to growth stages of bean. (CIAT)

0525

MINNAAR, J.J. 1970? Bonesaadproduksie in Suid Afrika. South Africa. Division of Seed Control. Special Report.

0526

PICKLES. Food Product Development 12(2):54. 1978.

Various types of pickles from other lands are described, including Malaysian pickled lemon wedges and South African pickled green beans. A picture and recipe are given for this garlicky-curried dish, called Green Beans Atjar. A mixture of pickled vegetables—onions, cucumbers, sweet red pepper strips, carrot strips, and slivered beans—is popular in Indonesia. Green bananas are pickled in Hawaii, and eggplant, in Turkey. (AS)

0527

SELLSCHOP, J. 1953. The grading of dry beans. Farming in South Africa 28(328):223-225.

0528

SELLSCHOP, J.P.F.; BREVIS, J. 1969. Soil and fertilizer requirements of dry beans. Farming in South Africa 45(9):38,44.

0529

SELLSCHOP, J.P.F. 1968. Beans in demand. Farming in South Africa 43(11):21.

0530

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

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

0531

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

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

0532

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

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

0533

SOUTH AFRICA. DEPARTMENT OF AGRICULTURAL TECHNICAL SERVICES. 1980? Annual report of the Secretary for Agricultural Technical Services for the period 1 July 1978 to June 1979. Pretoria, South Africa Government Printer. 114pp.

Research on summer cereals (maize and sorghum) and winter cereals (wheat, oats, barley and durum wheat), groundnuts, dry beans (Phaseolus vulgaris), soyabeans, sunflowers, potatoes, cotton, tobacco, peas and sweet potatoes is reported briefly in the section on plant production improvement. (CAB)

0534

* SOUTH AFRICA. DEPARTMENT OF AGRICULTURAL TECHNICAL SERVICES. 1970. Beans. In _____. The Horticultural Research Institute. Pretoria. p.6.

Brief information is presented on bean breeding and selection, bacterial diseases (Pseudomonas phaseolicola, Xanthomonas phaseoli), fungal diseases (Uromyces appendiculatus), pests (the beetle Mylabris oculata), and herbicides. Dwarf bean var. recommended for the Transvaal Lowveld are Wintergreen, Seminole and Victory; climbing var. are Green Savage, and Can Freezer. Topcrop, Contender, and Harvester are the recommended dwarf var. for the Transvaal Highveld, and Witsa, Green Savage and Can Freezer the recommended climbing types. (CIAT)

0535

* STADEN, J. VAN.; CARMI, A. 1982. The effects of decapitation on the distribution of cytokinins and growth of Phaseolus vulgaris Plants. Physiologia Plantarum 55(I):39-44.

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

0536

STADEN, J. VAN; DAVEY, J.E. 1976. Cytokinin translocation in xylem sap of herbaceous plants. Zeitschrift fur Pflanzenphysiologie 77(5):377-382.

Partition chromatography of the xylem sap of 7-week-old seedlings of 4 herbaceous species, including Phaseolus vulgaris, showed the presence of 2 peaks of activity which coeluted with zeatin and its riboside. The 2 peaks of activity usually elicited similar responses in the soyabean bioassay.

These results did not support the suggestion that zeatin-riboside was the major translocational form of cytokinin in the xylem. (CAB)

0537

STRYDOM, E. 1971. The production of green beans. Pretoria, South Africa. Department of Agricultural and Technical Services. Leaflet no. 64. Vegetable Series no.7.

0538

STRYDOM, E.; JOUBERT, T.G.LA G. 1957. Dwarf bean varieties for the Transvaal Middle- and Highveld. Farming in South Africa 33(9):44.

0539

VILLIERS, O.T. DE; GLYN, M.C.P.; LOURENS, R. 1980. The effect of ethanol and acetone on biochemical processes in isolated hypocotyl cells. Agroplantae (South Africa) 12(1):5-7.

The effects of ethanol and acetone on the rates of respiration, RNA synthesis, protein synthesis and lipid synthesis were studied in isolated hypocotyl cells of Phaseolus vulgaris. In general, concn. up to 1% had little inhibitory effect, whereas 3% ethanol or acetone had a pronounced inhibitory effect on all the processes. (CAB)

0540

VILLIERS, V. DE 1975. The effect of high air temperature on the reproduction of four Michigan dry bean cultivars (Phaseolus vulgaris L.). Crop Production 4:63-68.

P. vulgaris cv. Sanilec, SSB-3, SSB-5 and PC-7-H2-M-2-2M were subjected to day/night temperatures of 32/18°C for a 7-day period at 6 different growth stages and after high-temperature treatment were grown at 24/12°. High temperatures during the pre-flowering stage retarded flowering while exposure during the flower-bud or early-flowering stages extended the flowering period, increased the number of flowers/plant and delayed maturity of the 1st pods. SSB-3 did not flower when subjected to high temperatures but began to flower later when transferred to cooler temperatures. Flowering and pod set were most adversely affected when plants were exposed to high temperatures for a long period (14-56 days after sowing). Seed yields were decreased only when plants were exposed to high temperatures at 49-56 after sowing. (CAB)

0541

WAGER, A.V. 1936. Bacterial wilt and blight of french beans. Dept. Agric. For. Un. S. Afr. Sci. Bull. 149.

0542

WESTHUIZEN, G.C.A. VAN DER; JOUBERT, M.S.; GROBLER, L.J. 1979. Sclerotinia rot in dry beans. Farming in South Africa. (Dry Beans) F.1:1-3.

Brief information is given on the white mold disease, caused by the fungus Sclerotinia sclerotiorum, which has damaged crops in the state of Transvaal (South Africa). Symptoms, causal agent, form of attack, conditions favoring disease dissemination, host range, geographic distribution, and control measures are described. Cool, shady, and moist conditions promote disease development. The following practices are recommended to limit the spread and contamination of new fields: use of healthy seeds, control of host weeds, crop rotation, and spraying with 1 kg benomyl a.i./ha 3-5 days before full bloom. (CIAT)

0543

* ABDEL GABAR, A. 1970. Fasulia: Variety, sowing time and plant density experiment. In Ed-damer, Sudan, Hudeiba Research Station. Annual Report 1970-1971. Ed-Damer. pp.4-6.

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.

0545

* ABDEL-GABAR, A.G. 1979. Effect of sowing time by variety by plant population on yield of fasulia (Phaseolus vulgaris). In Ed-damer, Sudan, Hudeiba Research Station. Annual Report 1971-1972. Ed-Damer. p.7.

0546

* AGEEB, O.A. 1981. Fieldbeans. In Ed-Damer, Sudan, Hudeiba Research Station. Annual Report 1976-1977. Ed-Damer. pp.10-12.

0547

* AGEEB, O.A. 1981. Fieldbeans variety and watering interval trial. In Ed-Damer, Sudan, Hudeiba Research Station. Annual Report 1975-1976. Ed-Damer. pp.7-11.

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.

0549

* AYOUB, A.T. 1979. Fasulia experiments. In Ed-Damer, Sudan, Hudeiba Research Station. Annual Report 1971-1972. Ed-Damer. pp.55-58.

0550

* AYOUB, A.T. 1975. Effect of some soil amendments on plant growth, survival and yield of dry beans (Phaseolus vulgaris L.) in relation to sodium toxicity. Journal of Agricultural Science 85(3):471-475.

Soil amendments (gypsum, wheat straw mulch and animal manure) were tested on P. vulgaris at toxic and nontoxic NaCl levels in the soil. Slower growth rate and gradual death of seedlings were found under saline conditions. Gypsum and straw mulch increased bean tolerance to salinity, plant survival and vigour. Seed yield/ha was increased by an average of about 30 and 50% with gypsum and straw mulch treatments, respectively, and the gypsum + straw mulch treatment resulted in an increase of about 100% in seed yield. Number of plants survived and to a lesser degree seed weight were the predominant factors affecting seed yield/ha. Variation in yield/ha was attributable most to the number of plants/m^2. (CAB)

0551

* AYOUB, A.T. 1975. Effect of some soil amendments on sodium uptake and translocation in dry beans (P. vulgaris L.) in relation to sodium toxicity. Journal of Agricultural Science 84(3):537-541.

Bean plants were grown in field plots with the objective of comparing the effect of some soil amendments on Na uptake and translocation at 3 levels of soil salinity. Gypsum and wheat straw mulch treatments reduced Na translocation from the roots to the stems and leaves at the higher external

Na level. Incorporation of animal manure with the soil had little effect on translocation at the higher level but may have promoted Na translocation to the stems at the lower level. Plant growth and survival were negatively correlated with the Na content in the plant, particularly with that of the stems. (CAB)

0552

* AYOUB, A.T. 1974. Effect of calcium on sodium salinization of beans (Phaseolus vulgaris L.). Journal of Experimental Botany 25(85):245-252.

In trials in the cool and the hot seasons, the effect of Ca in enhancing Na tolerance of P. vulgaris grown in pots in soil watered with culture solution was studied. In the cool season, yields of DM, roots, nodules and pods increased as the Ca level in the solution increased up to 2mM and decreased with increasing Na level in the range 5-40mM. Na levels in roots and tops significantly declined and the uptake and translocation of Na were competitively inhibited by 2-8mM Ca, while at lower levels of Ca only Na translocation to the tops was markedly inhibited. In the hot season Ca had no beneficial effect on yield at any level of Na and at high rates of Ca plant mortality increased. (CAB)

0553

* AYOUB, A.T.; ISHAG, H.M. 1974. Sodium toxicity and cation imbalance in dry beans (Phaseolus vulgaris L.). Journal of Agricultural Science 82(2): 339-342.

Leaf burn and gradual death were the characteristic symptoms of injury in P. vulgaris sown on a sodic soil. Plant growth, total leaf area/plant, number of stomata and epidermal cells/unit leaf area, and relative water content were drastically reduced in injured plants; these reductions were associated with large Na accumulation in the shoot resulting in cation imbalance. (CAB)

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.

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.

0556

* EL -NADI, A.H. 1975. Water relations of beans. III. Pod and seed yield of haricot beans under different irrigation in the Sudan. Experimental Agriculture 11(2):155-158.

Equal volumes of irrigation water, applied in different ways to a crop of haricot beans in two seasons, showed that the best practice was 60 mm. irrigation every ten days. (AS)

0557

* EL-SHAFFIE, B.E.; BIELY, T.E.; BENNET, C.; KHAIRY, N.M.A. 1978. Snap bean variety trial. In Ed-Damer, Sudan, Hudeiba Research Station. Annual Report 1966-1967. Ed-Damer. p.57.

Trials were conducted at Shambat to test introduced and local snap bean var. and evaluate their performance in the province of Khartoum. Observations were made on characters such as yield, disease resistance and quality. Egyptian Black, Beladi, and White Bean gave the highest yields

(3.15, 3.13, and 2.63 t/feddan, resp.) and were tolerant to Fusarium wilt, and mosaic and leaf curl viruses. (CIAT)

0558

* CHOBRIAL, G.I. 1983. Effects of root pruning on translocation of photosynthates in Phaseolus vulgaris L. Journal of Experimental Botany 34(138):20-26.

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

0559

* HABISH, H.A.; ISHAG, H.M. 1974. Nodulation of legumes in the Sudan. III. Response of haricot bean to inoculation. Experimental Agriculture 10(1):45-50.

In a trial during 2 years at Shambat and Hudeiba, beans (Phaseolus vulgaris) were either given 43 or 86 kg N/ha, or the seeds or the soil were inoculated with a locally-isolated strain of rhizobium. Inoculation increased the number and weight of nodules/plant and tended to increase plant N content. Seed yields were increased more by inoculation than by 43 kg N/ha, but not more than by 86 kg N/ha. Soil inoculation gave better early nodulation than seed inoculation, but the differences diminished at later growth stages. (CAB)

0560

* HABISH, H.A. 1972. Aflatoxin in haricot bean and other pulses. Experimental Agriculture 8:135-137.

Aflatoxin was found in forty-one out of seventy-four samples of various pulses, whereas Aspergillus flavus occurred in all samples, and there was an apparent correlation between the occurrence of the fungus and the level of the toxin in haricot beans. There was evidence that the toxin was produced in haricot beans after harvest, and drying the pods immediately after harvest is therefore suggested as a method of controlling mould growth and the formation of aflatoxin. (AS)

0561

* HASSAN, M.S. 1980. Drybeans variety trials. Effect of sowing date on snapbeans. In Gezira Research Station and Sub-Stations. Annual Report 1973-1974. Sudan. pp.376-377.

0562

* HASSAN, M.S.; EL-FAHAL, A.; FAGER, S.E. 1979. Dry bean variety trial. In Ed-Damer, Sudan, Hudeiba Research Station. Annual Report 1971-1972. Ed-Damer. p.122.

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.

0564

* HASSAN, M.S.; EL MUBARAK, A. 1978. Processing quality of some dry bean

(Phaseolus vulgaris) cultivars in the Sudan. Acta Horticulturae no. 84: 123-129.

Field performance and processing quality of 9 cv. of dry beans were studied in Shendi, Wad Medani and Sennar regions. Cv. varied according to locality. The most suitable cv. for canning as baked beans at Shendi were: Baladi "S", Baladi, White Beans, Light Red Kidney, Pinto, White Kidney, Perry Marrow; for Wad Medani: Baladi "S", Baladi, White Beans and White Kidney; and for Sennar: Baladi "S", Baladi, White Beans and Perry Marrow. Great Northern and Red Kidney proved to be unacceptable for canning in Sennar region and were fairly good in Shendi and Medani areas. (AS)

0565

* ISHAG, H.M. 1977. Responses of haricot bean (Phaseolus vulgaris L.) and field bean to inoculation. In Ed-Damer, Sudan, Hudeiba Research Station. Annual Report 1970-1971. Ed-Damer. pp.11-14.

0566

* ISHAG, H.M.; AYOUB, A.T. 1974. Effect of sowing date and soil type on yield, yield components and survival of dry beans (Phaseolus vulgaris L.). Journal of Agricultural Science 82:343-347.

Field expt. were conducted on clay and sandy clay-loam soils to investigate the effects of sowing date on the incidence of plant losses. Early sowing dates from 2-23 Sept. resulted in very low seed yield (360 kg/ha), mainly because fewer plants survived. High air temp increased the rate of plant death, which was highly correlated with degree days, $r = +0.95$. No. of plants/m^2 was the predominant factor determining seed yield, and no. of pods/plant could not compensate for loss of plants. (AS)

0567

* KHALIFA, O. 1978. Fasulia (Phaseolus vulgaris). In Ed-Damer, Sudan, Hudeiba Research Station. Annual Report 1966-1967. Ed-Damer. p.37.

Crop establishment — The effects on emergence were tried of seven fungicides: Agrosan GN, Thiram, Dieldrex A, Dieldrex B, Fernasan D (Sweadedawa), Aldrex T (Sweda Shell) and dieldrin, each at 3 g per kg seed of variety Beladi. An untreated control was included. There was no significant effect, but emergence was generally good, ranging from 72.4% to 80.5%. Wilt-like disorder — In this disease, the leaves of the affected plants turn yellow and then brown, dry out and fall off, and finally the whole plant collapses. In a trial this season, the varieties Beladi, Great Northern 31, Great Northern 123, Red Mexican UI 34, Red Mexican UI 35, and Pinto III showed no symptoms, and there was no significant difference between their yields which were 393, 409, 392, 412, 503 and 390 kg per feddan respectively. (Full text)

0568

MOHAMED, A.A. 1976. Effects of planting dates, population density and fertilizers on yield and quality of snap beans (Phaseolus vulgaris). M.Sc. Thesis. Sudan, Khartoum University. Faculty of Agriculture. 46p.

0569

* MUTWAKIL, A. 1978. Fasulia (Phaseolus vulgaris). In Ed-Damer, Sudan, Hudeiba Research Station. Annual Report 1966-1967. Ed-Damer. p.30.

0570

* SABET, K.A.; ISHAG, F. 1969. Studies on the bacterial diseases of Sudan crops. VIII. Survival and dissemination of Xanthomonas phaseoli (E.F. Smith) Dowson. Annals of Applied Biology 64:65-74.

Xanthomonas phaseoli survived for more than 18 months in press-dried dolichos bean leaves kept in the laboratory. Survival of the organism in pure culture, or in leaf trash mixed with the soil, depends on soil moisture, being longest in air-dried and shortest in water saturated soil. In completely water-saturated, or in completely air-dry soil, no effect of soil autoclaving is observed. In moistened soil survival is longer in autoclaved than in untreated soil. In the absence of demonstrable phage activity, disappearance of the organism in water-saturated soil is attributed to prevailing anaerobic conditions and in moistened soil to the action of competitive saprophytes. In air-dry soil the organism is preserved by drying. The bacteria reach the seed, via the placenta, when young pods, less than 2 cm long, become infected by artificial inoculation: they do not invade the vascular tissues. Survival of the bacteria in the seed is considered of a relatively little importance in practice. Seedling infection is characterized by elongated brown lesions on the veins of the simple and first and second trifoliate leaves; those parts of the lamina dependent on affected veins become chlorotic and flaccid. Vein lesions show the pathogen in the vascular bundles, which exhibit no tissue differentiation. A strain of X. phaseoli from Vigna radiata (weed plant) also infects dolichos bean. Its minimal infective dose on Dolichos is considerably higher than that of the dolichos bean strain. The dolichos bean disease can be transmitted by heavy infestation of the whitefly Bemisia tabaci. (AS)

0571

* SABET, K.A. 1959. Studies on the bacterial diseases of Sudan crops. III. On the occurrence, host range and taxonomy of the bacteria causing leaf blight diseases of certain leguminous plants. Annals of Applied Biology 47:318-331.

The bacterial leaf blights of dolichos bean (Dolichos lablab L.), soybean (Glycine soja Sieb. and Zucc.), catjang cowpea [Vigna unguiculata (L.) Walp.], lucerne (Medicago sativa L.) and three species of senna (Cassia L.) were investigated and found to be caused by Xanthomonas phaseoli (Smith) Dowson, X. phaseoli var. sojense (Hedges) Starr & Burkholder, X. vignicola Burkholder, X. alfalfae Riker, Jones & Davis and X. cassiae Kulkarni, Patel & Dhande, respectively. None of these diseases has been investigated before in the Sudan and the lucerne disease had not been previously reported from this country. A comparative study which included several strains of the above bacteria as well as X. phaseoli var. fuscans (Burkholder) Starr & Burkholder, X. cajani Kulkarni, Patel & Abhyankar, and X. tamarindi Patel, Bhatt & Kulkarni, showed that the organisms were indistinguishable by the usual bacteriological procedures and the minute differences in certain biochemical characters were considered of little or no diagnostic value. Cross-inoculations revealed that the host ranges of these pathogens, with the exception of X. cajani and X. tamarindi overlapped. The latter two organisms infected only their original hosts, viz. Cajanus cajan (L.) Millsp. and Tamarindus indica L., respectively. Where a particular host was infected by more than one pathogen, the symptoms and effects they produced on that host were similar in every respect except in the case of X. vignicola when infecting Phaseolus vulgaris L. and Dolichos lablab. In this exceptional case the mature spots were dry and white, not conforming to the usual russet or dark-brown, haloed spots produced by other bacteria. Infection in most cases first appeared as minute dark-green more or less watersoaked spots which generally developed on all parts of the plants including the stems, leaves and pods. The systematic position of the pathogens under investigation was reconsidered and for the reasons discussed below all the bacteria included in the study were reduced to special forms of X. phaseoli with the exception of X. phaseoli var. fuscans, the varietal rank of which has been maintained. (AS)

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.

0573

* SALIH, F.A. 1981. Influence of seed size on yield and yield components of dry beans (Phaseolus vulgaris L.). Zeitschrift für Acker- und Pflanzenbau 150(1):19-26.

Crops grown in field trials in 1976 and 1977 from seeds of three dry bean cv. (RO/2/1, Red Mexican, and Great Northern no. 13) of 4 different size grades were compared to determine the influence of seed weight (expressed as g/1000 seeds) on the resulting crop. The seed sizes were graded in small, medium, large and ungraded forms. Results from the two seasons showed that seed size did not significantly affect seed yield/ha. Therefore, grading dry bean seeds would be of little or no economic value to the farmer. (AS)

0574

* SALIH, S.H. 1979. Haricot beans (fasulia). In Ed-Damer, Sudan, Hudeiba Research Station. Annual Report 1974-1975. Ed-Damer. pp.47-49.

0575

* SCHMUTTERER, H. 1969. Pests of crops in Northeast and Central Africa with particular reference to Sudan. Stuttgart, Gustav Fisher Verlag. 296p.

0576

SUDAN. AGRICULTURAL RESEARCH CORPORATION. 1980. Miscellaneous horticultural research reports 1967-1973. Wad Medani, Sudan. 116p.

Horticultural research at experimental stations throughout Sudan in 1967-73 is reported including spacing, sowing date, plant density and fertilizer trials with peas, spacing and fertilizer trials with Phaseolus vulgaris and spacing and soil type studies with sweet potato. (CAB)

0577

SUDAN. AGRICULTURAL RESEARCH CORPORATION. 1982. nual Report of the Hudeiba Research Station 1977-1978. Ed-Damer. 12op.

Research on beans (Phaseolus), beans (Vicia), onions, melons, okra, capsicums, tomatoes, oranges, grapefruits, tangerines, citrus rootstocks, dates, guavas and mangoes is reported. (CAB)

0578

SUDAN. MINISTRY OF AGRICULTURE. 1979. Annual Report of the Hudeiba Research Station 1974-75. Ed-Damer. 68p.

Interim and completed research projects on crops including wheat, chickpea, lentil (Lens culinaris), field bean (Vicia faba), Phaseolus vulgaris and castor are presented by individual authors under departmental headings: (a) agronomy; (b) botany and pathology; (c) plant breeding; (d) soil science; and (e) horticulture. Trials on aspects of sowing rate; interval of irrigation and plant spacing; sowing date and soil type, seed orientation and cv. interaction are reported in (a); variety trials in (c); and effects of toxic elements, especially salinity, in (d). (CAB)

0579

* SUDAN. MINISTRY OF AGRICULTURE. 1951. Seed inoculation of legumes. In _____. Annual Report of the Research Division 1948/49. Sudan. pp.60-61.

Seed inoculation of legumes and nodulation. Soyabeans and haricot (Phaseolus vulgaris) beans do not nodulate satisfactorily in Gezira soils unless their seed is inoculated. (CAB)

0580

* YASSIN, T.E.G. 1979. Fasulia (Phaseolus vulgaris). In Ed-Damer, Sudan, Hudeiba Research Station. Annual Report 1971-1972. Ed-Damer. pp.27-28.

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.

SWAZILAND

0582

* MAGAGULA, G.T.; HAQUE, I.; GODFREY-SAM-AGGREY, W.; FENDRU, I.; MASINA, G.T. 1981. Intercropping studies in Swaziland: present status and future projections. In Willey, R.W.; Garver, C., eds. International Workshop on Intercropping, Hyderabad, India, 1979. Proceedings. Patancheru, India, International Crops Research Institute for the Semi-Arid Tropics. pp.98-104.

0583

STEVENSON, R.M.A. 1973. A summary of trials conducted between August 1968 and July 1972 on Somerling soils. Big Bend, Swaziland, University of Bostwana, Lesotho and Swaziland. Agricultural Research Station. Miscellaneous Report no.98. 17p.

Results of irrigated trials with cotton, maize, rice, guar (Cyamopsis tetragonoloba), potatoes, beans (Phaseolus vulgaris) and wheat are presented. (CAB)

TANZANIA

0584

* ANDERSON, G.D. 1974. Bean responses to fertilizers on Mt. Kilimanjaro in relation to soil and climatic conditions. East African Agricultural and Forestry Journal 39(3):272-288.

In trials during 1 year at 91 sites on 9 soil associations, Phaseolus vulgaris cv. Canadian Wonder was given P, K and Ca alone or in combination. Mean seed yields ranged from 133 kg on the poorest soil to 1.12 t/ha on the best and were negatively correlated with altitude and with annual rainfall. Combined applications of PK and PK + Ca gave the highest yields, 763 and 753 kg/ha, respectively, at all sites. (CAB)

0585

* ANDERSON, G.D. 1972. A brief appraisal of potential navy bean areas in Northern Tanzania. Tanzania, Ministry of Agriculture. 40p.

A brief examination of the soils and environments of potential navy bean areas in Northern Tanzania has been carried out. Approximately 42,000 acres of navy beans could be produced on a sustained yield basis annually. Major areas of potential production are: a) the lower souther slopes of Kilimanjaro - 6,000 acres; b) Karatu/Oldeani/Mbulumbulu - 6,000 acres; c) Kiru/Derakuta/Shauri Moyo - 5,500 acres; d) Galappo - 6,000 acres. Reasonable yield potential for smaller acreages in parts of Kingori, Monduli-Essimingore, Nangwa/Katesh, Basotu, Ndareda, Magara, west and east Kilimanjaro. Areas with relatively low potential yield per acre include Oljoro, Lower Arusha, parts of Kingori, and Lolkisale. An equation for estimating the climatic potential for bean yield in an average year has been suggested. A scale for deducting yield from the above potential as a result of soil defects in texture, effective rooting depth, characteristics of the soil surface and fertility considerations has also been suggested. Where areas are already growing other crops the suggested bean acreages is only from 2.5 - 15% of the total acreage, the actual percentage suggested depending on the density of settlement and the type of farming. Another reason for recommending only small proportions of the total acreages for navy beans is the need for soil conservation in many areas. NAFCO unit farms growing in excess of 1000 acres of beans annually have been suggested for the Southern Kilimanjaro, Karatu-Oldeani, Kiru and Galappo areas. Smaller unit farms growing about 500 acres of beans might also be developed on formal sisal land in lower Kingori and in the mid-Monduli, Essimingere or Ndareda areas. Soil conservation should be tackled mainly by having a suitable crop rotation, by strip cropping on the controur and by leaving or planting grass strips roughly parallel to the contour. Earth banks should be resorted to only where the crop potential is high and the slope and erosion hazard considerable. In some of the areas visited sown pastures should be introduced and intensive dairy and beef production integrated with bean and cereal cropping. This is probably the soundest method of ensuring soil conservation and ultimately the best returns from the land. There is need for area-orientated research on beans and those crops to be grown in rotation with them. For this at least one fertility-agronomist with a keen interest in soils and one plant breeder/crop protectionist need to be appointed to work full time. Soil surveys are needed in potential areas to select the better soils for beans. This is particularly necessary in the Kiru-Derakuta-Shauri Moyo area, if seed multiplication/research and unit farms are to be sited there. The key to both the rapid expansion of navy bean acreage and increased yields of essential cereal crops is a concerted publicity and extension programme to ensure continually improving standards of husbandry. Considering the needs of the population and soil

conservation it has been suggested that the potential of these areas on a sustained yield basis is about 42,000 ac. annually. (AS)

0586

ANDERSON, G.D. 1964. Summary of results from a series of bean fertilizer trials carried out on the southern and eastern slopes of Kilimanjaro. Dar-es-Salaam, Tanzania, Ministry of Agriculture. Tengeru Report no. 30.

0587

* BARTLETT, C.D.A. 1978. Farm information in the design of improvements for small-scale agriculture with special reference to beans in lowland areas of Morogoro region, Tanzania. Morogoro, University of Sar-es-Salaam. Faculty of Agriculture, Forestry and Veterinary Science. Department of Rural Economy. Rural Economy Research Paper no.6. 22p.

Improvements for small-scale agriculture, if they are to be accepted by the farmer, must be designed within the context of the farming system. The peasant farm-household system is highly complex, and complete quantitative analysis of it in general is not practicable. An intensive qualitative investigation of the interactions of the farm-household system followed by a brief review for each agro-economic zone can yield information of value in the design of improvements. Such an investigation may lead to the identification of limited areas where a quantitative analysis will be useful and will also aid in the design of related experiments. Further information is gained by testing improvements in the field and by making an evaluation of their effects on the overall farming system. An examination of the production of beans in lowland areas of Morogoro Region, Tanzania, by this approach yielded recommendations on research directions, experimental design, and possible related projects which might well have been missed by conventional farm-level micro-questionnaires and analysis by partial budgets, gross-margins, or linear programming. (AS)

0588

* BROCKMAN, F. 1977. Tanzania National Grain Legume Research Program. Tropical Grain Legume Bulletin no. 8:67-76.

The present status of grain legume production in Tanzania is reviewed. The work of the National Grain Legume Research Programme includes screening for local high-yielding cowpea cv. (e.g. SVS 3) and testing existing ITTA cv., and studies on opt. plant spacing, sowing date, fertilizer response and relay cropping of cowpea with maize. Experiments with pigeon pea include intercropping and insecticide evaluation. A collection of Phaseolus vulgaris germplasm is being built up. Work on soyabean includes insecticide evaluation and timing and crop density. (CAB)

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.

0590

* BURNETT, G.F.; LEE, C.W.; PARK, P.O. 1966. Air-craft applications of insecticides in East Africa. XV. Very-low-volume treatment of a seed-bean crop with DDT in oil solution. Bulletin of Entomological Research 56(4):701-714.

Experiments are described on the aerial application of very low volumes (0.5 gal/acre) of oil solutions of DDT to control two pests, Heliothis armigera (Hb.) (bollworm) and Acanthomia horrida (Germ.) (brown bug), of

the seed-bean crop in northern Tanzania. The method was compared with an improved variant of the standard commercial method of aerial control, in which DDT emulsion is applied at 1.85 gal/acre. This improved variant was also compared with a standard commercial treatment. Very-low-volume (solution) treatments were made with rotary atomisers, normal volume (emulsion) treatments with boom-and-nozzle equipment. The results were assessed, by measuring the amount of DDT deposited on filter papers and on the leaves of the crop and by estimating pest mortality from counts made immediately before and 48 hours after spraying. A direct comparison of very-low- and normal-volume treatments under identical conditions was not possible, but it was established that under similar conditions the proportion of DDT emitted that was deposited at crop level (percentage recovery) was much the same for the two methods, varying between 41 and 62 per cent according to conditions. The lower leaves of a fairly young crop of an open variety received about 60 per cent of the deposit on the upper leaves, but in a mature crop of a tall dense variety this percentage fell to 35. Standard commercial practice, with the aircraft flying very close to the crop, gave a recovery of about 55 per cent in moderately good conditions but with a variation in deposit density across the swath of over 7:1. An identical application from 10 ft. above crop, as in our method gave in rather better conditions a recovery of 62 per cent, with the deposit-density variation reduced to 2:1. This performance was much the same as that achieved by the type of emulsion application used in the other experiments described. In similar conditions, both very-low- and normal-volume treatments gave very similar mortalities of Heliothis. Acanthomia was present in only one experiment and was less readily controlled; it required deposits at crop level of about 0.4 lb/acre to give satisfactory mortality, whereas in the same experiment 0.25 lb/acre gave 96 per cent mortality in a relatively young Heliothis population containing only 10 per cent of sixth-instar larvae. Older Heliothis larvae required higher dosages, 0.4 lb/acre at crop level killing only 53 per cent of a population containing 62 per cent of sixth-instar larvae. It was shown that there is a regular decrease in the kill inflicted by a given dosage on the successively later instars (from 92 per cent of the third to 66 per cent of the sixth) with a recorded deposit of 0.63 lb DDT per acre. Except in the first experiment, mortalities were much below those claimed for commercial treatments, even at lower rates of DDT per acre. The reasons for this are discussed, together with the advantages to be expected from a change to the very-low-volume technique with solutions. (AS)

0591

BURNETT, G.F. et al. 1965. Aerial spraying of insecticide concentrates. World Crops 17(2):72-74.

In northern Tanganyika, beans (Phaseolus vulgaris) are grown on a large scale for seed production. Most of the area is sprayed from the air against various pests, using 5.6 l of DDT concentrate diluted with 3 times its volume of water per ha. Since the weight of the water reduces the spraying capacity of the aircraft, trials were conducted to compare the standard treatment with spraying of undiluted concentrate, containing 20% DDT in oil, at a rate of 5.6 l/ha by means of Micronair equipment. Both methods proved to be highly and equally effective against the 2 main pests, the caterpillars of Heliothis armigera and the spiny bug, Acanthomia horrida. It is probable that, using the new technique, the dose of DDT per ha can be reduced. (RTI)

0592

BURNETT, G.F.; LEE, C.W.; PARK, P.O.; SWAINE, G. 1964. Aircraft applications of insecticides in East Africa. XVI. Low volume spraying of seed beans with DDT concentrate. Arusha, Tanzania, Tropical Pesticide Research Institute. Miscellaneous Report no. 464.

0593

* ENYI, B.A.C. 1973. Effects of intercropping maize or sorghum with cowpeas, pigeon peas or beans. Experimental Agriculture 9:83-90.

Intercropping maize or sorghum with pigeon peas, cowpeas or beans led to a reduction in leaf area indices, fresh weight yield at time of anthesis, straw yield at harvest and grain yield of the cereal crops. In sorghum, pigeon peas and cowpeas had a greater adverse effect on grain yield than beans, but with maize, beans and cowpeas had a more adverse effect on grain yield than pigeon peas. While intercropping maize with either beans or cowpeas decreased total yield of grain (cereal and legume) per hectare, intercropping sorghum with pigeon peas increased total grain yield per hectare. (AS)

0594

FOSTER, J.; MACARTNEY, J.C. 1966. Chemical weed control in dwarf French and haricot bean. Dar-es-Salaam, Tanzania, Ministry of Agriculture. Tengeru Report no.69.

0595

HUDSON, J.C.; JAFFER, A.A. 1970. Effect of systemic fungicides on bean rust. Arusha, Tanzania, Tropical Pesticides Research Institute. Miscellaneous Report no.726. 7p.

0596

ILONGA AGRICULTURAL RESEARCH INSTITUTE. 1969. Grain legumes. Tanzania. Research Report no.26.

0597

JAKOBSEN, H. 1976. Bean survey in Mbeya Region. Mbeya, Tanzania, Uyole Agricultural Centre. Research Report no.19.

0598

* KAHURANANGA, J.; MOSHA, C.J.; SAMBAH, L.M.; MOLLEL, S.L. 1974. The effect of four herbicides on weed density and navy bean (Phaseolus vulgaris L.) yield at Kiru Valley, Northern Tanzania. In East African Weed Control Conference, 5th., Nairobi, Kenya, 1974. Proceedings. Arusha, Tanzania, Tropical Pesticides Research Institute. pp.80-88.

Four herbicides were applied to navy beans var. Tengeru 16 in Kiru Valley (northern Tanzania) to assess their effect on weed density and crop yield. Alachlor, applied preemergence at 2 and 4 kg/ha, was best, followed by fluorodifen under the same conditions. Metobromuron (preemergence at 1.5 and 3 kg/ha) and bentazon (postemergence at 2 and 4 kg/ha) gave poor weed control, especially of grasses, and depressed yield severely. (AS)

0599

* KAREL, A.K.; MATARY, R.D.R. 1983. The effect of insecticide application and plant populations on insect pests and yield of intercropped maize and beans. Bean Improvement Cooperative. Annual Report 26:43-45.

The effect of insecticides applications and plant populations on the insect pests and yield of maize and bean grown in monoculture and intercropped was studied. Trials were carried out at Morogoro, Tanzania, in a split-split plot design with 2 treatments. Possible combinations of one third/two thirds of the component crops were formed. Thus 4 crop combinations of pure maize two third maize/one third bean, one third maize/two third bean, and pure bean, were used as subtreatments. Gamma HCH was sprayed at 600 g a.i./ha to control bean pests at 10, 20, 48 days after planting. For the control of maize pests aldrin dust was applied at 20 days after planting. Damage caused by Ootheca bennigseni was higher in intercropped bean. The

incidence of Taeniothrips sjostedti was low in pure stand bean. The incidence of Heliothis armigera was higher in pure stand than in intercropped bean. The number of Maruca testulalis larvae was generally low in both pure stand and intercropped bean. The highest seed yield was obtained at maize and bean population of 44,444 and 133,333 plants/ha, resp. The relative yield total is used for indicating whether or not intercropping is beneficial. (CIAT)

0600

* KAREL, A.K. 1983. Effect of time of planting on insect pests and yield of common beans. Bean Improvement Cooperative. Annual Report 26:108-110.

Experiments were conducted to study the effect of sowing time on insect pests and yield of bean at Morogoro, Tanzania. Bean var. Selian Wonder was used in a randomized block design with 4 replications in an area of 23 m x 24.5 m. Six weekly sowing times, the first commencing 7 April, were evaluated. Data on Ootheca damage, number of thrips, and percentage of damage by Heliothis and Maruca are recorded. The most reliable time for bean sowing is from the end of March to 17 April. In general, the best time for bean production would be within 15 days from the onset of rains. (CIAT)

0601

* KAREL, A.K.; RWEYEMAMU, C. 1983. Resistance to the foliar beetle (Ootheca bennigseni Weise) in common beans. Bean Improvement Cooperative. Annual Report 26:53-54.

Twenty seven bean var. were evaluated for their resistance to Ootheca bennigseni in an experiment conducted at the Faculty of Agriculture, Morogoro, Tanzania, in 5 m single row plot with 4 replications in a randomized block design. None of the 27 var. was immune to adult beetle foliar feeding, presumably due to the heavy infestation during the cropping season. However, significant (P = 0.05) varietal differences in feeding injury were recorded. T8 was most resistant to O. bennigseni followed by A83, BAT 1252, A82, A67 and Mexican 142. (CIAT)

0602

* KAREL, A.K.; RWEYEMAMU, C. 1983. Yield losses in field beans following foliar damage by Ootheca bennigseni Weise. Bean Improvement Cooperative. Annual Report 26:51-52.

The effect of Ootheca bennigseni foliar damage on grain yields was assessed in bean cv. Mexican 142, Masonga, Selian Wonder, and T8 under various insecticides treatments during the preflowering stage. A split plot design with 4 replications was used. The insecticidal treatments were: control, no application until 40 days after planting; lindane 500 g a.i./ha in 400 l of water applied at 10 days intervals for 10-40 days after planting; endosulfan 400 g a.i./ha in 400 l of water at same intervals; Ripcard 60 g a.i./ha in 200 l of water at same intervals. Cv. T8 and Mexican 142 had significantly fewer Ootheca. Ripcard, a synthetic pyrethroid, was more effective in reducing insect population. Pod and seed yields were significantly high (P = 0.05) for all cv. treated with insecticides. Untreated cv. showed a reduction of 18-31% in seed yield. (CIAT)

0603

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

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

0604

* KATUNDU, J.M. 1980. Agromyzid leaf miner - a new insect pest to Tanzania. Tropical Grain Legume Bulletin 20:8-10.

A species of Agromyzid fly was found in 1979 infesting beans. The insect was identified as Liriomyza trifolii. This is probably a new record for Tanzania. Description (egg, larva, pupa, and adult), life cycle, host plants, and economic importance of the insect are discussed. (RTI)

0605

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

The presence of hemagglutinins in foods prepared from beans (Phaseolus vulgaris) is an indication that they are inadequately cooked. Hemagglutinins were demonstrated in 22 percent of samples of a mixture of maize and bean flour cooked by African mothers in their homes. There is considerably less risk of incomplete hemagglutinin destruction when whole beans are prepared in the traditional way. The possible hazards of incomplete destruction of bean toxin and the possibilities of breeding toxin free strains of Phaseolus beans is discussed. The data suggest that bean flours which have not been adequately heat treated should not be used especially as a weaning food in infancy. (AS)

0606

KREYSLER, J. 1971. Trial on production and marketing of a low cost-high protein food for children on village level. A report on three experimental projects in Usambara, Tanzania. Indian Journal of Nutrition and Dietetics 8.130.

0607

KUNZLER, A. 1957. Report submitted to the Director of Tanganyika Farmer's Association on the prospects for a canning bean industry.

0608

LEE, C.W. 1966. Aerial applications of insecticide concentrates:droplet distribution in seed beans and cotton. Agricultural Aviation 8(2):54-61.

Research on aerial spraying for the control of common insect pests of seed beans (Phaseolus vulgaris) and cotton in Tanzania revealed that, under a variety of meteorological conditions, good spray coverage can be achieved using only 2 rotary atomizers and applying DDT oil concentrates as small droplets. Applications of insecticide concentrates at 5.5 l/ha as fine sprays and of emulsion concentrates at 22 l/ha as coarse sprays gave fairly uniform droplet distribution. The coverage achieved in terms of droplets per cm^2 with oil concentrates was 2 to 3 times that of emulsion concentrates despite the much lower volume of application. (RTI)

0609

MACARTNEY, J.C. 1966. A spacing trial on haricot beans. Dar-es-Salaam, Tanzania, Ministry of Agriculture. Tengeru Report no.83.

0610

MACARTNEY, J.C. 1966. Agronomic work on beans. Tengeru, Tanzania, Northern Research Center. Research Note no.3.

0611

MACARTNEY, J.C.; WATSON, D.R.W. 1966. Beans. Dar-es-Salaam, Tanzania, Ministry of Agriculture. Tengeru Report no.90.

0612

* MACARTNEY, J.C. 1966. The selection of haricot bean varieties suitable for canning. East African Agricultural and Forestry Journal 32(2):214-219.

At the Northern Research Centre in Tanzania, 73 varieties of haricot beans (Phaseolus vulgaris) introduced from various countries, and 38 selections obtained in Kenya, Uganda and Tanzania, were tested in field trials for their suitability for canning. Resistance to 6 races of bean rust (Uromyces phaseoli) identified at the East African Agriculture and Forestry Organization, the effects of soil, climate and storage on hard seed percentage, the seed quality, and yields as effected by various agronomic factors were studied. Only 4 varieties had complete field resistance to the 6 rust races and were found to have suitable seed quality for the canning trade as well. (RTI)

0613

* MACARTNEY, J.C. 1964. Report on fertilizer experiments on seed beans in the Arusha Region. Dar-es-Salaam, Tanzania, Ministry of Agriculture. Tengeru Report no.33. 4p.

Out of four trials none have shown any response to phosphate, gypsum application or innoculant. Observational trials with applications of magnesium and manganese will be necessary to ascertain the relative importance of these trace elements. (AS)

0614

* MACARTNEY, J.C.; HOWLAND, A.K. 1963. East African bean rust studies. Dar-es-Salaam, Tanzania, Ministry of Agriculture, Tengeru Report no. 76. 7p.

Lab. screening of field resistance to rust (Uromyces phaseoli) of Tengeru (Tanzania) selections of haricot beans is described. Twenty-six var. suitable for canning and showing field resistance were used. Six American bean rust differentials and Tengeru No. 8 were inoculated at 10 days and symptom expression recorded 16 days later. A classification of the bean rust races present within East Africa was also carried out. Two prevalent races were found in rust samples collected from the bean growing area of N. Tanzania in 1960, classified as race B and A. By 1966, 8 races had emerged designated A to H. Six of the resistant imported var. from Tengeru were tested for resistance to 1st 6 races. No. 8, 9, 14, and 19 were highly resistant to all 6 races, while No. 16 was susceptible to D and F and No. 21 to E and F. (CIAT)

0615

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

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

0616

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

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

0617

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

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

0618

* MAGHEMBE, J.A.; REDHEAD, J.F. 1982. Agroforestry: Preliminary results of intercropping Acacia, Eucalyptus and Leucaena with maize and beans. In Keswani, C.L.; Ndunguru, B.J., eds. Symposium on Intercropping in Semi-arid Areas. Morogoro, Tanzania, 1980. Proceedings. Ottawa, Canada, International Development Research Centre. pp.43-49.

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. Morogoro, Tanzania, 1980. Proceedings. Ottawa, Canada, International Development Research Centre. pp.158-159.

0620

* MATERU, M.E.A.; MAKUSI, R.A. 1973. Toxicity of synergized pyrethrum to Acanthomia spp. I. Acanthomia tomentosicollis Stal. East African Agricultural and Forestry Journal 39(2):141-143.

Toxicity tests were carried out to determine the effectiveness of synergized pyrethrum applied topically to Acanthomia tomentosicollis. The mortality of the bug 24 hours after treatment was lower than that caused by endosulfan. Pyrethrum is therefore not recommended at the present for field control of bean pests. (AS)

0621

MATERU, M.E.A.; KETTLE, D.S. 1972. Laboratory observations on the bionomics of Acanthomia spp. (Hemiptera, Coreidae). Arusha, Tanzania. Tropical Pests Research Institute. Miscellaneous Report no.804. 13p.

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.

0623

* MATERU, M.E.A.; MAKUSI, R.A. 1972. Toxicity of technical endosulfan applied topically to Acanthomia spp. (Coreidae, Hemiptera). East African Agricultural and Forestry Journal 37(4):313-317.

Tests were conducted to establish the toxicity of technical endosulfan to two Acanthomia species. The method of application and analysis of the results are described. The results show that the males and females of each species are equally susceptible to endosulfan but A. tomentosicollis is more susceptible than A. horrida. (AS)

0624

* MATERU, M.E.A. 1971. Population dynamics of Acanthomia spp. (Hemiptera, Coreidae) on beans and pigeon peas in the Arusha area of Tanzania. East African Agricultural and Forestry Journal 36(4):361-383.

Field experiments and observations were conducted on beans and pigeon peas between 1966 and 1967 to assess field population densities of A. tomentosicollis and A. horrida. The sampling and analysis methods are explained and their shortcomings pointed out. The data from these experiments showed that: (a) the distribution of both species in the field is uneven, especially so on beans. (b) A. tomentosicollis occurred on both beans and pigeon peas, but A. horrida was found on beans and rarely on pigeon peas. (c) Higher densities of A. tomentosicollis were recorded on pigeon peas than on beans. (d) The method of sampling and analysis used proved inadequate in supplying accurate information on the duration and survival of the instars. Nevertheless the duration of the instars in the field appeared to be about the same as in the laboratory at comparable temperatures. For accurate information daily sampling is recommended. (f) These species maintain themselves throughout the year by changing plant hosts, from beans to pigeon peas to Dolichos lablab and back to beans. (h) Two parasites, one of A. tomentosicollis (and possibly A. horrida) eggs and one of A. horrida adults were found. Hadronotus gridus (egg parasite) was widespread and appeared to be more numerous when A. tomentosicollis population was low and concentrated in small areas than when the population was high and spread over large areas. (AS)

0625

* MATERU, M.E.A. 1970. Damage caused by Acanthomia tomentosicollis Stal. and

A. horrida Germ. (Hemiptera, Coreidae). East African Agricultural and Forestry Journal 35(4):429-435.

Experiments were conducted on beans and pigeon peas to study the nature and amount of damage caused by Acanthomia tomentosicollis and A. horrida. These bugs were found to cause reduction of weight, number and the quality of seeds. The largest damage was the reduction of quality, which even at a low bug density was considerable. Disfigured seeds are rejected for sale and therefore Acanthomia damage can cause considerable financial losses. In the field, high densities of A. tomentosicollis have been observed on pigeon peas and at these densities over 50 per cent of the seeds were damaged. Nematospora coryli was found in bug-damaged seeds but not in clean seeds. (AS)

0626

MAYONA, C.M. 1979. Legume research in southern highlands of Tanzania. Profess. Report for 1978-79. ARI, Uyole. National Research Coordinating Committee, Morogoro, 22-25 Sept. 1979.

0627

MOSHA, A.C. 1975. The use of common beans as human food in Tanzania. In Jaffe, W.G.; Oliveira, J.E.D., eds. Nutritional aspects of common beans and other legume seeds as animal and human foods. Caracas, Venezuela, Sociedad Latinoamericana de Nutrición. pp.27-279.

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.

0629

MUKUNYA, D.M.; KEYA, S.O. 1975. Report on bean production study. Visit to Mainland Tanzania. 7-11 April, 1975. Kenya, University of Nairobi.

0630

* NATIONAL CROP RESEARCH PLANNING COMMITTEE. 1979. Grain legume agronomy report for 1978-79. Tanzania, Ilonga Agricultural Research Institute. 22p.

0631

* NATIONAL CROP RESEARCH PLANNING COMMITTEE. 1979. Grain legume breeding report for 1978-79. Tanzania, Ilonga Agricultural Research Institute. 22p.

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.

0633

RILEY, E.A. 1960. A revised list of plant diseases in Tanganyika Territory. Kew, Commonwealth Mycological Institute. Mycological Papers no. 75.

0634

ROBERTSON, J.K. 1955. The growing of canning beans in Tanganyika. World Crops 7(1):23-25.

During the past few years a not unimportant trade has developed in Br. East Africa in growing white haricot beans for canning. From Tanganyika in

particular exports have increased considerably in the past 5 years. A description of culture, varieties, exports and future possibilities. (RTI)

0635

* ROBERTSON, L.A.D. 1973. Notes on the insect parasites of some lepidopteran pests in Tanzania. East African Agricultural and Forestry Journal 39(1):82-93.

Caterpillars of crop pests were collected in Tanzania in 1961, 1962, 1963 and 1964 and reared in an outside insectary for assessment of parasitization. Records are given of the parasites obtained, mainly of the length of their pupal periods and of their relative importance in the years and places of collection. The host species were Spodoptera littoralis, Earias insulana, Earias bilplaga, Heliothis armigera, Xanthodes graelsii, Plusia acuta, Spodoptera exigua, Spodoptera exempta, Cosmophila flava, Sylepta derogata and Antigastra catalaunalis. Most information was obtained on the first four species, which were common. Thirty-seven species of primary parasites were obtained; some of the parasites species were reared from more than one host. (AS)

0636

THE SEED (Regulation of Standards) Act. 1973. The Gazette of the United Republic of Tanzania 54(29).

0637

* THE SEEDS regulations, 1976. The Gazette of the United Republic of Tanzania 57(7):39-72.

0638

* SEENAPPA, M.; KESWANI, C.L.; MATIKO, M. 1981. Aspergillus infection and aflatoxin production in beans (Phaseolus vulgaris) in Tanzania. International Biodeterioration Bulletin 17(3):79-82.

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

0639

SEENAPPA, M. 1981. Suitability of a modified minicolumn for detection of aflatoxin in corn and beans. Morogoro, Tanzania, University of Dar-es-Salaam, Department of Food Science and Technology.
Paper presented at the International Conference on Mycotoxins, Cairo, Egypt, 1981.

0640

SHAO, F.M. 1981. Studies on bean anthracnose in the Southern Highlands of Tanzania. M.Sc (Agric) Thesis. Morogoro, Tanzania. University of Dar-es-Salaam.

0641

* SILBERNAGEL, M.J.; WANG, S.; MILLS, L. 1983. New strain of BCMV from Africa and Michigan. Bean Improvement Cooperative. Annual Report 26:10-11.

In November 1982, a seed borne BCMV isolate was found in a bean accession from Tanzania. Initial greenhouse differential tests indicated that this

strain is similar to a field isolate from cv. Sanilac recently found in Michigan. (CIAT)

0642

* SILBERNAGEL, M.J. 1982. The Tanzanian-Washington State Title XII Bean CRSP. Bean Improvement Cooperative. Annual Report 25:30.

0643

* SWAINE, G. 1968. Studies on the biology and control of pests of seed beans (Phaseolus vuglaris) in northern Tanzania. Bulletin of Entomological Research 59(2):323-338.

Light-trap catches of Heliothis armigera (Hb.) reach peaks during the wet seasons, April and Nov.-Jan. Initial infestation of seed beans by H. armigera occurs in April-May at the time of flowering of the early-sown crop, the adults probably originating from an earlier generation on maize. Two generations are completed during the main seed bean season, the 1st on early-sown beans and the 2nd on later beans; and the dry period July-Oct. may be passed in pupal diapause. Damage caused by the older larvae eating the seeds in the pod is prevented by spraying the young larvae with DDT (25% EC at 3 pt/2 gal spray/acre), the standard treatment, or endosulfan (35% EC at 1 1/2 pt/2 gal spray/acre) at about 6 wk postemergence. Adults of the Pentatomidae Nezara viridula (L.) invade bean fields from alternative host plants at the same time as H. armigera. This species, even in small numbers, causes the loss of young pods and also damages or kills the developing seed. It is not controlled by the standard DDT treatment for H. armigera, but the following insecticides were found to be effective: gamma-BHC 20% EC (1 1/4 pt), dieldrin 18% EC (2 pt) and endosulfan 35% EC (1 1/2 pt) in 2 gal spray/acre. Where N. viridula and H. armigera are found together, the standard recommendation is endosulfan 35% EC (1 1/2 pt/2 gal spray/acre). The Coreidae Acanthomia horrida (Germ.) and A. tomentosicollis (Stal) cause damage similar to that of N. viridula but are serious only when infestations are heavy. They were controlled by DDT, dieldrin or endosulfan at the rates given above. Alatae of the bean aphid Aphis fabae Scop. invade bean fields mainly during the 1st 2 wk of the crop, producing apterae which concentrate on the tip of the plants. Damage (stunting and loss of flowers and pods) is serious only when large populations of apterae are produced on a high proportion of the young plants. The early infestation demands control measures separate from those for the other pests, the most effective being methyl demeton 50% EC (1/2 pt/2 gal spray/acre) applied 3-4 wk postemergence. Endosulfan, although promising and far less toxic to larvae of the predator Chemilomenes lunata (F.) than methyl demeton, was discarded on grounds of costs, as was dimethoate. Aphid populations reached a peak during July and Aug. and decreased with the warmer weather in Sept. A large no. of alternative host plants are listed, but source of the primary flight into beans is not known. Melanagromyza phaseoli (Tryon), the life cycle of which is completed in 23 days, is unimportant on beans as it is least abundant during the growing period of the main crop but may damage plants suffering from water stress. Tunneling in stems by larvae was controlled by seed dressings of aldrin or heptachlor (both 40% WP mixed with seed at 1:200 w/w). (AS)

0644

TANZANIA. DEPARTMENT OF HORTICULTURE. 1979. Preliminary progress report for the 1978-79 bean programme. Mbeya, Uyole Agricultural Centre.

0645

TANZANIA. MINISTRY OF AGRICULTURE. 1978. Bulletin of crop and livestock statistics. Tanzania, Statistics Section, Plannig Division. 68p.

0646

TANZANIA. MINISTRY OF AGRICULTURE. 1978. Report of research results of National Grain Legume Research Programme, 1977-78. Tanzania, Ilonga Agricultural Research Institute.

0647

TANZANIA. MINISTRY OF AGRICULTURE. 1975. Horticulture in Tanzania. The present position. 1. National aspects, Marketing Development Bureau. Tanzania. FAO/UNDP Project Tan no. 27.

0648

TANZANIA. MINISTRY OF AGRICULTURE. 1966. Import and export of bean seed (Phaseolus vulgaris). Tanzania. Tengeru Report no. 94. 2p.

0649

* TANZANIA. OFFICIAL CERTIFICATION AGENCY. 1978. Rules, regulations and certification procedures. 46p.

0650

* UNIVERSITY OF DAR ES SALAAM. FACULTY OF AGRICULTURE, FORESTRY AND VETERINARY SCIENCE. 1983. Breeding beans (Phaseolus vulgaris) for disease and insect resistance and determination of economic impact on subsistence of families. Morogoro, Tanzania. Title XII Bean-Cowpea Cooperative Research Support Programme. Annual Progress Report 1981-1982. 7p.

In 1981 a bean improvement program was started at the Faculty of Agriculture, Forestry, and Veterinary Science, U. of Dar es Salaam, Morogoro, Tanzania, to: (1) collect bean germplasm and evaluate its agronomic characteristics; (2) develop screening procedures for disease and pest resistance; (3) determine economic losses due to diseases and pests; (4) study inputs, timing of production, consumption, and marketing of smallholders; (5) collect and maintain in pure culture isolates of major pathogens; and (6) train Tanzanian students and staff. Currently there are over 300 accessions at the Faculty, approx. 2500 at the Uyole Agricultural Centre (Mbeya), and about 1000 accessions in Lyamungu (Moshi). At Mbeye the most important pests and diseases were the whitefly (Bemisia tabaci), Heliothis sp., and anthracnose (Colletotrichum lindemuthianum); in Lyamungu they were Ootheca bennigseni, anthracnose, and BCMV; and at Morogoro they were O. bennigseni, thrips, pod borers (Maruca testulalis), and Heliothis armigera. Among the CIAT bean var. tested under trials of the International Bean Yield and Adaptation Nursery (IBYAN), Línea 22 has the best overall performance regarding yield and insect resistance. In addition, BAT 1297 seems to be a promising var. for further investigation. In Lyamungu, var. Canadian Wonder selection No. 19 gave the highest yield; in Morogoro, the highest yield was obtained with a local var. A total of 119 lines from Morogoro accessions were assessed for nodulation and nitrogenase activity; only 2 showed the presence of nodulation and 17 showed root knot infection (Meloidogyne sp.). Expt. conducted in Morogoro indicated that yield increased by 10.3% due to rust (Uromyces phaseoli) control. Damage due to O. bennigseni ranged between 18-31% in different bean var. (CIAT)

0651

* URIYO, A.P.; SINGH, B.R.; MSAKY, J.J. 1982. Evaluation of phosphorus placement methods and nitrogen carriers under conditions of maize-bean intercropping. Summary. In Keswani, C.L.; Ndunguru, B.J., eds. Symposium on Intercropping in Semi-arid Areas, 2nd. Morogoro, Tanzania, 1980. Proceedings. Ottawa, Canada, International Development Research Centre. pp.65-66.

0652

* WALKER, P.T. 1960. Insecticide studies on East African agricultural pests. III. Seed dressings for the control of the bean fly Melanogromyza phaseoli (Coq.) in Tanganyika. Bulletin of Entomological Research 50(4):781-793.

The bean fly, Melanagromyza phaseoli (Coq.), the larvae of which tunnel in the stems of Phaseolus vulgaris, is a pest of this crop in Tanganyika. Field trials there in 1956 on haricot-type beans showed that dressing the seed with chlorinated-hydrocarbon insecticides could prevent attack for at least 30 days after germination; organophosphorus insecticides were less effective. In four further field trials (A-D), in 1957, the insecticides and types of formulation used were aldrin (wettable powder and emusifiable concentrate (EC), endrin (EC) y gamma BHC (dry dressing and EC), dieldrin (dry dressing and EC) and a proprietary organophosphorus systemic (dry dressing). Wet dressings were applied by treating the seeds with the liquid and drying immediately, and in one treatment aldrin as a wettable powder was applied dry and the seeds then damped and dried at once. Damage was assessed on an arbitrary scale on trials A and B, and yields measured on trials A, C and D. Results varied between insecticides and under different growing conditions, but wet dressing with endrin at 213 mg per 100 g seed, of which about 50 per cent was retained on the seeds, resulted in the lowest damage, amounting to 7.7 compared with 52.6 for the control (no dressing), and the highest yield, amounting to 13.5 units compared with 8.6 for the control. All treatments, except that with the organophosphorus dust, reduced the damage significantly below that in the control. Wet dressings were usually more effective than dry dressings with the same insecticide, as regards both yield and reduction in damage. This may be associated with the better retention of wet dressings, which was shown by the results of chemical analysis of the residues on the seeds left in the drill hopper after sowing. (AS)

0653

* WALLACE, G.B. 1941. Yellow bean mosaic and notes on other bean diseases. East African Agricultural Journal 7:114-115.

0654

* WALLACE, G.B. 1939. French bean diseases and bean fly in East Africa. East African Agricultural and Forestry Journal 5(3):170-175.

0655

* WATSON, D.R.W. 1966. Import and export of bean seed (Phaseolus vulgaris). Dar-es-Salaam, Tanzania, Ministry of Agriculture. Tengeru Report no.94. 2p.

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

0656

* WETALA, M.P.E.; MOSHA, C.J.; MOLLEL, S.L.; SAMBAI, L.M. 1979. A herbicide

bean (Phaseolus vulgaris L.) trial on T.P.R.I. farm during the first rains 1977. Arusha, Tanzania, Tropical Pesticides Research Institute. Miscellaneous Report no.968. 12p.

Trials were carried out on bean var. Canadian Wonder on sandy loam soils at the Tropical Pesticides Research Institute Farm, Arusha, Tanzania during the 1st rains of 1977. The weed flora consisted of about 40% broad-leaved species (with Argemone mexicana dominant), 50% grasses (mainly Setaria spp.), and less than 10% Cyperus spp. Chloramben at 1.8 kg/ha + linuron 0.6 kg preemergence and butralin at 1.75 kg/ha presowing followed by chloramben 2 kg preemergence controlled broad-leaved weeds for only 4 wk. but grass weed control lasted longer. Crop yields from these treatments did not differ significantly from those of the hand-weeded control. Pendimethalin at 1.6 kg/ha incorporated before sowing gave satisfactory control of broad-leaved weeds and grasses but damaged the crop. Dinoseb-alkanolamine at 11.9 and 14.28 kg/ha preemergence controlled broad-leaved weeds for a limited period but grasses were resistant. The same herbicide at lower rates scorched the crop when applied at the unifoliate stage of the beans and there was no improvement in weed control. Oxadiazon at 0.75 and 2 kg/ha preemergence gave satisfactory weed control but proved toxic to the crop especially at the high rate. Postemergence sprays of bentazon at 0.75 and 1 kg and isoproturon at 0.5 and 1 kg at the trifoliate leaf stage generally gave unsatisfactory weed control with the 1 kg rate of the latter defoliating the crop. No treatment controlled Cyperus spp. (AS)

0657

* WETALA, M.P.E.; MOSHA, C.J.; MOLLEL, S.L.; SAMBAI, L.M. 1979. Evaluation of pre-planting incorporated, pre-emergence and post-emergence herbicides in navy bean (Phaseolus vulgaris) in the Galapo area of Arusha region, Tanzania. Arusha, Tanzania, Tropical Pesticides Research Institute. Miscellaneous Report no.969. 10p.

A herbicide evaluation was carried out in navy beans on deep red soil during the first rains of 1977 at a farm of the National Agricultural and Food Corporation, Galapo, Tanzania. All the presowing, incorporated herbicides, isoproturon at 1 and 2 kg, chloramben 1.5 and 2.4 kg, and pendimethalin 1 and 1.6 kg/ha, gave less than 40% control of broad-leaved weeds and, with the exception of isoproturon at 2 kg/ha, more than 70% control of grasses. Overall weed control was poor with the best result amounting to only 67% (pendimethalin, 1 kg). Among the preemergence herbicides which included oxadiazon 0.75 and 2 kg, dinoseb-alkanolamine 11.9 and 14.2 kg, isoproturon 0.5 and 1 kg, pendimethalin 1 and 1.6 kg, chloramben 1 and 2 kg, chloramben + linuron 1.8 + 0.6 and 2.4 + 0.8 kg and alachlor + linuron 2 + 0.5 and 2 + 1 kg/ha, best control of broad-leaved weeds (70%) was obtained with pendimethalin 1 kg and oxadiazon 2 kg/ha. The other treatments, together with postemergence application of isoproturon 0.5 and 1 kg and bentazone 0.72 and 0.96 kg, gave 60% control of broad-leaved weeds. Oxadiazon, pendimethalin at 1 kg, and alachlor + linuron gave at least 90% control of grasses. Oxadiazon, pendimethalin 1 kg and alachlor + linuron (2 + 1 kg/ha) gave fair overall weed control (65-78%). Oxadiazon scorched 80-90% of the crop, resulting in 20% mortality, while isoproturon presowing and preemergence caused temporary scorch of the unifoliate leaves. (CAB)

0658

* LEPIGRE, M. 1965. Etude sur les possibilites d'amélioration de la conservation des haricots du Togo en milieu rural. Agronomie Tropicale 20(4): 388-430.

In Togo, Senegal and Dahomey beans and cereals suffer considerable insect damage even within a short time after harvest. In Togo the main kinds of beans, including Vigna sinensis and Phaseolus vulgaris, were studied with respect to (1) infestation by weevils (Apion spp. and Bruchidae), (2) storage, (3) marketing, (4) traditional methods of reducing damage. Recommendations are made for temporary measures of control, gradually to be followed by the introduction of modern methods including rapid drying of the harvest, air-tight storage, and the use of chemicals such as lindane and carbon tetrachloride. The organization necessary for the execution of this programme is discussed as well. Notes of a visit to Togo, Senegal and Dahomey illustrate the urgency of the problem. (RTI)

0659

ALPERT, M.F.; HUTT, M.S.R.; WOGAN, G.; DAVIDSON, C.S. 1971. Association between aflatoxin content of food and heptoma frequency in Uganda. Cancer 28:253-260.

0660

ATKIN, J.C. 1973. The importance, epidemiology and control of bean rust (Uromyces appendiculatus) on white haricot beans (P. vulgaris) in Uganda. M.Sc. Thesis. Kampala, Uganda, Makerere University.

0661

* COAKER, T.H. 1960. Investigations on Heliothis armigera (HB) in Uganda. Bulletin of Entomological Research 50(3):487-506.

A survey of the populations of eggs and larvae of Heliothis armigera (Hb.) was made on the Cotton Research Station, Namulonge, in Buganda Province, Uganda, over the four-year period, 1954-57 inclusive, on cotton, maize, groundnuts, beans and, in one year, sunflower. The populations encountered were low in comparison with some other cotton areas in Africa. The oviposition rate on each crop closely followed the flowering cycle, and there was no indication of the population from one crop influencing that on a subsequent crop, even when their flowering cycles overlapped. Under the normal crop sequence there is a sufficient gap between the attractive phases of successive crops to cause dispersal, possibly to wild host-plants, of the moths emerging from pupae bred in the preceding crop. The variation in population from year to year on a given crop was no greater than that between different localities in any one season. Maize and sunflower did not prove successful when tested as trap crops grown adjacent to cotton. Earias spp. and Argyroploce leucotreta Meyr. were less abundant than Heliothis and together constituted only 27 per cent. of the total population of Lepidopterous larvae on cotton. A method is described for breeding H. armigera in the laboratory, in which the mean duration of the various stages was: egg, 4 days; larva, 24.8 days; pupa 22.9 days; preoviposition period, 3.1 days; and oviposition period, 10.4 days. The mean number of eggs laid per female was 751.6, of which 71.4 per cent. hatched. Larval diets consisting of differing species and parts of food-plants caused significant differences in larval and pupal periods, the former being least (21.8 days) on maize silks and greatest (33.6 days) on sunflower corolla and receptacle, and the latter least (19.7 days) after larval feeding on three-week-old maize cobs and greatest (26 days) after seven-week-old cotton bolls. Pupae developing from larvae collected from the field did not exhibit any diapause or resting stage. Two egg parasites and 15 larval parasites (three of which were probably secondary) were bred from material of H. armigera collected in the field, but the degree of parasitism remained low throughout the year. A nuclear polyhedral virus disease of the larvae was also recorded. It is concluded that under the climatic conditions encountered, H. armigera is active throughout the year because wild or cultivated food-plants are always available and no resting stage of the insect is induced; this continuous activity is accompanied by biologically controlling factors that maintain populations stable at a relatively low level. (AS)

0662

* DAVIES, J.C. 1972. A note on the occurrence of Zabrotes subfasciatus Boh., Coleoptera. (Bruchidae) on legumes in Uganda. East African Agricultural and Forestry Journal 37(4):294-299.

The paper draws attention to the discovery and subsequent spread of Zabrotes subfasciatus (Boh.) in Uganda. This bruchid is an important pest of beans, Phaseolus vulgaris in many areas of the world. In Uganda it has been found to be an important pest of cowpeas Vigna unguiculata L. A description is given of the life cycle of the insect in Uganda with specific reference to oviposition and length of the life cycle. (AS)

0663

* DAVIES, J.C. 1970. Insect infestation and crop storage. In Jameson, J.D., ed. Agriculture in Uganda. Oxford University Press. pp.274-280.

0664

* DAVIES, J.C. 1970. Pests of beans. In Jameson, J.D., ed. Agriculture in Uganda. Oxford University Press. pp.242-243.

Major insects recorded in Uganda are: tissue eating ones such as Hedylepta indicata, Maruca testulalis, Heliothis armigera, Spodoptera litura, Alcidodes leucogrammus, Coryna apicicornis, Mylabris amplectens, Melanagromyza phaseoli, and Melanagromyza sp.; sucking insects such as Nezara viridula, Acanthomia horrida, Anoplocnemis curvipes, and aphids. (CIAT)

0665

DAVIES, J.C. 1963. In-sack storage of beans using 0.4% gamma-BHC dust. Tropical Products Information 6:213-221.

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.

0667

DAVIES, J.C. 1960. Coleoptera associated with stored products in Uganda. East African Agricultural Journal 25:199-201.

0668

DAVIES, J.C. 1959. A note on the control of bean pests in Uganda. East African Agricultural Journal 24(3):174-178.

Stored legumes in the tropics are very susceptible to attack by members of the insect family Bruchidae. A brief description of the life histories of the common bruchid pests in Uganda is given. Results of trials using BHC dust. It is recommended that beans which are to be stored for more than three months should be treated with 0.04% gamma BHC dust a rate of 8 oz. per 200 lb (1/4 kg per 100 kg), the same dosage as is recommended in the United Kingdom. (RTI)

0669

* FOSTER, H.L. 1970. Liming continuously cultivated soils in Uganda. East African Agricultural and Forestry Journal 36(1):58-69.

Lime was tested in 84 factorial trials on continuously cultivated soils in various districts of Uganda, and 18 significant responses were recorded. Beans did not respond to lime in 23 trials where the soil pH was above 5.25, but significant responses were obtained in 8 out of the 18 trials that had a soil Ca level below 6 meq/100 g and a soil pH below 5.25. In general, harmful effects of lime were not observed, even though some trials had initial soil pH values in excess of 6. No consistent interactions, either positive or negative, between lime and other treatments (including trace elements) were recorded. Soil analyses showed that for Uganda soils in general, appreciable amounts of exchangeable aluminum exist only when the pH is below 5.2. Soil analyses, giving quantitative results for the

changes in soil properties due to the application of lime show that the extent of the increase in pH is generally related to the amount of soil organic matter present. (AS)

0670

* GREATHEAD, D.J. 1969. A study in East Africa of the bean flies (Dip., Agromyzidae) affecting Phaseolus vulgaris and of their natural enemies, with the description of a new species of Melanogromyza Hend. Bulletin of Entomological Research 59:541-561.

Examination of infested bean plants (Phaseolus vulgaris) showed that bean flies in East Africa consist of 3 species: Melanagromyza phaseoli (Tryon), M. spencerella sp. n. and Ophiomyia centrosematis (de Meij.). M. spencerella is described, and notes are given on the life cycle, host plants and distribution for all 3 species. Their importance in East Africa is discussed. M. spencerella is the most damaging because it oviposits and feeds in the hypocotyl, is frequently the most abundant species and is less effectively parasitized. Bean plants able to produce adventitious roots freely are able to grow away from the important early attack in the stems. Published work on chemical control measures is summarized. The parasite complex associated with the bean fly in East Africa was studied, and notes are given on the species present, the recognition of their early stages, their host ranges and abundance. Parasitism is discussed in relation to the infestations found on beans, with special reference to Opius melanagromyzae Fisch., the most important parasite of M. phaseoli, and Eucoilidea sp., the most important parasite of M. spencerella. It is concluded from graphical analysis that O. melanagromyzae is density dependent and an important factor in limiting M. phaseoli populations in East Africa. Eucoilidea sp., on the other hand, shows signs of delayed density dependence and is less effective in controlling its principal host. O. melanagromyzae has recently been sent to Hawaii for release against M. phaseoli; some field recoveries have already been made. (AS)

0671

HOSKING, H.R. 1938. The improvement of native food crop production by selection and breeding in Uganda. East African Agricultural Journal 4:84-88.

0672

HOWLAND, A.K.; STOREY, H.H. 1961. East African bean rust studies. Paper presented at the Meeting of the Specialist Committee on Agricultural Botany, 9th., Kampala, Uganda, 1961.

0673

INGRAM, W.R. 1969. A note on the failure to control aphid infestation on beans with insecticides in Uganda. East African Agricultural an Forestry Journal 34(4):276-281.

Experiments over 2 seasons are described in which attempts were made to protect beans, Phaseolus vulgaris, from attack by Aphis fabae. Ten insecticides, viz. menazon, endosulfan, fenitrothion, demeton-methyl, phosphamidon, dimethoate, dicrotophos, bromophos, morphotion and formothion, were compared with an unsprayed treatment on May-sown beans. Only demeton-methyl gave any reduction in the degree of infestation, but none of the products gave any increase in yield. All insecticides reduced the percentage of plants on which parasites and predators were observed, demeton-methyl and formothion being the worst; morphotion and endosulfan appeared to be the least harmful. (AS)

0674

* INGRAM, W.R. 1969. Observations on the pest status of bean flower thrips in Uganda. East African Agricultural and Forestry Journal 34(4):482-484.

Larvae and adults of Taeniothrips sjostedti and Frankliniella dampfi occur in the flowers of a wide range of plants including Phaseolus vulgaris. Spraying trials conducted at 2 centers in Uganda from 1963-64 showed that DDT, lindane and, to a lesser extent, malathion reduced thrips populations. However, as no yield increases were obtained following these reductions, it is concluded that thrips do not cause any damage to the beans. (AS)

0675

INGRAM, W.R. 1967. Entomology Section, Kawanda Annual Report. Part II. 1966-67.

0676

INGRAM, W.R. 1965. Entomology Section, Kawanda Annual Report. Part II. 1965.

0677

* LEAKEY, C.L.A. 1973. A note on Xanthomonas blight of beans (Phaseolus vulgaris (L.) Savi) and prospects for its control by breeding for tolerance. Euphytica 22(1):132-140.

This short review attempts to collect information on Xanthomonas pathogens of beans that is of importance to attempts to breed for tolerance. Sources of immunity are not yet recognized, but tolerance has been reported in several genetic stocks. All inheritance of tolerance so far reported has been quantitative. Some different pathotypes are already recognized and indications are that more of these will be found as they are looked for. Different inoculation methods may be appropriate for detecting different sorts of host tolerance. (AS)

0678

* LEAKEY, C.L.A. 1973. Plant introduction and germplasm of Phaseolus vulgaris and other food legumes. Commentary. In Seminar on Potentials of Field Beans and other Food Legumes in Latin America, Cali, Colombia, 1973. Papers presented. Cali, Centro Internacional de Agricultura Tropical. Series Seminars no.2E. pp.263-266.

Some measures whereby the yield of Phaseolus could be increased, including a suggested diallel cross of some varieties with outstanding characteristics, are outlined. (CAB)

0679

* LEAKEY, C.L.A.; ATKINS, J.; MAGARA, J. 1972. Bean rust studies in Uganda. Bean Improvement Cooperative. Annual Report 15:60-63.

0680

* LEAKEY, C.L.A. 1972. Crop index in beans. Bean Improvement Cooperative. Annual Report 15:64-65.

0681

* LEAKEY, C.L.A. 1972. Factors affecting increased production and marketing of food crops in Uganda. Eastern Africa Journal of Rural Development 4:1-20.

Factors affecting the increased production of food crops, including Phaseolus vulgaris, as a policy objective are discussed. Assuming that Uganda produces enough food in aggregate and also enough calories and proteins to feed its entire population with a margin to spare, the follow-

ing aspects are analyzed: tradition and resistance to innovation, types of research, development strategies, traditional agricultural systems in East Africa, the convergence of modern agricultural science with peasant practices, and technical factors in increased production (fertility, improved seed and planting material, implements, pest and disease control, marketing and prices, and agricultural credit). A market information service combined with a liberal marketing structure with efforts to shorten the paths between producers and consumers is recommended. To be economic, any significant extra production must be used for the urban or export markets or for conversion through industry. The market for processing includes that for the production of animal feeds to support a growing livestock industry and for conversion of raw food materials to higher value and less perishable exportable forms. (CIAT)

0682

* LEAKEY, C.L.A.; SIMBWA-BUNNYA, M. 1972. Races of Colletotrichum lindemuthianum and implications for bean breeding in Uganda. Annals of Applied Biology 70(1):25-34.

Nineteen local isolates of the bean anthracnose pathogen have been obtained and tested over the period 1964-70 for pathogenicity on a set of differential cultivars including the sets of four cultivars each used in the alternative systems of Schreiber and Hubberling and of Bannerot and Blondet. The results indicate the existence of a number of races not conforming to those of either system and the ability, when freshly collected, of some isolates with affinities to both alpha and beta races partially to overcome the immunity of the cultivar Cornell 49-242. The implications of the position as now known from these results and review of the literature for disease-resistance breeding are discussed. Tests of the Uganda isolates, on a range of other dry bean cultivars, indicate a tendency for alpha and delta races to be pathogenic on small-seeded indeterminate viny or indeterminate bush cultivars, whereas beta and gamma races tend to be pathogenic on larger-seeded and determinate cultivars. (AS)

0683

* LEAKEY, C.L.A. 1972. The effect of plant population and fertility level on yield and its components in two determinate cultivars of Phaseolus vulgaris L. Savi. Journal of Agricultural Science 79:259-267.

The biological and useful yield of Phaseolus vulgaris cv. 'Banja' and cv. 'Diacol Nima' were compared when sown at populations, in row spacings, equivalent to 5.4-32.3 plants m^{-2}, at four levels of fertility achieved by the use of zero, five, ten and 20 cwt/ac respectively of a fertilizer mixture containing by weight 2:2:1 calcium ammonium nitrate, single superphosphate and muriate of potash. Yield and its components were determined at final harvest. The two cultivars behaved generally similarly. Crop Index, while highest in the plants with no fertilizer, was more or less constant for each cultivar over a wide range of biological yields in those plants receiving fertilizer. Yield is determined to the extent of 85.7% and 86.1% respectively for 'Diacol Nima' and 'Banja' by the product of pods/plant and plants surviving to harvest. High densities, although giving the highest grain yields, are wasteful of seed in that the percentage of plants surviving to contribute to yield is much reduced. (AS)

0684

* LEAKEY, C.L.A. 1970. The improvement of beans (Phaseolus vulgaris) in East Africa. In _____., ed. Crop improvement in East Africa. Farnham Royal, England. Commonwealth Agricultural Bureaux. pp.99-128.

The work on the improvement of beans in E. Africa is described along with extense information on the origin, use, and production of Phaseolus

vulgaris, its contribution to human nutrition, wild and cultivated forms, and biotic factors limiting productivity. Research in Uganda has been centered on the selection and improvement of beans for horticulture and in Tanzania, on the selection of white haricot beans for exporting; Uganda and Kenya are also interested in this work. The Uganda bean program is described: objectives, cv., selection, techniques of hybridization, hybridization programs, and selection in new hybrid populations. Selection and improvement of white haricot beans for canning are included. The agronomy of beans in relation to bean improvement is explained extensively. Research in Uganda and Tanzania will also benefit Kenya. (CIAT)

0685

* LEAKEY, C.L.A. 1970. Anthracnose resistance breeding in pinto beans in Uganda using the AbE gene from Cornell 49-242. Bean Improvement Cooperative. Annual Report 13:60-61.

0686

* LEAKEY, C.L.A. 1970. Background to current breeding work at Makerere University College, Uganda. Bean Improvement Cooperative. Annual Report 13:59-60.

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.

0688

LEAKEY, C.L.A. 1969. Progress in the genetic improvement of Phaseolus beans at Kabanyolo, Kampala, Uganda, Makerere University.
Paper presented at the Meeting of the Specialist Committee on Agricultural Botany, 12th., 1969.

0689

LEAKEY, C.L.A. 1964. Some recent fungicide and other trial results on beans in Uganda compared with those from other countries and their relevance to field practice. Kampala, Uganda, Depratment of Agriculture. Technical Communication no.16.

0690

LEAKEY, C.L.A.; MUKASA, S.K. 1963. Bean diseases and prospects for their control by breeding. Uganda, Department of Agriculture. Kawanda Research Station.
Paper presented at the Meeting of the Specialist Committee on Agricultural Botany, 10th., Nairobi, Kenya, 1963.

0691

LEAKEY, C.L.A. 1963. French beans and their diseases in Uganda. Kampala, Uganda. Department of Agriculture. Bulletin no.4.

0692

* LEAKEY, C.L.A.; MUKASA, S.K. 1963. Report on bean growing and improvement in Uganda. II. Bean diseases and prospects for their control by breeding. Uganda. Department of Agriculture. Kawanda Research Station.

Information recently obtained on bean cultivation in Uganda is included as well as a brief literature review on major diseases. Symptomatology, etiology, and var. resistant or susceptible to the following diseases recorded in Uganda are given: anthracnose (Colletotrichum lindemuthianum); angular leaf spot (Isariopsis griseola); rust (Uromyces appendiculatus); white mold [Ramularia deusta (Sclerotinia sclerotiorum)]; Ascochyta leaf and pod spot (Ascochyta phaseolorum); powdery mildew (Erysiphe polygoni);

Didymella sp.; bacterial blight (Xanthomonas phaseoli). Viral disease do not cause much damage compared with fungal and bacterial diseases. The breeding program currently carried out in Uganda, mainly directed towards obtaining materials resistant to the mentioned diseases, is discussed. (CIAT)

0693

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

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

0694

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

The results of 3 spacing trials with rows wider than 0.3 m conducted in Uganda are given. In the 1st trial the spacing was varied without altering the seeding rate and the ideal stand with all spacings was 43560 plants/ac. The trial was planted during 3 seasons at Kawanda and Bukalasa and the plots were split for 2 var. Banja (bush type) and Mutike 4 (semi-climbing). The 0.3 x 0.3 m gave the highest yield in all the trials at the 2 sites, but when plant populations were maintained at that same level the widening of rows to 0.6 m did not significantly lower yields. The 2nd trial was planted during the 1st season of 1962 on 2 planting dates in Kawanda and Bukalasa. Plots were split for 2 var.: Kawanda 35 and Tanganyika Black (both semi-climbing). At both sites yield differences were not significant, indicating the considerable compensating capacity of the plants of semi-climbing var. In the 3rd trial a 0.6 m row width and a wider range of seeding rates with the row were tested. Var. Banja 2 and Kawanda 35 were planted at Kawanda and Bukalasa for 3 seasons. For both var. the optimum spacing within the row is in the range of 2-4 seeds/0.3 m. A high seeding rate is particularly essential for the bush type var. Banja 2; the semi-climbing var. with its compensatory capacity is less sensitive to the seeding rate. (CIAT)

0695

* MUKASA, S.K. 1962. Notes on French beans (Phaseolus vulgaris). The importance of the crop. Uganda, Kawanda Research Station. 2p.

The importance and present state of French bean cultivation in Kawanda, Uganda, is briefly described. The quality of the crop for marketing is very low since it is a mixture of var. and very little effort is made to clean the crop which always contains foreign matter, bits of straw, broken

and discolored or diseased seeds. Symptomatology of major French bean disease are included, namely anthracnose (Colletotrichum lindemuthianum), bacterial blight (Pseudomonas medicaginis var. phaseolicola), angular leaf spot (Isariopsis griseola), and other diseases that may be important in localized areas or during particular seasons: rust (Uromyces appendiculatus), Ascochyta leaf spot (Ascochyta fabae), viruses, and white mold (Ramularia deusta). The var. collection is being assessed and crosses are being made; preliminary observations have revealed a no. of disease-resistant var. among semiclimbers and climbers. None of the bush type var. have showed resistance. Promising or disease-resistant var. are being imported from other countries. (CIAT)

0696

* MUKASA, S.K. 1961. The improvement of Phaseolus beans in Uganda. Uganda, Kawanda Research Station. 1p.
Paper presented at Meeting of the Specialist Committee on Agricultural Botany, Kawanda Research Station, Uganda, 1961.

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

0697

MUKASA, S.K. 1960. Beans and malnutrition in Uganda. Uganda, Kawanda Research Station.

0698

* MUKIIBI, J.K. 1982. Effect of intercropping on some diseases of beans and groundnuts.Summary. In Keswani, C.L.; Ndunguru, B.J., eds. Symposium on Intercropping in Semi-arid Areas, 2nd., Morogoro, Tanzania, 1980. Proceedings. Ottawa, Canada, International Development Research Centre. pp.116-117.

0699

* NYIIRA, Z.M. 1973. Pest status of thrips and lepidopterous species on vegetables in Uganda. East African Agricultural and Forestry Journal 39(2):131-135.

During survey carried out between October 1970 and July 1971, six species of Thysanoptera and 38 of Lepidoptera were recorded as pests of vegetables in Uganda. Their economic status and hosts are described. The majority and economically important species were Lepidoptera belonging to the families, Noctuidae, Pyralidae and Plutellidae. Thrips were Lepidoptera belonging to the families, on onions and tomatoes. (AS)

0700

* OSIRU, D.S.O. 1982. Genotype identification for intercropping systems. Summary. In Keswani, C.L.; Ndunguru, B.J., eds. Symposium on Intercropping in Semi-arid Areas, 2nd., Morogoro, Tanzania, 1980. Proceedings. Ottawa, Canada, International Development Research Centre. pp.91-92.

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.

0702

* OSIRU, D.S.O.; WILLEY, R.W. 1972. Studies in mixtures of dwarf sorghum and beans (Phaseolus vulgaris) with particular reference to plant population. Journal of Agricultural Science 79(3):531-540.

In a trial in 1971, a comparison of pure stands and mixtures of maize and beans was repeated, in which maize was replaced by dwarf sorghum cv. MUS 16; plant densities were 5.6, 11.2, 22.2 or 44.4 plants/m^2. Results were similar to those with maize, but yields of mixtures were up to 55% higher than those of pure stands. In contrast with maize/bean mixtures, sorghum was the more competitive crop in the 33% beans/67% sorghum mixture, but the reverse occurred with 67% beans/33% sorghum, and the relative competitive abilities were not affected by changes in plant density. (CAB)

0703

* RUBAIHAYO, P.R.; MULINDWA, D.; SENGOOBA, T.; KAMUGIRA, F. 1981. Bean production in Uganda. In Regional Workshop on Potential for Field Beans in Eastern Africa, Lilongwe, Malawi, 1980. Proceedings. Cali, Colombia, Centro Internacional de Agricultura Tropical. Series 03EB-1. pp.155-186.

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

0704

RUBAIHAYO, P.R. 1978. A review of grain legumes in Uganda. Journal of Agronomy and Crop Science 146:235-245.

0705

* RUBAIHAYO, P.R., 1978. The performance of gamma-ray induced mutants of three pulse crops. In Seed protein improvement by nuclear techniques. Vienna, Austria, International Atomic Energy Agency, 1978. pp.235-241.

The M_6-M_9 generations of white-seeded beans, french beans and soybean elite mutants were evaluated for their seed and protein yield potential in replicated trials over several seasons. Several mutant lines of each crop with significantly higher yield potential than the initial lines were identified and given to the Govt field trials officer for further testing on stations throughout Uganda for at least 3 more seasons. Results will then be considered by the National Variety Release Committee if any of these mutants show outstanding performance in these trials. (AS)

0706

RUBAIHAYO, P.R. 1977. The status of grain legumes in Uganda. In International Congress of the Society for the Advancement of Breeding

Researchers in Asia and Oceania (SABRAO), 3rd, Camberra, Australia, 1977. Plant Breeding Papers:1 and 2. SABRAO. pp.3(c).29-3(c).36.

The cultivation of Phaseolus vulgaris, groundnut, soyabean, Cajanus cajan, Vigna unguiculata and pea in Uganda is briefly discussed. (CAB)

0707

* RUBAIHAYO, P.R. 1976. The selection criteria for seed yield in grain legumes. East African Agricultural and Forestry Journal 41(4):289-293.

Populations of 15 french bean lines (Phaseolus vulgaris), 17 white dry bean lines (P. vulgaris) and 13 soybean lines were studied to compare the efficiency of selection based on individual yield components, yield itself and a combined score index for seed yield. It was concluded that all methods of selection were inconsistent and could not be recommended as routine procedure. (CAB)

0708

RUBAIHAYO, P.R. 1975. Experiences with mutation breeding in beans and soybeans. In Breeding for seed protein improvement using nuclear techniques. Vienna, International Atomic Energy Agency.

0709

* RUBAIHAYO, P.R. 1975. Gamma-ray induced mutations in Phaseolus vulgaris (L.). East African Agricultural and Forestry Journal 41(2):134-138.

Following treatment of Phaseolus vulgaris var. Banja 2 dry seeds with 5 doses of gamma rays, a number of desirable mutants were isolated in the M_2-generation. The M_1-generation had shown physiological stimulation of growth by low doses and growth retardation by high doses. Several mutant lines showed significant improvement in seed and protein yield compared to the initial line. (AS)

0710

RUBAIHAYO, P.R. 1975. The use of gamma-ray induced mutations in Phaseolus vulgaris L. Zeitschrift fur Pflanzenzuchtung 75(3):257-261.

Air-dry seeds of P. vulgaris cv. Mexico 142 (spreading type) were treated with gamma-rays at doses of 0-21 kR. 3 bush-type lines were selected which consistently gave higher seed yields and had similar seed size and protein content but a higher protein yield/unit area than the original lines. (CAB)

0711

RUBAIHAYO, P.R. 1973. Status and potential of beans (Phaseolus vulgaris) in Uganda. In Proceedings. 1st. Symposium U. Soc. Agron. Kampala. pp.65-72.

0712

* RUBAIHAYO, P.R. 1973. The variability and correlation of some characters in the Makerere bean (Phaseolus vulgaris L.) germplasm. In Grain Legume Improvement Workshop, Ibadan, Nigeria, 1973. Proceedings. Ibadan, International Institute of Tropical Agriculture. pp.91-95.

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. Proceedings. New York, Protein Advisory Group of the United Nations. pp.117-130.

0714

* SCHUSTER, M.L.; COYNE, D.P.; HOFF, B. 1973. Comparative virulence of

Xanthomonas phaseoli strains from Uganda, Colombia and Nebraska. Plant Disease Reporter 57(1):74-75.

A new highly virulent strain of Xanthomonas phaseoli from Uganda was about equally virulent to the Colombian strains but more virulent than the Nebraska isolate. Host differentials consisted of eight cultivars of three Phaseolus species. Phaseolus vulgaris PI 207262 (Colombia) was tolerant to all four strains while P. acutifolius, Nebr. Acc. #10 was tolerant to three of the four strains tested. (AS)

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.

0716

* SIMBWA BUNNYA, M. 1972. Fungicidal control of bean disease at Kawana, Uganda. Plant Disease Reporter 56(10):901-903.

Of 4 fungicides tested for control of bean (Phaseolus vulgaris) diseases at Kawanda Research Station (Uganda), zinc + maneb was the most effective at a rate of 3 lb/50-70 gal H_2O/acre. (AS)

0717

* SINGH, D.; MATHUR, S.K. 1974. Sclerotium rolfsii in seeds of bean from Uganda. Seed Science and Technology 2:481-483.

Sclerotium rolfsii Sacc. is an important pathogen of beans (Phaseolus vulgaris L.), but it had not been recorded on seed. Occurrence of S. rolfsii on 2 samples of bean seeds from Uganda was recorded and its pathogenicity established. (AS)

0718

* STEPHENS, D. 1969. Changes in yields and fertilizer responses with continuous cropping in Uganda. Experimental Agriculture 5(4):263-269.

In 16 field trials over a 6-yr period at 8 sites in Buganda and western Uganda, a 2-yr, continuously cropped rotation of early and late crops following a grass fallow was given all combinations of 0 or 120 lb ammonium sulfate, 0 or 60 lb superphosphate, 0 or 60 lb KCl, 0 or 60 lb MgO and 0 or 2 tons farmyard manure (FYM)/acre annually. The crops in the rotation varied with site and included maize, cotton, beans (Phaseolus vulgaris), sweet potatoes, groundnuts, finger millet (Elcasine coracana) and sorghum. Yields of all crops declined steadily during the 1st 2 cycles. Yields were increased by N, P, K and FYM; responses to K and FYM increased during the period; but responses to N and P showed no significant changes. It was concluded that after a few years of continuous cropping, K deficiency limited yields, especially of sweet potatoes. (AS)

0719

* STEPHENS, D. 1969. The effects of fertilizers, manure and trace elements in continuous cropping rotations in Southern and Western Uganda. East African Agricultural and Forestry Journal 34:401-417.

Eighteen factorial fertilizer trials, sited in pairs at nine stations, have shown that the largest responses were of maize and beans to nitrogen and of sweet potatoes and cotton to potassium of frequently cropped, strongly acid ferrallitic soils. Responses to phosphorus were smaller and to magnesium or soil applications of micronutrients usually negligible. The effects of farmyard manure were partly explained by its nutrient content, particularly potassium. After four years ammonium sulphate had lowered the pH of the 0-8

inch soil layer by 0.3 unit per ton of fertilizer per acre and removed approximately 1.2 x its chemical equivalent of exchangeable cations from the top 16 inches, while about one-third of the applied phosphorus, one-half of the potassium and three-quarters of the magnesium remained extractable by the Truog method and ammonium acetate respectively. The potassium fertilizer also appeared to depress the level of extractable phosphorus. Manure raised the level of exchangeable potassium slightly more effectively than potassium fertilizer and increased soil nitrogen, but it had no significant effect on the level of Truog phosphorus. Four years of continuous cropping depressed the pH and exchangeable potassium but had little effect on other exchangeable bases or Truog phosphorus: it also probably reduced the level of organic matter at the rate of 3 per cent of its initial value each year. The pH of the soil was the best indicator of site responses to phosphorus or potassium and the pH or exchangeable potassium the best indicator of crop yield. Leaf analysis confirmed the importance of potassium deficiency but levels of nitrogen or phosphorus in leaf samples were only occasionally correlated with yields. (AS)

0720

STEPHENS, D. 1967. The effects of ammonium sulphate and other fertilizer and inoculation treatments on beans (Phaseolus vulgaris). East African Agricultural and Forestry Journal 32(4):411-417.

In 2 experiments on a strongly acid ferrallitic loam soil in Uganda, bean yields were significantly increased by superphosphate, lime and ammonium sulphate but not by urea, gypsum, molybdate or inoculating with N-fixing root-nodulating bacteria. Bean roots were weakly nodulated, leaf N levels were low, and it is considered that the response to ammonium sulphate was due to the extra effectiveness of its N over that of urea rather than to its S content. Leaf analysis was a guide to the P status of the plant but gave little information about N or S status. Although it increased yields, superphosphate depressed germination. (AS)

0721

* WILL, A.G.K. 1971. Notes on a small vegetable market garden trial in Uganda. In East African Horticultural Symnposium, 1st., Kampala, Uganda, 1970. Papers. The Hague, Netherlands, International Society for Horticultural Science. Technical Communications no.21. pp.66-72.

Five years of monitoring an intensively cultivated vegetable garden with crop rotation at the Kawanda Research Station, Uganda, showed the most successful crop sequence to be: for the 1st year, cabbage, broccoli, cauliflower, leeks; the 2nd year, tomato, French bean; the 3rd year, Swiss chard, lettuce, cucumber and with the following catch crops: carrots, spring onions, beet, spinach, Amaranthus sp., Solanum sp., and French bean. With supplementary irrigation, all year round vegetable production can be achieved in Uganda. A min. size of 2 ha is recommended to allow an adequate profit margin. (CIAT)

0722

* WILLEY, R.W.; OSIRU, D.S.O. 1972. Studies on mixtures of maize and beans (Phaseolus vulgaris) with particular reference to plant population. Journal of Agricultural Science 79(3):517-529.

In 1970-1, beans cv. Diacolonima and maize cv. Katumanic were grown in pure stands or in mixtures of (a) 33% beans/67% maize or (b) 67% beans/33% maize at plant densities of 2.8, 5.6, 11.1 or 22.2 plants/m^2. Mixtures were obtained by replacing complete rows of one crop by the other and maize rows were given 130 kg N/ha to eliminate any effects of N transfer from the beans. Average total seed yields were up to 38% higher with mixtures than with pure stands, which yielded up to 4 t maize grain and 1.7 t bean

seed/ha; yields of mixtures were higher with (a) than with (b). The yield increases of mixtures increased with increase in plant density. Maize had the higher competitive ability and this increased with increase in plant density. It was concluded that light utilization was the major factor in the results. (CAB)

0723

D'ARONDEL DE HAYES, J.; HUYEZ, M. 1973. Les essais maraichers a Farako-Ba (Haute Volta). Synthese de travaux. Agronomie Tropicale 28(8):717-750.

In trials on a valley bottom area in the dry season, bean (*Phaseolus vulgaris*) cv. Haricot Blanc Coco and Haricot Lingot de Paris (both introduced from France) and the local cv. Gros Blanc de Banankeledaga gave the highest yields of dry seeds (2.1-2.3 t/ha). Trials with introduced cultivars of potatoes showed that although tuber yields of up to 21.3 t/ha could be obtained, the main difficulty was the storage of the seed tubers. (CAB)

0724

* BAUDET, J.C. 1977. Recherches sur la classification generique des Papilionaceae-Phaseoleae. These. Ph.D. Paris, France, Universite Pierre et Marie Curie. 213p.

The pantropical tribe Phaseoleae (91 genus and approx 1500 spp) was subdivided into 6 subtribes on an organographic basis. A critical study of the non-organographic postulates at a generic level including new observations on certain areas (chorology, palynology, dermology, blastography and flavone chemistry) has permitted a "choro-ecological" hypothesis to be formed that divides Phaseoleae into Glycininae, a forestal-type subtribe and Phaseolinae and Cajaninae, 2 more advanced savanna-type subtribes. The taxonomic importance of the different non-organographic characteristics is established and a group sub-division of the 3 existing subtribes is proposed. (AS)

0725

* CHAMBON, R.; ALOFS, M. 1958. Le district agricole du Tanganika. Bruxelles, Ministere des Colonies. 140p.

0726

* DUPRIEZ, G. 1964. Haricots. In _____. L'evaporation et les besoins en eau des differentes cultures dans la region de Mvuazi (Bas Congo). Bruxelles. Institut National pour l'Etude Agronomique du Congo Belge. pp.37-40.

0727

* FOSCOLO, E. 1934. La ferme de Dele (Mines de Kilo-Moto). Bulletin Agricole du Congo Belge 25(3):438-441.

0728

* FOSCOLO, E. 1928. L'agriculture dans l'Ituri. Bulletin Agricole du Congo Belge 19(4):631-636.

0729

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1959. Centre Experimental de la Ndihira. In _____. Rapport Annuel pour l'Exercice 1958. Bruxelles. pp.438-442.

0730

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1959. Secteur du Kivu. Station de Recherches Agronomiques de Mulungu-Tshibinda. In _____. Rapport Annuel pour l'Exercice 1959. Bruxelles. pp.418-449.

0731

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1959. Secteur Bas-Congo. Station de Recherches Agronomiques de Mvuazi. In _____. Rapport Annuel pour l'Exercice 1958. Bruxelles. pp.199-217.

0732

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1959. Secteur du Kivu. Station de Recherches Agronomiques de Mulungu-Tshibinda. In _____. Rapport Annuel pour l'Exercice 1958. Bruxelles. pp.409-437.

0733

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1959. Secteur Sud. Station Experimentale de Gandajika. In _____. Rapport Annuel pour l'Exercice 1959. Bruxelles. pp.333-360.

0734

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1959. Secteur du Sud. Station Experimentale de Gandajika. In _____. Rapport Annuel pour l'Exercice 1958. Bruxelles. pp.346-366.

0735

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1959. Station Experimentale du Mont Hawa. In _____. Rapport Annuel pour l'Exercice 1958. Bruxelles. pp.465-471.

0736

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1958. Centre d'Experimentation de Bena-Long. In _____. Rapport Annuel pour l'Exercice 1957. Bruxelles. pp.281-283.

0737

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1958. Centre Experimental de Kibangula. In _____. Rapport Annuel pour l'Exercice 1957. Bruxelles. pp.387-390.

0738

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1958. Centre Experimental de La Ndihira. In _____. Rapport Annuel pour l'Exercice 1957. Bruxelles. pp.441-444.

0739

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1958. Secteur de l'Ituri. Station de Recherches Agronomiques de Nioka. In _____. Rapport Annuel pour l'Exercice 1957. Bruxelles. pp.445-469.

0740

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1958. Secteur du Bas Congo. Station de Recherches Agronomiques de Mvuazi. In _____. Rapport Annuel pour l'Exercice 1957. Bruxelles. pp.225-248.

0741

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1958. Secteur du Kivu. Station de Recherches Agronomiques de Mulungu-Tshibinda. In _____. Rapport Annuel pour l'Exercice 1957. Bruxelles. pp.422-440.

0742

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1958. Secteur Sud. Station Experimentale de Gandajika. In _____. Rapport Annuel pour l'Exercice 1957. Bruxelles. pp.361-378.

0743

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1958. Station d'Essais de Kondo. In _____. Rapport Annuel pour l'Exercice 1957. Bruxelles. pp.256-262.

0744

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1958. Station Experimentale du Mont Hawa. In _____. Rapport Annuel pour l'Exercice 1957. Bruxelles. pp.470-475.

0745

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1957. Secteur de l'Ituri. Station de Recherches Agronomiques de Nioka. In _____. Rapport Annuel pour l'Exercice 1956. Bruxelles. pp.472-492.

0746

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1957. Secteur de Kivu. Station de Recherches Agronomiques de Mulungu-Tshibinda. In _____. Rapport Annuel pour l'Exercice 1956. Bruxelles. pp.451-468.

0747

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1957. Station Experimentale de Mont Hawa. In _____. Rapport Annuel pour l'Exercice 1956. Bruxelles. pp.495-499.

0748

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1955. Centre de Recherches de Yangambi. In _____. Rapport Annuel pour l'Exercice 1954. Bruxelles. pp.23-190.

0749

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1955. Centre Experimentale de La Ndihira. In _____. Rapport Annuel pour l'Exercice 1954. Bruxelles. pp.416-418.

0750

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1955. Secteur de Bas-Congo. Station de Recherches Agronomiques de Mvuazi. In _____. Rapport Annuel pour l'Exercice 1954. Bruxelles. pp. 191-211.

0751

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1955. Secteur de l'Ituri. Station de Recherches Agronomiques de Nioka. In _____. Rapport Annuel pour l'Exercice 1954. Bruxelles. pp.420-442.

0752

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1955. Secteur du Sud. Station Experimentale de Gandajika. In _____. Rapport Annuel pour l'Exercice 1954. Bruxelles. pp.314-332.

0753

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1955. Secteur de Kivu. Station de Recherches Agronomiques de Mulungu-Tshibinda. In _____. Rapport Annuel pour l'Exercice 1954. Bruxelles. pp.392-415.

0754

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1955. Station Experimentale de Mont Hawa. In _____. Rapport Annuel pour l'Exercice 1954. Bruxelles. pp.443-449.

0755

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1953. Secteur de Kivu. Station de Recherches Agronomiques de Mulungu-Tshibinda. In _____. Rapport Annuel pour l'Exercice 1952. Bruxelles. pp.320-336.

0756

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1953. Secteur de l'Ituri. Station Experimentale de Nioka. In _____. Rapport Annuel pour l'Exercice 1952. Bruxelles. pp.337-353.

0757

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1953. Secteur du Sud. Station Experimentale de Gandajika. In _____. Rapport Annuel pour l'Exercice 1952. Bruxelles. pp.267-282.

0758

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1953. Station d'Essai de Lubarika. In _____. Rapport Annuel pour l'Exercice 1952. Bruxelles. pp.292-299.

0759

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1953. Station Experimentale de Kiyaka. In _____. Rapport Annuel pour l'Exercice 1952. Bruxelles. pp.283-291.

0760

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1952. Station d'Essais de Kiyaka. In _____. Rapport Annuel pour l'Exercice 1951. Bruxelles. pp.375-385.

0761

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1952. Station d'Essais de Lubarika. In _____. Rapport Annuel pour l'Exercice 1951. Bruxellea. pp.355-362.

0762

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1952. Station Experimentale de Mulunga-Tshibinda. In _____. Rapport Annuel pour l'Exercice 1951. Bruxelles. pp.258-276.

0763

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1952. Station Experimentale de Mvuazi. In _____. Rapport Annuel pour l'Exercice 1951. Bruxelles. pp.277-287.

0764

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1952. Station Experimentale de Nioka. In _____. Rapport Annuel pour l'Exercice 1951. Bruxelles. pp.223-243.

0765

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1950. Section des Recherches Scientifiques. In _____. Rapport Annuel pour l'Exercice 1949. Bruxelles. pp.16-87.

0766

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1949. Station de Recherches Agronomiques. In _____. Rapport Annuel pour l'Exercice 1948. Bruxelles. pp.81-119.

0767

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1949. Station Experimentale de Gandajika. In _____. Rapport Annuel pour l'Exercice 1948. Bruxelles. pp.245-265.

0768

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1949. Station Experimentale de Mulungu-Tshibinda. In _____. Rapport Annuel pour l'Exercice 1948. Bruxelles. pp.188-200.

0769

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1948. Centre de Recherches de Yangambi. In _____. Rapport Annuel pour l'Exercice 1947. Bruxelles. pp.9-93.

0770

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1948. Station Experimentale de Gandajika. In _____. Rapport Annuel pour l'Exercice 1947. Bruxelles. pp.183-197.

0771

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1948. Station Experimentale de Mulungu-Tshibinda. In _____. Rapport Annuel pour l'Exercice 1947. Bruxelles. pp.143-151.

0772

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1948. Station Experimentale de Nioka. In _____. Rapport Annuel pour l'Exercice 1947. Bruxelles. pp.124-139.

0773

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1948. Station Experimentale de Nioka. In _____. Rapport Annuel pour l'Exercice 1946. Bruxelles. pp.99-114.

0774

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1947. Centre de Recherches Agronomiques de Yanmgambi. In _____. Rapport Annuel pour l'Exercice 1944-1945. Bruxelles. pp.8-67.

0775

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1947. Station Experimentale de Nioka. In _____. Rapport Annuel pour l'Exercice 1944-1945. Bruxelles. pp.106-119.

0776

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1944. Station Experimentale de Nioka. In _____. Rapport Annuel pour l'Exercice 1942-1943. Leopoldville. pp.87-102.

0777

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1943. Secteur des Regions Est. Station Experimentale de Nioka. In _____. Rapport Annuel pour l'Exercice 1940-1941. pp.84-94.

0778

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1941. Secteur des Regions Est. Station Experimentale de Nioka. In _____. Rapport Annuel pour l'Exercice 1939. pp.161-198.

0779

* INSTITUT NATIONAL POUR L'ETUDE AGRONOMIQUE DU CONGO BELGE. 1939. Centre de Recherches Agronomiques de Yangambi. In _____. Rapport Annuel pour l'Exercice 1939. pp.21-117.

0780

* LE MARCHAND, G. 1962. Essai de synthese sur l'orientation a donner a la selection du haricot dans le cadre de l'aide aux pays en voie de developpement. Bulletin d'Information de l'INEAC 11:247-260.

0781

* LE MARCHAND, G. 1958. Les centres d'essais locaux (C.E.L.) du nord du Kivu. Bulletin d'Information de l'INEAC 7(5):303-321.

0782

* LEFEVRE, P.C. 1955. Un important parasite du haricot: Melanogromyza (Agromyza) phaseoli Coq. Bulletin d'Information de l'INEAC 4:44-46.

0783

* LEFEVRE, P.C. 1953. Bruchus obtectus Say.ou bruche des haricots (Phaseolus vulgaris). Bulletin de Documentation et de Technique Agricole 7(25): 35-50.

0784

* LEFEVRE, P.C. 1950. Bruchus obtectus Say ou bruche des haricots (Phaseolus vulgaris L.). Institut National pour l'Etude Agronomique du Congo Belge. Serie Scientifique no.48. 65p.

Phaseolus vulgaris is grown in most regions of the Belgian Congo and Ruanda-Urundi (the total annual production is about 300,000 metric tons) and in parts of these regions it is the basic food of the natives. Bruchus obtectus attacks this crop in the field and in storage. It also attacks the seeds of other legumes. Control measures, mechanical, physical and chemical, are reviewed. Various control trials were carried out at the INEAC stations. Treatment with DDT in powder form appeared to be cheaper and more effective than treatment with pyrethrum powder. There was no decrease in germination power when 1 kg of bean seeds were treated with 1 grm. of Geigy 33, a DDT preparation, which forms a coating of powder over the seed. In an investigation into the resistance of 20 bean varieties to B. obtectus, Wulma took the first place, followed by Kalerera. The yield of 19 of these varieties was over 1 metric ton of beans per ha. It was calculated that 12 months after harvest 4 only of these varieties had a minimum of 1 metric ton of seeds undamaged by B. obtectus. (CAB)

0785

* MONTI, J.R. 1930. La culture du mais a la ferme de Dele. In Congrés International d'Agriculture Tropicale, V^{e}. Anvers. 1930. pp.593-594.

0786

MPESA, L. 1979. L'influence de la nature du sol sur le rendement de Phaseolus vulgaris. These. (Pedologie appliquee). Mbanza-Ngungu. Université Nationale du Zaire. Institut Superieur Pedologique. 18p.

0787

MWAMUFIYA, M.; FITCH, J.B. 197? Maize production patterns in southern Zaire. Mexico D.F. Centro Internacional para el Mejoramiento de Maiz y Trigo. 12p.

A survey of cropping patterns in 4 districts of S. central Zaire based on 299 producers was carried out in 1974 and 1975. Plots averaging 1.6 ha/family were used for 4-5 yr then abandoned to fallow for 4 yr or more. Recently, in densely populated areas the fallow period had been shortened. Maize sowing took place mainly after the 1st rains (late Aug. to Jan.) but 5-8% was sown just before and 15-30% long after the rains started. Crops grown before maize were cassava, tobacco, beans (Phaseolus vulgaris) and cotton, and combinations of maize and beans, maize and cassava, maize and cassava with groundnuts or beans. Over 50% of farmers sowed 2 crops of maize/yr. Only 2% of them reported the use of any chemical fertilizers or insecticides or improved cv. A number of farmers were involved with government programmes for production of cotton or tobacco, with consequent reduction in cropping area for maize. These farmers benefited by receiving extension agent advice on maize as well as on the other crops. (CAB)

0788
* PARIJS, A. VAN 1959. Les cultures en marais drainés en Ituri. Bulletin d'Information de l'INEAC. 8:375-390.

0789
* PLAEN, G. VAN; DAM, J. VAN; COULONVAUX, G. 1961. Les rotations de cultures dans les région de la zone cotonniére septentrionale. Bulletin d'Information de l'INEAC 10:17-38.

0790
* ZWIJSEN, R. 1960. Note sur le paysannats en Haut Ituri et en chefferie Pondoro en particulier. Institut National pour l'Etude Agronomique du Congo Belge. 8p.

ZAMBIA

0791

* BROOK, C.E. 1970. Field bean investigations. A review of trials conducted with Phaseolus beans 1967-1970. Zambia. Department of Agriculture. Research Branch. Kabwe Regional Research Station. 56p.

The primary aim of the current bean trial programme has been to identify the cause of the low yields of the locally acceptable Speckled Sugar bean, and secondly, to determine whether these yields can be improved by single agronomic means. A total of 19 trials have been conducted over the three year period 1967-68 to 1969-70. Investigations have ranged over the fertilizer; spacing; time of planting; type of cultivation; herbicide; pest and disease control; micronutrient; and varietal aspects of production. While final dried bean yields are the criteria of successful production, where these are low it is important to attempt to identify the cause. To this end several components of yield were identified at the start of the programme, and the resultant data related to eventual yields in terms of the cultural practices with which they were associated. Field emergence and stand survival through to harvest were generally poor. While this was partly associated with climatic factors and therefore dependent on the time of planting no other single major factor was identified. There is general evidence to suggest that an improved source of certified disease free seed is essential. Pod producing potential per unit area was improved by application of N up to 100 kg N/ha. As individual plants tended to become more productive at wider spacings podding potential per unit area tended to remain constant irrespective of plant population. Until field emergence and stand survival have been improved it is recommended that spacing should be 7-10 cm apart along rows 60-75 cm apart, aiming at a harvest population of around 100,000 plants/ha. While the ratio between pod producing potential and actual mature pods at harvest remained similar in any one season irrespective of treatment seasonal differences were large. Pod set percentages seem to be dependent on climatic conditions, particularly moisture stress accompanied by hot dry winds. The effect of excessive rainfall was less severe. To ensure adequate rainfall at flowering and pod set it is recommended that planting should be during late November to mid-December rather than mid-January. Stands, pod producing potential and pod set percentage were found to be in direct relationship to final yield. A combination of late November to early December planting with spacing between 7-10 cm apart along rows 60-75 cm apart and N application up to 100 kg/ha resulting in the highest yield levels. No advantage has been found in split application of N. Application of lime, P and micronutrients did not increase yields. No beneficial effect accrued to the use of fungicides and inoculation with strains of Rhizobium did not improve nodulation. Routine sprays of insecticide were found to be essential, although details of frequency of application require clarification. Ridge planting was superior to flat planting when sowing was during November and December. There was virtually no difference between the two at later plantings. Row planting proved superior to broadcast sowing on the flat. Vernam Treflan and Lasso show promise as useful herbicides. In the var. evaluations the yields of Speckled Sugar were only moderate. Productivity of Mexican Wonder 142 has been particularly disappointing at Kabwe in view of the success of this var. elsewhere in Zambia. (AS)

0792

* HILL, G.C.H. 1981. Co-ordination report. Grain legumes section including field beans but excluding soya beans. Trials during the 1979-80 season. Zambia, Ministry of Agriculture and Water Development. Department of Agriculture. 19p.

0793

* LOGAN, J. 1974. Plant pathology in Zambia. Pans 20(2):169-176.

The location and climate of Zambia are described, together with the types of farming practiced and the organisation of the plant pathology diagnostic and advisory services. The phytosanitary arrangements are discussed. The main diseases, in Zambia, of maize, rice and other cereal crops, groundnut, cassava, cotton and kenaf, sugarcane, tobacco and other field crops, potato, tomato, brassicas, cucurbits, phaseolus beans and other vegetables, coffee and fruit crops are reviewed and the currently recommended control practices are given. (AS)

0794

* MELHUISH, G.C. 1978. Field bean investigations. Productive Farming no. 54:7-11.

0795

* MELHUISH, G.R. 1978. Beans (Phaseolus vulgaris):review of agronomic investigations 1969-1976. Zambia, Ministry of Lands and Agriculture. Department of Agriculture. Research Memorandum no.20. 57p.

0796

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

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

0797

* SARMEZEY, A.A.V. 1977. Beans in Zambia. Productive Farming no.46:5-11.

The breeding and introduction of bean var. is a long term process. Yield, quality and disease resistance are far from perfect. Looking at the yield results of bean var. trials a definite improvement is noticeable. In the late 50s and early 60s, experimental yields of over 1000 kg/ha were regarded as exceptional. The same yield at present is regarded as fair only. These results are due to improved strains and production methods. Unfortunately the low rainfall areas have not reached this level yet and var. better suited to those areas need to be developed. It can be stated that if soil conditions are at least not definitely unfavourable, the crop can be successfully grown at places like Kasama or Mansa and fair yields can be achieved. The reasons why variety experiments gave acceptable yields are: (a) The plant population was always at its optimum due to

careful planting of good quality seed and the use of Dieldrin seed dressing against beanfly maggot. (b) Fertilizer rates were never under 40 kg/ha P_2O_5 and 50 kg/ha N, thus ensuring adequate nutrition. (c) The best yielding var. had either very low susceptibility to the main diseases, or at least to one of them and they were vigorously growing indeterminate types. At present the following var. can be recommended: Misamfu Speckled Sugar for the high rainfall areas Mexican 142 as white small bean for canning, for the high rainfall areas only White Cooking as an extra early, large, white grained cooking bean for the low rainfall areas only Misamfu Stringless as an Anthracnose-resistant snap-bean for private and commercial growers in all areas. It is of interest that CIAT, the International Institute for bean improvement in Colombia has, as its target, to increase the average bean yields in South America to 1000 kg/ha by 1990. Under Zambian conditions this can be achieved even with present knowledge and var. (AS)

0798

* SARMEZEY, A.A.V. 1977. Beans (Phaseolus vulgaris): breeding and variety experiments 1966-1976. Zambia. Ministry of Lands and Agriculture. Department of Agriculture. Research Memorandum no.18. 30p.

The introduction and breeding of bean varieties should be a continuous process as yield, quality and disease resistance are, at present, far from perfect. Inspection of yields in bean varietal experiments in Zambia indicates a definite improvement. Yields of over 1000 kg/ha were regarded as exceptional in the early 60s, but the same yield is now regarded as only fair. Beans sown in the higher rainfall areas produced av yields of 1101 kg/ha between 1968-1976, with the highest yielding varieties averaging 1416 kg. These improved results are due to improved strains and production methods. Unfortunately, yield in the low-rainfall areas has not yet reached this level, and varieties better suited to those areas are required. Yields in varietal experiments were acceptable because (1) plant populations were always optimum due to careful planting, good-quality seed and the use of dieldrin dressing to control bean stem maggot. (2) Basic nutrition was adequate since fertilizer rates were never under 19 kg P and 50 kg N/ha. (3) The best yielding varieties had very low susceptibility to at least one of the main diseases; and they were vigorous, indeterminate types. At present the following varieties are recommended: (1) Misamfu Speckled Sugar, a sugar bean mainly for the high rainfall areas; (2) Copperbelt 609, a small white, cooking bean, mainly for the high rainfall areas; (3) Mexican 142, a small white, dry canning bean for the high rainfall areas; (4) White Cooking bean, a very early-maturing, large, white-seeded cooking bean for the low-rainfall areas only; (5) Nanzinde, a standard strain for agrotechnical experiments; and (6) Misamfu Stringless, an anthracnose-resistant French bean for all areas. Irrigation may make it possible to extend the areas of production. (AS)

0799

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

The long-term objective of the Grain Legume Research Team of the Ministry of Agriculture and Water Development is to increase the productivity of bean, cowpea, and bambarra groundnut in Zambia through breeding cv. with heavy yield potential and resistance to the major pests and diseases. The products of the breeding program should be evaluated for suitability to adoption in existing farming systems. Substantial collections of the major grain legumes have been assembled at Msekera, and some 1321 accessions evaluated. Collaboration with international agricultural research centres (CIAT in Colombia for bean, International Institute of Tropical Agriculture in Nigeria for cowpea, bambarra groundnut, and lima bean) has proved to be

of utmost importance. Trials have led to the identification of genotypes of bean (BAT 1253 and BAT 1254) and cowpea (TVx 3236-01G, TVx 3381-02F, TVx 3410-02J, and TVx 4659-03E) that substantially outyielded the local control cv. Preliminary results from cooking time tests with bean showed that higher yielding cv. cooked quicker than the local control, Misamfu Speckled Sugar. Cowpea demonstrated a greater potential than bean at Msekera when no added inputs were given, and it is of considerable significance that grain yields of more than 1 t/ha can be achieved with neither fertilizer nor insecticide. The superiority of cowpea over bean at Msekera (1016 m alt., 1092 mm rainfall over 4.5 mo.), in which the 2 crops could be expected to overlap ecologically, is perhaps attributable in part to the former's greater efficacy of nodulation but it is also a testament to recent progress in breeding for pest and disease resistance. Preliminary information has been gathered on the prevalence of pests and diseases of bean and cowpea. The importance of the bean stem fly (Ophiomyia phaseoli) to bean production is paramount. Available information of resistance to this pest is scanty and, for the moment, the use of seed dressings is unavoidable. There is some evidence to suggest that insecticides much safer than dieldrin can provide adequate protection; pirimiphos ethyl appears especially promising. Common blight (Xanthomonas campestris pv. phaseoli) and rust (Uromyces appendiculatus) are among the major diseases of bean at lower (1000-1400 m) elevations, where anthracnose (Colletotrichum lindemuthianum), angular leaf spot (Phaeoisariopsis griseola), and ascochyta blight (Ascochyta phaseolorum) increase in severity at higher (1400-1700 m) elevations. BCMV is widespread but apparently seldom damaging in the main bean producing areas of Northern Province. Host plant resistance is available against all these diseases so that chemical control is unlikely to be necessary, if adequate levels of combined resistance are built up in appropriate backgrounds. In the northern bean growing areas around Mbala, and in the Isoka and Nakonde Districts, nodulation of bean appeared to depend largely on soil fertility; effective nodules were found on better soils or where N was applied. In the Northern Province, the rains are of sufficient duration to permit 2 consecutive seasons (sowing in Oct./Nov. and Feb./March); the 2nd is the more important season for bean. Bean is grown either as sole or as relay crop in rotation with cassava, maize, or finger millet (Eleusine coracana). In most cases bean is grown as a mixture of types (yellow and white is a common blend), and most are facultative climbers (habit type 3). (AS)

ZIMBABWE

0800

* ARCHIBALD, R.I.M. 1974. Production of seed beans, Phaseolus vulgaris, in the lowveld. Rhodesia Agricultural Journal 71(3):61-64.

Topics discussed include climatic and soil requirements, cultivar, fertilizer, sowing, seed treatment, irrigation, thinning, harvesting, threshing, seed-borne diseases (anthracnose, halo and common bacterial blight), other diseases (root rot, crown rot, rust, leaf and pod spot), sunscald, pests (eelworms, bean stem maggot, American bollworm, lesser army worm, beetles, pod borers and pod weevils, and red spider mite). (CIAT)

0801

* CACKETT, K.E. 1965. Winter production of seed beans in the lowveld. Rhodesia Agricultural Journal 62(3):69-71,73.

Beans (Phaseolus vulgaris) for seed production are an important winter crop of irrigated land in Rhodesia. The seed is exported; demand is primarily for white seed. Some results of research conducted certain in the Sabi Valley are: (1) certain white-seeded varieties yield as much as do coloured varieties; (2) N fertilizer should be applied at planting; (3) optimum plant populations vary from 250-375,000/ha at a high yield level to 375-625,000/ha under poor conditions; (4) overhead irrigation is preferable to surface irrigation; when the entire root zone is wetted to field capacity at planting, the crop requires an additional 300 mm of water until maturation; (5) the dipterous stem borer Melanagromyza phaseoli can be controlled by seed treatment with endrin or dieldrin; (6) rust (Uromyces phaseoli) is the main disease, but some other diseases may become troublesome under certain conditions. (RTI)

0802

CACKETT, K.A.; METELERKAMP, H.R.R. 1963. The relationship between evapotranspiration and the development of the field bean crop. Rhodesia Journal of Agricultural Research 1(1):18-21.

0803

* DAMPING-OFF Disease. 1982. Zimbabwe Agricultural Journal 79(5):157-158.

Brief information is presented on Pythium and Rhizoctonia, causal agents of the damping-off disease in Zimbabwe. Symptomatology and control measures are included. The bean damping-off (Rhizoctonia sp.) should be controlled by applying 250-500 g Quintozene/100 l of water (75% formulation). (CIAT)

0804

* HANSSEN, K.B. 1970. Production of seed beans for export. Rhodesia Agricultural Journal 67(2):43-50.

Rhodesia has an assured market for seed beans in the international seed trade due to the ability of local growers to comply with the necessary health requirements of importing countries. The best seed beans come from the irrigated winter crops of the lowveld, where good profits can be obtained. The crop is always grown on a contract basis. Production can be expected to be free of undue fluctuations as demand is fairly constant for the Rhodesian product. As a short-term crop, seed beans have a catch-crop status and can be very usefully integrated into rotations to suit irrigation farming. (AS)

0805

HARPER, J.C.; HANSSEN, K.B. 1965. There's a good profit in beans if grown in the right area. Rhodesia Herald.

0806

* HUTCHISON, G. 1980. Dry bean production (Phaseolus vulgaris). Salisbury, Zimbabwe, Department of Conservation and Extension. Conex Advisory Notes B/332/2. 6p.

0807

JACK, R.W. 1913. The bean stem maggot. Rhodesia Agricultural Journal 10:545-553.

0808

* KERR, W.E. 1962. Bean seed production. Rhodesia Agricultural Journal 59(3):159-164.

Bean (Phaseolus vulgaris) cultivation in Rhodesia is confined to irrigable land. Climatic and soil conditions and cultivation practices for bean growing are described; special attention must be paid to irrigation. The potential yield is about 1500 kg/ha. Various pests and diseases and their control are reviewed. (RTI)

0809

TAYLOR, C.E. 1959. Control of the bean stem maggot by insecticidal dressings. Rhodesia Agricultural Journal 56(5):195-196.

0810

TAYLOR, C.E. 1958. The bean stem maggot. Rhodesia Agricultural Journal 55(6):634-636.

0811

* WELLS, P.D. 1982. Green bean. Zimbabwe Agricultural Journal 79(3):91-95.

Detailed cultural practices, including climate, soils, fertilizer requirements, sowing, management, irrigation, harvest, yields, marketing and storage, of bush beans (Phaseolus vulgaris) in Zimbabwe are given. The principal cultivars, pests and diseases are listed in tables. (AS)

0812

* WHITESIDE, J.O. 1955. Diseases of legume crops in Southern Rhodesia. In Annual Conference of the Professional Officers of the Department of Research Specialist Services, 4th., Salisbury, 1955. Proceedings. pp.52-59.

Lists of diseases recorded on legume crops in Southern Rhodesia are given with descriptive accounts of the appearance and control of those of major importance. Special attention is drawn to the importance of wider rotations and the use of healthy seed in reducing the incidence of diseases. The relation of resistant var., cultural practices, field hygiene and other factors to the successful production of legumes under local conditions is also discussed. (AS)

0813

WHITEWAY, J.R.; NDUKU, W.K. 1967. Effect of mineral nutrition on nitrogen fixation in inoculated field beans (Phaseolus vulgaris). Rhodesia, Zambia, Malawi Journal of Agricultural Research 5(3):309-311.

Pot trials conducted in Rhodesia with inoculated beans (Phaseolus vulgaris) grown in acid sandy soils without N fertilizer showed that nodulation and growth up to an age of 7 weeks responded strongly to application of Ca. On

l soil with a pH of 5.1, nodulation was very poor without lime but good when a basal dressing equivalent to 1,120 kg $CaCO_3$ per ha was applied, with a corresponding effect on growth. S and Mo, which had no effect without Ca, were beneficial on limed soil, and there was a positive S x Mo interaction. The results indicate that beans and probably other temperate-zone legumes behave very differently from tropical legumes such as groundnuts and soya beans, which are adapted to acid soils and do not require liming for good nodulation. (RTI)

ABBREVIATIONS AND ACRONYMS

A	Angstrom(s)
ABA	Abscisic acid
ac	Acre(s)
Afr.	Afrikaans
a.i.	Active ingredient
alt.	Altitude
CAMD	Cassava African mosaic disease
CAMV	Cassava African mosaic virus
AMV	Alfalfa mosaic virus
approx.	Approximate(ly)
atm.	Atmosphere
ATP	Adenosine 5'-triphosphate
av.	Average
BAP	6-Benzylaminopurine
BBMV	Broad bean mosaic virus
BCMV	Bean common mosaic virus
BGMV	Bean golden mosaic virus
BGYMV	Bean golden yellow mosaic virus
BOD	Biochemical oxigen demand
BPMV	Bean pod mottle virus
BRMV	Bean rugose mosaic virus
BSMV	Bean southern mosaic virus
BV	Biological value
BYMV	Bean yellow mosaic virus
°C	Degrees Celsius (centigrade)
ca.	About (circa)
CBB	Cassava bacterial blight
CBSD	Cassava brown streak disease
CEC	Cation exchange capacity
CER	CO_2 exchange rate
CF	Cassava flour
CGR	Crop growth rate
CLM	Cassava leaf meal
CLV	Cassava latent virus
CM	Cassava meal
cm	Centimeter(s)
COD	Chemical oxigen demand
concd.	Concentrated
concn.	Concentration
CP	Crude protein
CSL	Calcium stearyl lactylate
CSW	Cassava starch wastes
C.V.	Coefficient of variation
cv.	Cultivar(s)
2,4-D	2,4-dichlorophenoxyacetic acid
DM	Dry matter
DNA	Deoxyribonucleic acid
EC	Emulsifiable concentrate
EDTA	Ethylenediaminetetraacetic acid
EEC	European Economic Community
e.g.	For example
ELISA	Enzyme-linked immunosorbent assays
EMS	Ethyl methane sulfonate
Engl.	English
expt.	Experiment(s)
exptl.	Experimental
°F	Degrees Fahrenheit
Fr.	French
ft-ca	Foot candles (10.76 lux)
FYM	Farmyard manure
g	Gram(s)
G	Giga (10^9)
GA	Gibberellic acid
gal	Gallon(s)
GE	Gross energy
Germ.	German
GERs	Glucose entry rates
GLC	Gas-liquid chromatography
govt.	Government
govtl.	Governmental
h	Hour(s)
ha	Hectare(s)
HCN	Hydrocyanic acid
HDP	Hydroxypropyl distarch phosphate (modified cassava starch)
HI	Harvest index
IAA	Indoleacetic acid
IBA	Indolebutyric acid
Illus.	Illustrated
in.	Inches
i.e.	That is
Ital.	Italian
IU	International unit
J	Joule
Jap.	Japanese
kat	Katal(amount of enzymatic activity that converts 1 mole of substrate/s)
kcal	Kilocalorie(s)
kg	Kilogram(s)
Kj	Kilojoule
km	Kilometer(s)
KNap	Potassium naphthenate
kR	Kiloroentgen(s)
l	Liter(s) (only in combination with no.)
LAD	Leaf area duration
LAI	Leaf area index
lat.	Latitude
lb	Pound(s)
LD_{50}	Mean lethal dose
LER	Land efficiency ratio
LPC	Leaf protein concentrate

lx	Lux
M	Mega
M	Molar
m	Meter(s)
Mal.	Malay
max.	Maximum
MC	Moisture content
ME	Metabolizable energy
meq	Milliequivalent(s)
met.	Methionine
mg	Milligram(s)
mho	Reciprocal ohm
min.	Minimum
min	Minute(s)
ml	Milliliter(s)
mm	Millimeter(s)
mo.	Month
mol.wt.	Molecular weight
m.p.	Melting point
NAA	Alpha-naphthalene acetic acid
NAD	Nicotinamide adenine dinucleotide
NADH	Nicotinamide adenine dinucleotide, reduced from
NAR	Net assimilation rate
NCE	Net CO_2 exchange
NE	Northeast
NER	Net energy ratio
nm	Nanometer(s) (10^{-9} m)
no.	Number(s)
NPFs	Negative production factors
NPR	Net protein ratio
NPU	Net protein utilization
NW	Northwest
OM	Organic matter
oz	Ounce(s)
P	Probability
Pa.	Pascal(s)
PAN	Pexoxyacetic nitrate
PCNB	Pentachloronitrobenzene
PDA	Potato dextrose agar
PER	Protein efficiency ratio
pH	Hydrogen ion concentration
pphm	Parts per hundred million
PPI	Pre-planting incorporation
ppm	Parts per million
PSA	Potato sucrose agar
pv.	Pathovar.
Ref(s).	Reference(s)
resp.	Respective(ly)
Rf	Retardation factor-chromatography
RGRs	Relative growth rate
RH	Relative humidity
RNA	Ribonucleic acid
Rom.	Romanian
Russ.	Russian
S	Svedberg unit of sedimentation coeff. (10^{-3} S)
s	Second
$S_{20,w}$	Sedimentation coefficient corrected to water at 20°C
SBM	Soybean meal
SCN	Thiocyanate
SCP	Single cell protein
SDS	Sodium dodecyl sulfate
Sk.	Slovak
sp.	Specie
Span.	Spanish
spp.	Species
SSL	Sodium stearyl-2-lactylate
Sum.	Summary
t	Ton(s)
TDN	Total digestible nutrients
temp.	Temperature
TIA	Trypsin inhibitor activity
TIBA	2,3,5-Triiodobenzoic acid compound with N-methylmethanamine
TLC	Thin-layer chromatography
TMV	Tobbaco mosaic virus
TSH	Thyroid-stimulating hormone
UDPG	Uridine diphosphate glucose
UMS	Unmodified cassava starch
UV	Ultraviolet
var.	Variety(ies), varietal
VFA	Volatile fatty acids
vol.	Volume
VPD	Vapor pressure deficit
vpm	Volume per million
W	West
wk.	Week
WP	Wettable powder
wt.	Weight
YFEL	Youngest fully expanded leaves
yr	Year(s)
α	alpha
β	beta
γ	gamma
δ	delta
ε	epsilon
λ	lambda
π	pi
ψ	psi
/	Per
μ	Micro
%	percent(age)
>	More than, greater than
<	Less than
$\leq$	Equal to or less than
$\geq$	Equal to or greater than
$\pm$	Plus or minus
ϕ	Diameter
$\ll$	Much less than
$\gg$	Much greater than

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  Plant damage 0693
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Viroses
0041 0061 0260 0310
(see also specific pathogens)

Virus transmission 0075
Myzus persicae 0129

Water content 0055 0553

Water management 0374

Water requirements 0093 0152 0544 0547 0556 0726

Water stress 0049 0198 0489 0643 0791

Water use 0352 0353

Weed control 0161 0206 0210 0211 0236 0237 0238 0243 0247 0303 0330 0345 0370 0500 0594
Herbicides 0598 0656 0657
Yield 0362

Weeds 0209

Xanthomonas 0365 0677

Xanthomonas phaseoli 0007 0234 0261 0286 0324 0534 0570 0571 0693
Disease control 0693
Resistance 0266 0327 0692 0693 0714 0794
Symptomatology 0276

Xanthomonas phaseoli var. *fuscans* 0007 0234 0276 0395 0497 0571
Resistance 0693
Symptomatology 0276

Yield 0021 0024 0049 0078 0080 0088 0095 0101 0115 0121 0127 0158 0159 0198 0224 0237 0240 0244 0270 0280 0345 0360 0367 0371 0373 0381 0383 0390 0393 0394 0396 0397 0401 0409 0443 0448 0455 0456 0475 0524 0544 0550 0555 0556 0566 0568 0573 0584 0585 0599 0602 0612 0683 0718 0723 0786 0791 0797 0808

Yield components 0121 0390 0393 0566 0573 0683

Zabrotes subfasciatus 0007 0234 0662
Insect control 0319
Insecticides 0319
Zinc 0081 0504