TANZANIA - ENTOMOLOGY

Informants — Dr A. Karel Sokoine University
Mr G.A. Mallya Uyole Agricultural Centre
Mr J. Saidi Tropical Pesticides Research Institute.

Literature

(1) Karel A.K. In press. Yield losses from and control of bean pod borers, Maruca testulalis and Heliothis armigera. J. Econ. Entom.

(2) Karel A.K. and Rweyemamu C.L. In press. Resistance to the foliar beetle Ootheca bennigseni in common beans, Environmental Entomology Vo. 14.

(3) Karel A.K. and Mghogho R.M.K. In press. The effect of insecticides and plant populations on the insect pests and yields of common bean (Phaseolus vulgaris) J. Econ. Entomol.

(4) Karel A.K. and Rweyamamu C.L. 1984. Yield losses in field beans following foliar damage by Ootheca bennigseni J. Econ. Entomol. 77: 762-765.

Sokoine University, Morogoro, Dr Karel's current work

(1) Bean fly resistance 500 lines were tested and 24 were found with enough resistance to be used in crosses. A few of these were crossed at CIAT with Tanzanian and CIAT varieties. The progeny came back in Sept. 1984 and has now been planted in two seasons. Progress is slow because usually there is strong bean fly pressure only in the short wet season, also the material is still segregating. 8 parameters are measured the main ones being no. of ovipunctures, larval counts and stem damage. A paper on the selection for resistance is due to come out shortly in the J. Econ. Entomol. Vol 78 4 or 5.

(2) Ootheca beetle resistance. Local and CIAT lines were tested. Both non-preference and tolerance were found and crosses were made at CIAT with Kabanima and other acceptable varieties. The progeny have been tested in 3 seasons at Lyamungu. (very heavy attack at Lyamungu this year made re-planting necessary). See literature for paper on the identification of resistance.

(3) Taenia thrips resistance. Reports of flower loss due to these thrips have come especially from parts of central Tanzania and Kagera region. Damage is highes when a dry period co-incides with flowering. 35 lines are being tested, many of which are already known to have resistance to bean fly and Ootheca. Nothing published.

(4) Assessment of crop losses

(a) bean fly - not written up
(b) Ootheca
(c) pod borers Heliothis spp
Maruca testualis } see literature for articles.

Losses to each pest range from 30-50%

(5) Effect of plant populations on insect pests

Previous experiments showed the best population to be between 200,000 - 300,000 plants per hectare, (see literature). In 1984 and 1985 further work is trying to pin point the optimum within this range, when cover sprays of fungicide are used.

(6) Time of planting. Previous experiments found insect damage least with planting two weeks after the start of the rains. (see bean bibliography). This year, 1985, the work is being repeated with Kabanima in addition to the Selian Wonder used before.

(7) Intercropping. There are 4 plant populations and 4 combinations of maize and beans:

pure maize
¾M ¼B
½M ½B
pure beans

} using a replacement series where 1M = 3B

In 1983 133,000 bean plants + 40,000 maize plants per ha gave the highest L.E.R. and also the lowest insect populations of most insect species. Dithane M45 was applied to control fungal diseases. There were no results in 1984 and the experiment is being repeated this year. Nothing published so far.

(8) Integrated control. An experiment was run for three years using Kabanima (which has some resistance to Ootheca and bean fly), Bacillus thuringiensis against pod borers and insecticides where necessary. A paper on this work was co-authored by van Schoonhoven.

(9) Indigeneous insecticides. Extracts from tomatoe leaves, chillie seeds and neem were compared and neem was found most effective. For the last two years various formulations from neem have been compared with insecticide.

aqueous extract from neem leaf
aqueous extract from neem kernel
alcohol extract from neem leaf
alcohol extract from neem kernel
neem dust

The aqueous extracts have been the most effective. Nothing published so far.

(10) Bruchids. Various oils including that of neem were compared at 1% and 3% concentration. They controlled bruchids for about two months. This will be published in the B.I.C. annual report.

Tropical Pesticides Research Institute. Mr J. Saidi

(1) Insect growth regulators. 1985 is the first year of comparing diflubenzuron and fenoxycarb with endosulfan for control of Heliothis armigera and aphids, the main insect pests in this region.

(2) Conventional insecticides. Chemicals are supplied by manufacturers who want them registered. They are tested for three seasons. Those currently under trial are:

Dursban 48% E.C., Cypermethrin 10% E.C., Facron E.C., Talstar E.C. and Fenom C 425.

Uyole Agricultural Centre Mr G.A. Mallya

(1) Bean fly resistance. This is the second year of screening. The parameters measured are ovipuncture counts, stem damage at different periods, larval and pupal counts, plant vigour, plant type (determinate/indeterminate) and yield components. In the first years results Uyole 84 showed good resistance. Usually March planting gives the most bean fly infestation but this year the pressure of attack was low. It is not possible to plant in the dry season because irrigation is uncertain.

(2) Bean fly yield loss trial. First conducted this season 1985.

(3) Bruchid work is planned.

27044

TANZANIA: SOILS

Informants

1 Dr Seme Sokoine University (Who is working with Dr Msumali)

2 Dr Salema in the same department is also doing N_2 fixation work on beans, but he was not present during June 1985

Literature

1 Semu E Msumali G P and Chowdhury M S , Modulation and yields of beans as affected by seed inoculation and nitrogen application Paper presented at conference??

2 N_2 fixation under intercropping 1985 is the first year of the experiment The treatments are

sole maize
sole beans
alternate rows maize and beans
maize and beans in the same row
maize and beans planted in the same hole

Measurements are made of

nodule number
nodule activity, by acytelene reduction at bean flowering
total N in the plants
plant dry matter

3 In the above experiment a streptomycin resistant innoculum was used It is hoped to recover this in mid season, end of season and in the following season, either from the nodules or soil dilution

Future plans

Dr Seme is writing a proposal for an experiment on using modified forest litter as a carrier for Rhizobia.

27045

TANZANIA BEAN PRODUCTION STATISTICS

Present data

The only figures available are extension staff estimates passed through the District and Provincial agriculture offices Only the provincial level data is sent to Dar es Salaam

Future

Sample surveys of crop areas and yields have begun, in 4 provinces this year, but only the cereals are measured There are no plans to extend the sampling to other crops

TANZANIA: Sales of bean seed in Northern Region

Fig in Tons. 1976/1985

Source Tanseed, Arusha

1976-1977	4 Tons	
1977-1978	35 Tons	
1978-1979	81 Tons	
1979-1980	41 Tons	
1980-1981	103 Tons	
1981-1982	143 Tons	
1982-1983	128 Tons	
1983-1984	153 Tons	
1984-1985	137 Tons	Ending Apr 1985
Total	825 Tons	

NOTE Tanseed divides the country into 3 regions, northern (Arusha), central (Morogoro) and southern (Njomba)

TANZANIA Bean production estimates made by Regional Agricultural Development Offices. (in 000 = tonnes)

Region	R.A.D.Os estimates 1982/83 Hectares	1982/83 production	1983/84 hectares	1983/84 production	Projections 1984/85 production
Coast	-	-	-	-	25.1
Dodoma	2.0	1.2	2.5	1.5	6.2
Rukwa	29.3	21.7	32.2	27.0	41.6
Tanga	30.5	25.3	37.9	38.9	46.9
Kilimanjaro	28.0	20.0	26.0	12.0	15.2
Singida	0.9	0.5	1.5	0.6	0.9
Mwanza	34.1	17.1	15.4	7.8	14.1
Arusha	41.8	18.0	34.3	23.4	59.4
Morogoro	13.7	9.6	22.9	16.0	13.2
Tabora	17.4	12.1	15.2	6.2	4.9
Dar-es-Salaam	-	-	-	-	-
Mara	4.1	3.0	4.0	3.0	4.7
Iringa	44.3	27.0	71.5	34.3	38.0
Ruvuma	21.2	6.0	-	-	28.8
Mtwara	-	-	-	-	10.2
Mbeya	44.0	22.8	43.3	22.6	37.9
Shinyanga	-	-	-	-	13.2
Lindi	-	-	-	-	23.6
Kigoma	36.2	24.4	21.6	14.6	13.3
Kagera	118.4	73.2	118.4	73.2	103.7
TOTAL	465.9	281.9	446.7	281.1	500.9

27046

TANZANIA: SEED BEANS FOR EXPORT

(green bean varieties for Europe)

Informants Mr J. Smit Sluis Bros. Ltd.
Mr Brunk Pop Vriend Ltd.
Mr Bannister Mringa Estates.

Region Arusha, West Kilimanjaro and areas to the south and west of Arusha such as Ngongoro, Mbulu and Naborere. Average rainfall ranges from 250mm to 900mm.

Prospects. 10 years ago the seed bean area was 60,000 ha to 70,000 ha and is now only 25,000 ha. This big drop is due to the poor infrastructure of Tanzania and its overvalued currency. The Dutch companies are expanding in the U.S.A. and to a lesser extent in Kenya and Zimbabwe. The area in Tanzania has increased this year because of low stocks after last year's poor harvest, but the long term trend is still probably downward.

At present Idaho can undercut Tanzania for price, but its product has poorer germination due to mechanical harvesting/threshing/sorting. Tanzanian seed is sometimes used to improve the germination percentage of the Idaho product. If bean handling machinery in U.S.A. was improved then the market for seed from Tanzania would drop dramatically.

Contract growers

Most production is on large estates, often leased directly by the Dutch seed companies. In the early 1970s the companies tried, and abandoned, working with smallholders, but larger contract growers remained, planting between 20-800 ha. There is currently a shift away from the use of out-growers to production being concentrated more on company estates. The companies state that this is due to the higher quality of their own production which must be preserved in the long term although outgrower production can be more profitable in the short term. A company normally grows its protected varieties on its own estates.

Inputs and prices. The contract growers are heavily financed by the companies which provide seed, chemicals and often land preparation, sorting and cash loans. It is this financing which attracts out-growers since the price they are paid is often well below the local market price for food beans.

This year the export price will be about Sh 12 per kg, with contract growers paid about Sh 8 per kg. The government price for food beans (1985) is Sh 12 per kg and Tanseed will pay Sh 16.80 per kg. The local market price at present (June) is Sh 30-35 but will drop at harvest and may not rise so high as it did after the poor harvest of last year.

Land preparation

The seed companies and large estates use moisture conserving techniques. They chisel plough after harvest before the short rains of Sept/Oct, and sub soil once in 2 or 4 years. The land is harrowed several time before the next years planting, both to kill weeds and reduce evaporation. Using this system one farm which received 300mm of rain last year harvested 740 kg/ha.

Contract growers, having limited equipment, mostly plough after the short rains. The resulting high moisture loss was the reason given by one company why its own farm achieved 70% higher yields than its contract growers last year (1984) which had below average rainfall.

Planting is increasingly by pneumatic drill on company land and large estates while contract farmers use wheat seed drills. Seed rates are 49 - 54 kg per ha.

Herbicide use is standard. Two main types are used, pre-planting incorporated, especially and pre-emergence especially.

Insects. Some, but not all, growers use an organo-chloride seed dressing against bean fly. One informant said this dressing is not fully effective if soil moisture is low at planting.

Apart from bean fly the main insect pests are tobacco white fly, aphids, leaf eating beetles and Heliothis spp., the latter being rated as most serious by all informants. Insecticide use varies, some growers spray at flowering and then again if bollworm is serious. Others wait until early podding or until bollworm eggs are seen, and rarely use more than one spray. The main insecticides used are synthetic pyrethroids, Thiodan and endosulphan. Application is commonly by ULV sprayers, whatever scale of production.

Diseases

The relatively low rainfall in this area and abrupt end to the rains leads to generally low levels of disease. The main problems are rust and angular leaf spot with, more rarely, halo blight and anthracnose. One informat estimated that it would be economic to spray only once in five years, but the fungicides to do this are not available occasionally a coffee chemical can be diverted, such as Daylan which gave some control of rust this year.

Fertilizers/rotations

At present no fertilizers are used although locally produced phosphates and lime are being considered. Nodulation is fairly good; one informant said that cereals planted after beans yielded 500 kg/ha more than those which did not follow beans. Normally the same land is planted in beans for three or more years before a break of grass or cereals.

Yields

One large company, working in several different areas, said average yields are just over 600 kg/ha. An estate in a relatively wet area (100mm) averages 1000 kg/ha.

Relationship with T.P.R.I.

T.P.R.I. runs trials on herbicides, insecticides and fungicides in beans. It works in isolation having no contact with the only users of these chemicals in the bean crop, who are the growers of seed for export.

27047

TANZANIA: BREEDING

Informants
Mr E.M.K. Koinange, breeder, Lyamungu
Mrs C. Madata, breeder, Uyole
Mr Misangu, Sokoine University
Dr Doto, Sokoine University.

Literature
(1) See annual reports, Lyamungu and Uyole 1980-84.
(2) Koinange E.M.K., 1984 Development, evaluation and utilisation of germplasm in Tanzania. TARO Lyamungu.
(3) Misangu R.N. and Doto A.L. 1984. Character associations amoung bean varieties.

LYAMUNGU

Material entering the yield trials comes mainly from local collections and CIAT. The local collection in Ilonga was transfered here in 1981. From CIAT there is IBYAN, some advanced lines and segregating material in F_4, F_5 and F_6. There is also IBYAN, but arrival of the seeds was delayed so it will not give results this year.

Preliminary yield trial. This year has 60 entries, 2 reps., only at one site (Lambo, just below Lyamungu).

Advanced yield trial. 36 entries, 3 reps. Since 1983 there have been 3 sites; Lambo, Arusha (Saliani TARO) and Uyole.

Unform cultivar trial. Since 1983 has used 12 sites; Lyamungu, Lambo, Miwaleni (in Kilimanjaro area), Arusha (foundation seed farm), Arusha (Saliani), Tanga (Merikitanda), Ilonga, Gariru, Uyole (two sites), Maruku, Kigoma (Kasulu). There are 16 entries and 4 reps.

Farmers field trials. These trials are the weakest part of the programme. Last year there were only results from 3 farms. They are not ypical situations being either schools or state farms. They are run almost exactly as the station trials with mono-cropping, and spacing and arrangement as on the station. All trials are sprayed insecticide where necessary, this year. Thiodan was used against Ootheca.

Promising material (used in farmers field trials)

T 23 Type 1. Early. Medium sized mottled red seed. Generally disease resistant and yields well.

Y 2 Similar to T 23 but has yielded higher.

T 3 Type 2 B, relatively late. Small red seed. Resistant to most diseases but susceptible to BCMV, especially at Uyole. Because of BCMV T 3 may be replaced next year by the similar selection 8.

P 283 Type 2 B. Small creamy seed. Generally resistant and high yielding. Problem could come from unpopular seed colour.

Taste All these selections taste similar to the local Kiburu type, i.e. better than Canadian Wonder. They were sent to the Food and Nutrition Centre in Dar-es-Salaam which found T 3 the most palatable.

Variety release. Probably nothing will be released after this seasons results.

Uyole Agricultural Centre (U.A.C.)

In the 1970s H. Jacobsen made a germplasm collection all of which was later lost except 3 out of the 151) UAC accessions, UAC 41, UAC 1116 and UAC 71. The material entering yield trials comes largely from CIAT, IBYAN, advanced lines and segregating material. Local collections are included and all are observed at U.A.C. for one or two seasons.

Preliminary trial 1. The five centres where supervision is best, Bose (Near Zambia), Mbimba (Long wet season), Isman in Iringa (dry) and Sumbawanga.

Preliminary trial 2. The five centres as above plus two more including Ruvuma.

Preliminary trial 3. The material is planted in two seasons at U.A.C., including an extra early planting at the start of the rains. This trial is used if something is thought to have good anthracnose resistance.

The decision on which preliminary trial to use depends on maturity time and other characters, and seed quantity.

Uniform trials. All seven sub-stations are used.

Village trials. These have expanded from 3 villages in 1983 to 8 this year. 4-6 varieties are used on each site: local check, kablanketi or masuzi.
Kabanima
Masai red or T 3
1-3 good selections from uniform trials.
A fertilizer trial with 4 treatments is also included
0N 0P
30N 0P
0N 60/80P
30N 60/80P

With two replications there are therefore many plots so to save the farmers land no paths are left between plots.

At present only sole cropping is used but from next year intercropping will be included.

Released varieties.

(1) Kabanima released 1978. This came from a cross made by C. Leakey, Dialconima x something with the Are gene for anthracnose resistance. Very popular but seed multiplication has been poor. 150 bags are expected from Dabaga seed farm this year. Shatters easily.

(2) T 3 released 1978. Type 2 B small red. Rust and BCMV problem.

(3) Uyole 84. Type 4 B and agressvie in intercropping. Large cream haricot. Both leaves and seeds taste good. No shattering.

Promising varieties not released.

(1) 'cowpea' small dark brown, tastes like cowpea. Type 1. does well as an intercrop.

(2) Kabanyolo Type 4, yield not very high but disease resistance and taste are good.

Extension

All these varieties are being multiplied on sub-stations and sold to staff. They are given to farmers through the village trials and to farmers training courses. There is little, if any, link with Tanseed however and therefore no commercial multiplication.

Sokoine University

Material being tested comes from two main sources, local collections and crosses made at CIAT and Prosser. The crosses were with either Selian Wonder, Kabanima or Canadian Wonder and various lines with disease resistance. They are now in F_6 and being tested at Morogoro, Uyole and Lyamungu this year.

From local collections a promising line is TTD 101. A problem is lack of trial sites and this line has only been planted in one year at Uyole and Lyamungu, all other results are from the university farm. This year it is also being tested in farmers fields in the Morogoro area. It cannot be released as a variety because of failure in seed multiplication.

27048

TANZANIA Food Science and Nutrition

Informant Dr E.E. Maeda. Sokoine University

Bean work started in January 1985.

(1) Soaking. It was found that soaking for over four hours did not save cooking time.

(2) Cooking time. 33 varieties were each soaked for four hours and their cookability measured with a penetrameter. There was no correlation with seed size, nor with the % of seed weight which is accounted for by the seed coat. There was a high negative correlation between the moisture imbibed in four hours and cooking time.

Future plans

(1) Until now distilled water has been used in cooking. In a new series sodium bi-carbonate will be added.

(2) The length of cooking time needed to completely inactivate trypsin inhibitor will be compared between varieties.

(3) The tannin content will be studied.

TANZANIA Data for map on bean intensity by region 1982/83-1983/84

Adjusted up to 1983 by 3% a year

Region	Production[a] (tonnes)	Area[b] (sq.km)	Kg beans[c] per ha	Population[d] (rural)	Kg beans[e] per person (rural pop)	Population (total) (000s)	Kg beans per person (total pop)	with 1983 pop
Coast	-	32407		514,000		534,000		
Dodoma	1350	41311	0.03	945,000	1.4	1,026,000 (1211)	1.3	1 2
Rukwa	24350	68635	0.35	457,000	53.3 E	492,000 537 7	49.5	45 3
Tanga	32100	26808	1.20	959,000	33.5 D	1,099,000 (1201 2)	29.2	26 7
Kilimanjaro	16000	13309	1.20	894,000	17.9 B	953,000 (1041 6)	16.8	15 4
Singida	550	49341	0.01	610,000	0.9 A	646,000 706 1	0.9	0 8
Mwanza	12450	19592	0.63	1,381,000	9.0 A	1,526,000 (1667 9)	8.0	7 5
Arusha	20700	82306	0.25	936,000	22.1 C	997,000 (1089 7)	20.8	19 0
Morogoro	12800	70799	0.18	896,000	14.3 B	992,000 (1084 2)	12.9	11 8
Tabora	9150	76151	0.12	810,000	11.3 B	893,000 976 0	10.2	9 4
Dar-es-Salaam	-	1393		97,000		1,008,000 (1101 7)		
Mara	3000	19566	0.15	720,000	4.2 A	758,000 828 5	4.0	3 6
Iringa	30650	56864	0.54	903,000	33.9 D	971,000 (1061 3)	31.6	28 9
Ruvuma	6000	63498	0.09	577,000	10.4 B	600,000 655 8	10.0	9 1
Mtwara	-	16707		735,000		801,000 875 5		
Mbeya	22700	60350	0.38	1,041,000	21.8 C	1,147,000 (1253 7)	19.8	18 1
Shinyanga	-	50781		1,387,000		1,414,000		
Lindi	-	55046		517,000		548,000		
Kigoma	19500	37037	0.53	628,000	31.0 D	687,000 750 9	28.4	26 0
Kagera	73200	28388	2.58	1,062,000	68.9 E	1,086,000 (1187 0)	67.4	61 7

Notes

(a) Production in tonnes, mean of RADO estimates for 1982/83 and 1983/84 seasons
(b) Area, excluding water area, from statistical abstracts 1984
(c) = $\frac{(a)}{(b)}$
(d) rural population, Min. of Ag. estimates for 1980 based on 1978 census
(e) = $\frac{(a)}{(d)}$

Data for map on bean intensity per person 1972-1984

Region	Production(t) 1972/73-83/84	Population rural 1978	kg/person
Coast	-	501,000	-
Dodoma	1600	903,000	1.8
Rukwa	26600	423,000	62.9
Tanga	21500	918,000	23.4
Kilimanjaro	7700	850,000	9.0
Singida	500	585,000	0.8
Mwanza	14000	1,325,000	10.6
Arusha	27100	873,000	31.0
Morogoro	7600	858,000	8.9
Tabora	5300	751,000	7.1
Dar-es-Salaam	-	95,000	-
Iringa	18600	866,000	21.5
Ruvuma	16200	546,000	29.7
Mtwara	-	715,000	-
Mbeya	22600	993,000	22.8
Shinyanga	5600	1,302,000	4.3
Lindi	-	501,000	-
Kigoma	15100	599,000	25.2
Kagera	49000	989,000	49.5
Mara	2900	690,000	4.2
		15,283,000	

27049

MALAWI: WOMEN FARMERS IN BEAN PRODUCTION

(project of CRSP, with Bunda College, in the northern region).

Informants

1. Dr E. Bortei-Doku CRSP Research Associate N. Region.
2. Dr P. Bames-McConnell. Head of CRSP, Michegan State University.

Literature

1. Abani K. and Bames-McConnell P. (1983). Social science pilot study in northern Malawi, preliminary findings. CRSP Technical report 2.
2. Questionaires used in the survey i.e.:

Family, background	bean production
Family health	bean preparation
	bean consumption
Family activities	bean economic

3. Spring A. (1981). A preliminary analysis of Karonga A.D.D. NSSA surveys (Household composition, Resources and Extension) in terms of male and female headed households and wives of household heads. University of Florida/USAID report.

Surveys undertaken

1982. Survey of 25 households in Nchenachena and Misuku areas. (See Abani and Bammes-McConnell 1983, above).
1984. Continuation of the 1983 survey. The results are at Michegan State University but have not been written up.
1984-85. Further survey with a full time researcher based at Mzuzu in the N. region (Dr. E. Bortei-Doku). This is a repeat of the 1983-84 survey with some modifications. In addition family activities, with an emphasis on those related to beans, have been observed over several months. Every three weeks the evaluators visit a family for 3 days and record the activities of each person half hourly for an eight hour day. The sample for this survey is as follows:

Mphompha - 5 households, around the farmers training centre.
Nchenachena - 5 households, around the F.T.C.
Misuku Hills - 10 households, in the Mwaliko area.

Problems with the surveys

1. For the 1982 work Bunda students who come from the norther region were used as evaluators. These could not do the family activity survey and women have been recruited for full time work, but their educational background is not good.
2. The families are visited after a gap of 3 weeks so frequently important operations involving beans are missed.

Future work Funding for the northern region project has been extended for a further year until July 1986. The original justification for the present research was that it would show how women maintain and modify the great genetic diversity of beans found in the region. This aspect has received very little attention so far although some results from the family activity survey may be relevent. A new questionaire is being designed which includes questions on such topics as:

(a) where are bean seeds obtained?
(b) what seed types are desirable and why?
(c) what is the farmers response to new/unknown bean types?
(d) what proportion of seeds of various characteristics (quick cooking,

drought resistant plants, etc) would the farmer like to have in her mixture?

(e) what is done with undesirable bean types?

27050 Malawi

BEANS CROP EVALUATION

	1983/84			1984/85		
KARONGA	Area	Yield	Production	Area	Yield	Production
Chitipa	2500	300	750	2300	500	1150
Karonga				30	200	6
SALIMA						
Nkhotakota	170	600	102	200	700	140
Salima		negligible		10	600	6
Bwanje valley	42	700	28	35	700	25
	212	650	130	245	700	171
KASUNGU						
Ntchisi	425	350	149	320	350	112
Dowa West	400	350	140	210	370	80
Mchingi	350	250	88	420	300	126
Kasungu	3700	240	880	3000	300	900
Dowa East	1300	350	450	200	350	70
	6175	277	1707	4150	310	1288
LILONGWE						
Thiwi/Lifidzi	2050	180	369	6896	300	2069
Dedza Hills	5286	220	1163	5286	300	1586
Ntcheu	10213	210	2145	9862	300	2959
Lilongwe	500	100	50	no estimate done		
	1115	100	111	1213	150	182
LIWONDE						
Zomba	200	400	80	510	380	194
Kawinga	35	340	12	70	340	24
Mangochi	80	340	27	270	360	97
Namwera	1350	320	432	1400	370	518
BLANTYRE						
Phalombe	300	350	105	No figures available		
Blantyre/Shire highlands	6000	400	2400	because pulses		
Mulanje	2500	400	960			
Mwanza	(new division)			were combined		

27051

MALAWI BEAN CROPPING SYSTEMS

THYOLO area, Southern Highlands

Informants

(1) Director of Farmers training centre and extension staff.

(2) Four farmers

(3) Prof. T. Edje.

This is one of the main bean producing areas and gives the highest sales to ADMARC. Beans are grown in two seasons. First interplanted with maize and then relay planted following the maize. Due to shortage of land two crops of beans and one of maize are sometimes taken from the same plot for several years in succession.

Calendar

Nov. (or end Oct) Maize and beans planted together, usually in the same hole, on ridges.

Dec. During 2nd weeding weeds are buried as part of ridge repair.

early March. Maize is mature. The lower leaves are stripped and left in the furrows, together with weeds, for 1-2 weeks to dry. They are then covered with soil, by splitting the ridges, and left for a further 1-2 weeks before planting the beans. Usually 2 rows per furrow are planted, sometimes 3.

Problems Light for the relay bean crop

When the area was visited, in early March, most bean crops were showing some etiolation in spite of maize leaf removal. A very few farmers avoided this problem by cutting the maize stalk above the cob, leaving only the cob itself.

Lodging. Splitting the ridges, especially if not done with great care, frequently causes the maize to lodge.

Low fertility All the bean plants seen, of whatever age, looked chlorotic. No fertilizer is normally used on maize/beans, only on hybrid maize which is usually planted as a pure stand.

MZUZU A.D.D. Northern Region.

Informants

(1) Staff at Mphompha farmers training centre.

(2) Crops officer (Mr Gondwe) at Mzuzu A.D.D..

(3) Farms visited in Mphompha and Herge valley areas.

Literature

(1) Bean disposal survey 1982. Mzuzu A.D.D.

All sources agreed that beans is a problem crop, with yields and even area planted having declined since the 1970's. (The little data available from sample surveys is copied below).

	Sole crop		mixed crop	
Henga/Lower Kasitu	ha	kg/ha	ha	kg/ha
78 - 79	241	440	2330	316
79 - 80	75	378	2465	106
80 - 81	31	95	2981	202
81 - 82	224	430	2369	187
82 - 83	41	329	1643	204
83 - 84	112	500	1219	434
Central Mzimba (Mzimba-Rukuru)				
78 - 79	455	219	1236	175
79 - 80	229	218	980	174
80 - 81	104	301	1169	182
81 - 82	234	280	661	235
82 - 83	131	440	1002	223
83 - 84	156	232	690	138

For the other parts of the ADD data was only available since 1980.

Cropping system

Oct Rains begin but maize is not planted or it would mature in wet weather.

Dec Maize and beans planted together, usually in the same holes, on ridges.

Mar-April Beans harvested. A few farmers split the ridges and plant a relay bean crop, but this is rare. When practiced the lower leaves of maize may not be removed and even if removed they are not burried in the new ridges. Beans may be planted on the maize ridges.

In the Henga Valley, and parts of Mphompha, it is more normal for the April sown bean crop to be planted on land which is newly cleared, having been under fallow. Broad ridges are made, at least 30cm wide, to cover the cleared vegetation. Beans are planted randomly across the ridge. This land will be used for maize or a maize/bean mixture the following December.

Problems with the second beans crop

Relatively few beans are planted in the 2nd season as can be seen from the data on this page where it is all included as 'sole crop'. Possible reasons for the low area planted can be suggested:

(1) Seed shortage. Although the crop just harvested could be re-planted this is the season just before maize harvest when beans may be badly needed for food or for sale.

(2) Cold. May-June are cold in Mphompha (4,500 ft) which reduces yields of an April sown crop.

(3) One farmer said she had tried planting in this season but the stem/root always rotted.

Results of survey on bean growers problems (Mzuzu ADD 1982)

Reasons for not growing beans among farmers not growing:	lack of seed	- 50% of respondents
	poor soil	- 22% "
	poor weather	- 5% "
	lack of labour	- 9% "
	not profitable	- 2% "

Difficulties in bean growing:	pests	42% of respondents
	weather	24% "
	diseases	20% "
	labour	10% "
	no problems	29% "

CENTRAL PLATEAU

Informants (1) Prof. O.T. Edje

(2) Observation on farms around Dowa.

Literature (1) 1982. Mulinde C.E. A survey of cropping systems in Lilongwe A.D.A.

In the centre of Malawi the rainy season is shorter than in either the north or in the southern highlands. Relay cropping is therefore not possible and most beans are planted together with maize in December, usually on the same ridges. Sole cropping is very rare.

Because of this system it is likely that there is a greater tendency to climbing types than in either the north or south.

A survey in Lilongwe A.D.A. (Mulinde 1982) showed more farmers growing beans in a mixture of 3 crops, (with pumpkins, groundnuts or sweet potato) than simply with maize.

MALAWI Bean purchases by government marketing organisation, ADMARC, with groundnut for comparison.

YEAR	SOUTHERN REGION (BEANS) t	CENTRAL REGION BEANS(t)	CENTRAL REGION GROUNDNUTS(t)
1974/75	569	549	23,021
1975/76	569	1,598	27,067
1976/77	633	5,620	27,441
1977/78	287	2,461	15,251
1978/79	737	1,147	8,337
1979/80	617	1,030	20,115
1980/81	1,264	406	27,174
1981/82	668	499	18,232
1982/83	323	248	8,563
1983/84	83	74	8,241
1984/85	989	610	8,851

NB. 1984/85 figures are not yet complete, purchasing continues.

Data supplied by Admarc regional managers, southern and central regions. The northern region buys relatively very small quantities of beans.

27052

ZAMBIA: BEAN NUTRITION/SOILS

Informants

R.C. Cheatle Soil chemist Mt. Makulu research station
D. Roose Mt Makulu
P. Thole Zamseed.

Literature

D. Roose (1984). Bean trials 1983-84, Grain Legume research committee meeting Sept. 1984.

Fertilizer use

1979 Ministry of Agriculture recommendations for beans:

Fertility status	kg/ha			
	N	P_2O_5	K, O	S
low	100-120	60-80	30-40	20
medium	70-90	40-50	10-20	20
high	40-60	20-30	0	20

Mr Chilambo, one of Zambia's largest bean growers with 50 ha of seed beans, uses 70.60.30.30.

Acidity and toxicity. An experiment has been run for two seasons from Mount Makulu by D. Roose and R.J. Cheatle. The newly released varieties, BAT 331, Carioka and Nep 2 have been compared with Misamphu speckled sugar at several trial sites between pH 3.2 - 4.8. 10 soil chemical characteristics are measured.

Last years work (see literature above) is generally confirmed by the larger number of trials this season, the results of which have not yet been written up. Below pH 4.0 there was no bean yield. The yields were better explained by a combined measure of Ca and Mg with pH than by pH alone. On some sites Al and Mn toxicity were also important.

This seasons results are expected to show a regresion curve for each variety. Deep pH testing (below 15 cms), where pH can be much higher, may show whether different rooting patterns could explain the varieta differences.

Soil characteristics in farmers fields.

Most beans come from the northern region where soil pH is usually below 4.0 and therefore they are normally grown in the chitemene (ash culture) system. pH of bean soils in this system have been measured by R.J. Cheatle ranging from 4.0 - 9.0, normally at the lower end, depending largely on the stage in the cycle. The pH of the Mbala trial sites at around 4.2 is therefore not un-typical, though it was obtained by liming up from 3.9 rather than by ash.

Nodulation.

All informants stated that active nodules are rarely seen on beans in Zambia.

27053

ZAMBIA: BCMV

Informants

Dr D. Greenberg — Breeder/head of ERADP legume programme at Chipata.

Ir D. Roose — Virologist at Mount Makulu research station.

Mr Swanepoel — Farmer and seed merchant.

Literature

EPADP Msekera annual reports
Roose D. (1984). Proposal for release of dry bean varieties
Roose D. (1984). Grain Legume research committee meeting.

Areas affected and crop losses.

The levels of BCMV damage vary greatly from season to season depending largely on the occurence of dry spells hwhich enable aphid build up. BCMV is said to be less serious in the north than in the Lusaka area. One farmer near Lusaka who has grown seed beans for many years, Mr Swanepoel, has never achieved above 400 kg/ha (mainly with Misamphu speckled sugar). Since he uses irrigation and fertilizer; always has virus infection but never any other major disease, BCMV is very likely the main cause of these low yields. Much of the certified bean seed sold in Zambia is produced around Lusaka and presumably is heavily infected.

Hypersensitive varieties. Three such varieties have been officially released in Zambia (see literature above), BAT 331, Nep 2 and Carioka. These have different levels of resistance, depending on the virus strain, with BAT 331 the best and Nep 2 the worst. D. Roose is working on the identification of the virus strains present in Zambia using a differential cultivar set from CIAT.

The results of Roose's work on these varieties suggest that the yields are very much affected by the level of infection from neighbouring fields which causes the necrotic reaction. To illustrate this point the design below has been used in the 1984-85 season at two sites, the University and Mt. Makulu.

rays of hypersensitive varieties

spreader

cowpeas

(misamphu speckled sugar)

The results have not yet been written up (April 1985). They show a decrease in black root and increase in yield away from the central spreader, the disease pattern being affected by the prevailing wind direction.

27054

ZAMBIA: BEAN SEED

Informants

(1) Mrs P. Thole, production officer Zamseed.
(2) Mr J. Swanepoel, bean seed producer and seller.
(3) Miss C. Wijnberg, commercial farmers bureau.
(4) Ir D. Roose, virologist Mt. Makulu research station.

Literature

(1) Zamseed 1985. Production of maize seed compared to other agricultural seeds.

The Zambian seed merchants. Zamseed (40% government 60% Dutch company) had a virtual monopoly for many years. Now Midland farmers co-op and some smaller companies are competing, but none deal with any significant quantity of beans.

Decline in bean seed production. Zamseed's production of bean seed dropped from 122.4 tonnes in 1982 to 17.5 tonnes in 1984. Some of the reasons for this decline are:

(1) High price of food beans. Zamseed pays ZK 2.50 - 3.00 but the price for consumption is sometimes higher.
(2) Labour. Commercial farmers in the Lusaka area mainly grow combinable crops, maize and soya. One commercial farmer informant said that labour for harvest and cleaning had caused him to drop the crop.
(3) Supervision. Beans do not do well in the Lusaka area but for ease of supervision much of the seed crop comes from this area. Zamseed had several small scale producers in Eastern Province which they have now stopped working with because of the cost of visiting.
(4) Unsuitable varieties. This is undoubtedly the most serious problem. For many years the dominant variety has been Misamphu speckled sugar which has no resistance to BCMV. A farmer who has grown bean seed for many years, Mr Swanepoel, said that he has never achieved above 400 kg/ha. Since he uses irrigation and fertilizer, always has virus infection but never any other major disease, BCMV is presumably the cause of such low yields. Other producers of Misamphu speckled sugar get up to 600 kg/ha. In the 1981-82 season from 122 ha of seed beans in the Lusaka area the average yield was 150 kg/ha. Though the season was rather dry this alone could not account for such very low yields.

Production system

The farmer buys from Zamseed at ZK 4.00/kg. It is dressed with Captasan and Dieldrin dressing against bean fly is common. Between 0-300 kg/ha of 10.20.10 is applied at planting and 0 - 100 kg/ha of urea is top-dressed. Planting is usually in Jan - early Feb and the crop is rain-fed. Some farmers would plant later and use irrigation if the crop was more profitable since they have borehole water and sprinklers.

BCMV hypersensitive varieties

3 varieties have been released, Carioka, Nep 2 and BAT 331; but there is a shortage of seed. A commercial farm near Lusaka, Walkover Estate, grew 3 ha of BAT 336 last year and got 1800 kg/ha. This year they have planted 9 ha.

The problem of black root carried from local beans carrying the virus in the seed should not arise since beans are not a common crop in the Lusaka area. Unfortunately Zamseed is supplying both Misamphu speckled sugar and hypersensitive varieties to the same farmers.

27055

ZAMBIA BEAN PRODUCTION DATA

Informants
(1) Mr B.C. Patel, head of agricultural section Central Statistical office.
(2) Mr S. Zebedia and Mr Murphy
Agricultural statisticians, Ministry of Agriculture.

Literature
(1) Crop estimates, by province, 1982-1985. Ministry of Agriculture.
(2) Production and sales of beans by province 1970-1978. From sample survey Central Statistical Office.
(3) Bean yields, from crop cutting excercise 1970/71. Central Statistical Office.
(4) Bean area, production and expected sales by province for 82/83 and 1983/84 from sample survey Central Statistical Office.

Dual source of data

As in Malawi there are crop estimates, (made by field extension workers and passed up the chain to Ministry of Agriculture, planning division) and sample surveys run by the central statistical office.

Statistical office surveys 1970-1978.

The sample frame was the polling district. Data came mainly from post harvest questionaires. Only production was included, not area. Yield was measured only for 1 year.

Statistical office surveys 1982-1985.

The system has been improved since the earlier series though at field level it is still understaffed with 90 ennumerators for the whole of Zambia.

Sampling

The primary unit is the standard ennumeration area (SEA) based on census ennumeration areas. In each province either 10% or 20% of the SEA's are selected (systematic circular with random start), then 10% of the households in the selected SEA are used. 20% of SEA's are surveyed in the main maize provinces only which does not include Northern Province, the main bean area. In future a master sampling frame will be used, as in Kenya.

Ennumerators schedule

Oct - Nov.	household listing, selection of 10% sample
Dec - Jan.	crop forecast, by questionaire and in-field
Mar	sub-sample re-estimate forecast
Apr - July	area measurement and maize cutting (only maize yields are sampled)
Sept.	post-harvest questionaire.

Specific bean problems

The survey is always in Dec/Jan yet in the north, where most beans are grown, the main season is Feb-May. Beans may therefore be under-estimated.

In the 1983/84 survey an intercropped field of 1 ha is recorded as 1 ha - maize plus 1 ha - beans. In 1984/85 the system was changed to estimating the equivalent area under sole crop.

Data for maps of bean intensity in Zambia 1983/84 (From National Statistics Office sample survey)

District	Total Area (km^2)	Bean Production (t)	Beans Kn/ha	Population	Beans kn/person
Kabue rural	25760	57.7	0.022	142,523	0.40
Mkushi	22608	16.0	0.007	71,949	0.23
Mumbwa	21103	27.2	0.013	81,976	0.33
Serenje	23351	166.2	0.071	73,752	2.25
Ndola rural	23571	11.9	0.005	102,703	0.12
Other copperbelt	7757	42.9	0.055		
Chadiza	2574	84.5	0.328	42,601	1.85
Chama	17630	N/A		36,843	
Chipata	11986	169.2	0.138	209,970	0.81
Katete	3989	164.5	0.412	93,220	1.76
Lundazi	14058	363.1	0.258	117,961	3.08
Petauke	18868	106.2	0.056	158,786	0.67
Kawambwa	9303	N/A		61,005	0.67
Mansa	16161	266.1	0.165	110,100	2.42
Muense	6718	980.1	0.146	64,220	15.27
Nchelenge	8055	N/A		76,319	
Samfya	10329	1172.0	0.113	101,154	11.59
Luangwa	3471	4.0	0.014	11,474	0.42
Lusaka rural	18065	264.9	0.146	143,935	1.84
Chinsali	15395	721.1	0.468	67,473	10.68
Isoka	13846	1714.3	1.24	93,642	18.31
Kaputa	13004	N/A		44,934	
Kasama	20554	2293.6	1.116	148,806	15.41
Luwingu/Chiluhi	13540	1808.2	1.335	87,730	20.62
Mbala	18508	246.7	0.133	111,647	2.21
Mpika	40935	1157.8	0.283	81,377	14.22
Mporokoso	12043	1379.9	1.146	42,685	32.32

...../2

Data for maps of bean intensity in Zambia 1983/84 (from National Statistics Office sample survey) continued

District	Total Area (km^2)	Bean Production (t)	Beans kg/ha	Population	Beans kg/person
Chizera	20756	92.6	0.045	14,566	6.34
Kabompo	14532	28.6	0.020	40,992	0.70
Kasempa	20821	4.0	0.002	28,023	0.14
Mwinilunga	21116	280.8	0.133	67,423	4.17
Solwezi	30261	733.9	0.242	92,380	7.94
Zambezi	18340	40.0	0.022	58,293	0.69
Choma	7296	39.0	0.053	132,737	0.29
Gwemba	12611	N/A		23,431	
Kalomo	31103	78.1	0.025	102,011	0.76
Livingstone	1427	2.1	0.015	71,987	0.03
Mazabuka	6842	141.7	0.207	115,384	1.23
Monze	4854	58.1	0.120	110,650	0.52
Sinazongwe				46,541	
Sievonga		16.2		26,902	0.60
Namwala	21751	11.8	0.005	56,826	0.21
Kalaba	17526	21.6	0.012	97,933	0.22
Kaoma	23315	231.7	0.099	70,149	3.30
Lukulu	16291			42,996	
Mongo	10075			116,888	
Senanga	29906	47.6	0.016	101,662	0.47
Seshake	29272	115.8	0.039	58,360	1.98

Zambia Data from which bean maps were drawn. 1972/73 - 1977/78 average.

Province	Production (t) 6 years mean 1972/73-1977/78	Area (km^2)	kg beans per hectare of area.	Population 1980 census total.	Population 1980 census excluding	kg beans per person (rural)	kg beans per person
Central							
* Lusaka	698.5	94394	0.07	1,207,713	525,609	1.33	0.58
Copperbelt							
* N. Western	1648.5	157154	0.10	1,550,565	404,388	4.08	1.06
Eastern	660.0	69106	0.10	656,381	656,381	1.01	1.01
Luapula	597.0	50567	0.12	412,798	412,798	1.45	1.45
Northern	6118.5	147826	0.41	677,894	677,894	9.03	9.03
Southern	336.6	85283	0.04	686,469	611,482	0.55	0.49
Western	154.5	126386	0.01	487,988	487,988	0.32	0.32

Source: Central office of statistics

27056

ZIMBABWE - SEED BEANS

Informants

Mr J. Stroobach - National Tested Seeds.
Dr Kelly - Farmers Co-op.
Dr Musa - Seed Services (Dept. of Research & S.S.).

Literature

1. 1964: The seed bean crop in southern Rhodesia. Economics and markets section Ministry of Agriculture.
2. 1970: Hanssen K.B. Production of seed beans for export. Bull. No. 2545 Reprint from Rhod. Agric. J.
3. 1979-1983: Annual reports of low-veld research stations
4. 1985: Bean seed returns.
5. 1985: Growers contracts. National Tested Seed.

Seed beans for export

History

In the 1960's there was considerable (over 400/yr) export, with the majority of production on small scale irrigation schemes in the Sabi and Runde valleys. After independence the industry started again and is expanding fast.

Present production

Export in 1985 may be 800-900 tonnes of which perhaps half will go to Europe and the rest to southern and central Africa (vague due to commercial secrecy). The following companies act through agents:

Bucker, Royal Slais) Dutch Klauser, Vil Morin) French

The expansion for the European market is at the expense of Tanzanian and French producers.

Areas

Most production is within 100 km of Harare, for ease of supervision by the agents. Areas below 1,200 i.e. Chegutu and Mazowe are preferred because of their freedom from frosts.

Varieties

For southern Africa sugar beans are preferred and the main variety grown is Bonus, because good seed was available from S. Africa. For Europe all the basic seed is imported.

Yields

Canning types (30% of the market in Europe) - 2.5 t/ha.
Green types (70% of the market in Europe) - 1.8 t/ha

Costs/prices

Costs are about Z $ 700/ha and the farmer is paid about Z $ 1,000/tonne. The crop is attractive.

Insects

Usually aldrin or dieldrin seed dressing is used against bean fly. If this is not done then 4 sprays of diazonal may be needed. If aphids or red spider mite build up dimethoate is used.

Disease — Thiram seed dressing. Generally the drop in temperature and relative humidity, due to planting at the end of the rains prevents major problems, but Anthracnose and Altemaria leaf spot (if after a tobacco crop) do occur. For the last two years, dry ones, no fungicide sprays have been required.

Other problems — Threshing is difficult and losses high with green bean seed.

Fertilizer — National Tested Seed recommends:

seedbed 200kg of 6.17.15
topdress 50kg of ammonium nitrate } after tobacco

seedbed 300kg of 6.17.15
topdress 100kg of ammonium nitrate } after maize

Cropping System — Planting is in the last half of February or sometimes early in March, so supplementary irrigation is essential in most years. Many farmers plant after tobacco, soya or groundnuts, though with the latter two possibilities the schedule is tight. Sometimes 2 bean crops are taken in the season.

Seed beans for local consumption

The head of seed Services estimates that 20% of seed beans planted by farmers in the communal areas are bought from seed companies. In recent years however the quality of such seed has been very low and there has been a shortage. The main supplier is Farmers Co-op which this year has contract farmers multiplying Natal sugar from S. Africa. They expect to supply neighbouring countries with this seed, in addition to the home market.

27057

ZIMBABWE BEAN PRICING

Informant — Mr P. Murphy Economics section, Min. of Ag.

Controlled crops

Dry beans became a controlled crop in 1984, together with bulrush millet and finger millet. The parties to price negotiations on these crops are:

Agricultural Marketing Authority, representing Grain Marketing Board
Farmers Unions representatives
Economics and marketing section of the Ministry of Agriculture.

Method of arriving at control price

The Ministry economists calculate the margins per $ invested and per hectare for each crop under 2 systems, commercial and communal. The farmer is assumed to follow something close to Agritex recommendations, with lower inputs for communal farmers, but still some fertilizer and chemicals. (figures, approx., for 1983-84 season).

	Commercial	Communal
assumed yield/ha	1 tonne	0.8 tonne
margin/ha	$ 75.00	$ 245
margin/$ invested	$ 1.15	$ 2.50

The normal aim of the ministry is for the price to enable a return per $ invested of $ 1.50. This aim was not achieved for the 3 new crops introduced in 1984. Their prices were set higher in order to benefit the smallholder farmers who are the main producers of these crops.

Ministry worries, justified?

The economist is concerned that the beans price may have been set too high, in which case the price to consumers in production areas would be forced up and the G.M.B. could have difficulty selling its stocks. (This worry seems quite unnecessary given (a) assumption of yield 800 kg/ha while average yields estimated by Agritex are only 500 kg/ha (b) unofficial prices are already about $ 1,000/ton (c) Sales at the new price to G.M.B. last season, 1984, were only 14 tonnes for the whole country). One reason for low sales to G.M.B. last year was drought and the associated seed shortage. The true effect of the control price of $ 450/tonne will only appear in 1985 and 1986.

Commercial farms

The estimated return per $ invested of $ 1.15 is not enough to cover overheads (approx 30% of investment). The main reasons for the commercial farmers' lower margins are the higher inputs for labour ($ 80/ha) and tractors ($ 70/ha). The return per hectare (approx $ 70) is also most unattractive compared with approx $ 240/ha for soya, groundnu or maize.

Commercial producers are therefore only interested in canning beans, seed beans or some other market outside the G.M.B.

27058

ZIMBABWE BEAN NUTRITION

Informants
Mrs Grant, Manager, innoculant factory
Mrs Ryder, microbiologist, soil productivity research institute (SPRI) Marondera
Dr P. Grant, Zimbabwe fertilizer company
Mr I. Mharapara, Chiredzi research station.

Literature
(1) 1984 Zimbabwe fertilizer company, beans recommendations
(2) 1984 Olivine industries, beans recommendations
(3) 1984 ARDA Budget working papers, inputs.

Fertilizer recommendations

All have been converted to common units and averaged where a range was given, for ease of comparison.

	Kg per ha			
	N	P	K	Region
Olivine (Heinz)	34.5	11	10	high altitude
National Tested Seed	40.5	42.5	37.5	high "
A.R.D.A (parastatal)	68.0		0	low "
Zimbabwe Fertilizer Co-op.	72.5	32.5	25	high "
Chiredzi research station	140.0	60.0	0	low "

All sources agree that for the low veld no potash is needed and all fertilizer can be applied at planting while for high altitude areas potash is needed and some of the nitrogen should be topdressed.

Innoculation The innoculum factory is a semi-commercial unit within the ministry of agriculture. In its year of maximum production 1981-'82 (slight decline since then) output was 85,000 units of which 80,000 were for soya, 2,000 for groundnuts and 1,000 for beans. In the current season over 1,000 units for beans have been sold. 1 unit treats 42 kg of bean seed. Most farmers do not know what innoculum does, thinking 'its something to do with germination'. Its probably bought because the soya innoculum is dramatically effective and because its cheap, $ 0.75 / unit.

Strain used and effectiveness

Only 1 Rhizobium strain is used, CB 1141, from Australia, called 1380 MAR in Zimbabwe. No field trials have been done. It was chosen on greenhouse performance and storage since the other strains for beans did not keep at all well. The problem may be the bagasillo medium used, it kept better on agar. The microbiologist decided against doing field trials saying that beans are not a crop of sufficient importance.

There are some indications that innoculation may have an effect. Dr P. Grant of the Zimbabwe fertilizer company said in her general observation innoculated beans nodulate better. She suggests that failure to nodulate can be due to ploughing in crop residue immediately before planting which immobilises soil nitrogen. A field experiment by the bean breeder, O. Venge, in 1984 showed significantly more nodules and higher yields on innoculated plants; but this work has not yet been writen up.

27059

ZIMBABWE - GREEN BEANS

Informants Mr M. Vogel, horticulturalist, Marondera R.S.

Mr Nzima, horticulturalist, Chiredzi R.S.

Literature

(a) 1977 Horticulture research station annual report 1976-1977.

(2) Wells P.D. 1982 Horticultural Notes Green Bean. Zimbabwe agric. J. Vol. 79 (3).

Leaves Bean leaves are eaten very rarely, if ever, as a vegetable in Zimbabwe.

Immature dry bean varieties

Beans grown in vlei (dambo) land and at the end of summer after a groundnut crop are sometimes harvested green for urban sale.

Green bean varieties

The main varieties are top crop, contender, seminole and slender white. Virtually all production is either around Harare or in the Mutare area where the canning companies are (Lemco, Gibcan, Rusape, Cerebos).

Major problems Anthracnose, bacterial blights, rust, beanfly, spider mites (some areas).

Research In only 2 years 1977 and 1985 have variety trials been done at Marondera, the horticultural research station. The crop is not important enough to warrant more effort.

27060

ZIMBABWE: BEAN DISEASES

Informants

Mr Mariga Pathologist, D.R. & SS Harare Crop protection Institute
Mr I.M. Mharapara Agronomist, Chiredze research station
Mr Bartlett, Olivine Industries
Mr McKenzie, A.R.D.A.

Literature

Mariga (1983) BCMV and Bean rust, Plant Pathology Notes in Zimbabwe agric. J. Vol 80 (4)

Agronomy Inst. 1981-84 IBYAN results in Agronomy institute annual reports. 1983

Agronomy Inst. 1983 IBYAN results
1984 Michegan pea bean variety trial results.

Lowveld Disease problems are relatively few due to the planting of beans only in the dry winter season. The ANDA estates have not noticed any serious disease with either flood or spray irrigation. At the two low veld research stations it has been observed over several years that spray irrigation results in more blights, anthracnose, rust and Rhizoctonia solani. This problem does not affect the small scale irrigation schemes which use flood irrigation.

High veld. At the six trial sites over the last two years the main disease have been rust, common bacterial blight, altemaria leaf spot, BCMV and anthracnose, with Fusarium wilt and root rots of less importance.

The farmers growing for Heinz in 1983/84 and 1984/85 have found rust the most serious, followed by common bacterial blight, root rots, damping off and BCMV.

Research. No pathologist is working full time on beans. Mr Mariga, however, does the disease identification and scoring for the IBYAN and Michegan pea bean trials.

No one at the university is working on any bean disease.

27061

ZIMBABWE BEAN CROPPING SYSTEMS

Informants

Dr Avila)
Mr Shumba) Farming systems team. Dept. of Research & specialist
Mr Dendera) services.
Mr Mckenzie: Agricultural Rural Development Agency (ARDA)
Mr Bartlett: Olivine Industries (Heinz).
Mr I.M. Mherepere: Agronomist, Chiredzi Research Station.

Literature

(1) Mariga 1984, A review of field bean production practices, current and future research. Agronomy Institute DR & SS,

(2) Characteristics of farms in Chibi and Mangwende communal areas p 101 in Zimb. Sci. News Vol. 18 1984.

(3) ARDA Chisumbanje estate Budget for 300 ha beans, 1985.

(4) Olivine Industries (1984) Michegan pea beans; recommended cultivation practices.

COMMUNAL LANDS FARMS

Phaseolus vulgaris is a much newer introduction to Zimbabwe than cowpeas or groundnuts. This is shown by the very limited genetic diversity and also by the use, in Shona, of the word 'nyemba', which originally meant cowpeas, to mean beans as well. Intercropping. All informants agreed that in most areas beans are not normally intercropped, largely due to strong extension campaigns for pure maize crops. In the eastern mountains, however, maize/bean mixtures are common and around homes beans and pumpkins are often planted with maize.

Bean cropping systems in Mashonaland

(1) On vlei land in the winter small plots of either green or dry beans are planted either in pure stands or mixed with vegetables.

(2) Groundnuts planted at the start of the rains can be followed by beans which mature on residual moisture.

(3) If planting is delayed or the main crop fails a catch crop of beans is sometimes taken.

Farming systems research in Zimbabwe. The systems team, assisted by CIMMYT, concentrates on two communal lands: Chibi, which is a low potential area and Mangwenda, which is a high potential area close to Harare. They are looking at farmers current practice and experiment with the more intensive approaches which might be beneficial if extended to a larger number of farmers. One such practice under current investigation is the planting of beans after groundnuts.

Beans following groundnuts. A survey (see literature above) showed that 50% of Mangwende farmers took a bean crop after groundnuts in 1984. Mr Shumba, of farming systems, estimates that this year 80-90% of farmers grew groundnuts and 30% of these then planted beans on at least part of the groundnut land. As the survey showed average area under groundnuts to be 0.5Ohs per household the potential for bean production in this system is large.

A groundnut specialist, Dr Hildebrand of the University of Zimbabwe, suggests that farmers would profit more by growing a 165-180 day groundnut than by trying to harvest the 120-130 day types from wet soil and squeezing in a bean crop.

COMMERCIAL AREA FARMS

Beans have often been grown only after another crop failed, due to their short season. The low yields (see 1983 commercial farm data) have reflected the low priority of the crop.

A.R.D.A. (Agricultural Rural Development Authority). This parastatal has some of the largest scale food bean production in Zimbabwe. It has 18 estates, mainly in low altitude areas, and concentrates on wheat and cotton. Beans are grown both in the low veld and the Zambezi valley. Their main advantage is their short season so that planting can be mid-June, a month later than for the alternative crop wheat. 100-200 hectares of beans are planted each year.

Varieties: Natal sugar, Canadian wonder (from seed growers association)

Yields: 1.2 - 1.5t/ha in recent years due to shortage of irrigation water, expecting 2t/ha this year.

Disease: Not a problem with either flood or spray irrigation.

Insects: Aphids. Bean fly is a major problem unless a systemic seed dressing is used.

Nodulation: Very poor. (see inputs sheet for fertilizers).

Other problems: Germination on clay soils. Shattering losses are high.

Beans on small scale irrigation schemes. In the Sabi and Rende valleys of S.E. Zimbabwe (low veld) each farmer has about 1 hectare of irrigated land where the normal cropping pattern is:

Sept - Dec/Jan	maize, harvested green
Feb - April	beans
May - August	vegetables.

Sometimes there is a problem of flower drop due to high temperatures in March. The horticulturalist at Chiredzi, Mr Nzima, is investigating this system and alternatives.

Canning beans. Heinz plans to use Zimbabwe as an alternative to Canada to supply the U.K. market. The project has been carefully planned with hectarage being built up gradually: 1984-10ha, 1985-100ha, 1986-500ha (projected). 18-20 varieties are being tested annually on six sites in conjunction with the Ministry of Agriculture (R & SS). (For results see annual institute reports of agronomy institute).

Planting date: Mid December-early January. It is necessary to plant this early since the farmers do not have irrigation.

Disease: High, due to early planting and susceptibility of navy bean varieties to rust. At least two applications of fungicide are made.

Insects: In the 1983/84 season false codling moth was a problem. Insecticide is sprayed routinely at pod set because complete freedom from weevils is essential for the export market.

Yields: Expecting up to 3t/ha. The main variety used is 110 days, something longer would be preferred.

Area: Must not be too far from Harare for ease of visiting. Mainly commercial farmers but some communal farmers are also growing.

Cropping system: Several farmers plant beans after tobacco, which is fully harvested by end January. There is some concern whether this could increase nematodes, so Olivine Industries have an experiment with a fumigated control to investigate. The intensive tobacco→beans→wheat 3 crops a year system looks attractive to some producers.

27062

ZIMBABWE BEAN PRODUCTION DATA

Informant — Mr Johnson, Agritex. (the extension branch of Ministry of Agriculture).

Literature
(1) Commercial production (large and small scale) 1983. Central office of statistics
(2) Commercial production (irrigated and non-irrigated) 1983. Central office of statistics
(3) National data 1976 - 1983 (Central office of statistics).
(4) Agritex national forecasts for 1985, to compare with other crops.
(5) First crop estimate for 1984-85 season by province (Agritex).
(6) Ennumerators instructions for 1985 national crop area survey, Agritex.

Communal areas — These are the areas where land is held under traditional tenure systems. Agritex states that their data for these areas are non-existant or very unreliable so they are doing a national sample survey this season. 100 square grids were placed over aerial photographs and ennumerators record what is present at each grid intersection.

Commercial areas. — Data for these areas comes from the central Office of statistics rather than Agritex. A complete, not sample, survey is done yearly, nevertheless it isn't very reliable for beans. There are internal inconsistancies (e.g. between (1) and (2) above) and some obvious mistakes.

ZIMBABWE Beans on Commercial Farms 1983

TABLE 1

		Non irrigated			Irrigated		
		ha	t	kg/ha	ha	t	kg/ha
Manicaland	consumption	92	37	402	12	11	917
	seed	*	*	*	*	*	*
Mashonaland Central	consumption	17	13	765	-	-	-
	seed	-	-	-	-	-	-
Mashonaland East	consumption	38	37	974	-	-	-
	seed	61	8	131	*	*	*
Mashonaland West	consumption	40	5	125	55	46	836
	seed	90	67	744	*	*	*
Matabeleland North	consumption	*	*	*	-	-	-
	seed	*	*	*	-	-	-
Matabeleland South	consumption	*	*	*	-	-	-
	seed	-	-	-	-	-	-
Midlands	consumption	-	-	-	-	-	-
	seed	-	-	-	-	-	-
Masvingo	consumption	*	*	*	-	-	-
	seed	-	-	-	-	-	-

* under 4 farms.

TABLE 2

		Large Commercial			Small Commercial		
Manicaland	consumption	104	48	462	181	28	156
	seed						
Mashonaland Central	consumption	28	230	8214	9	4	456
	seed						
Mashonaland East	consumption	38	37	974	94	4	44
	seed	61	8	131			
Mashonaland West	consumption	95	51	537	20	1	70
	seed	129	81	628			
Matabeleland North	consumption				3	1	172
	seed						
Matabeleland South	consumption				58	17	296
	seed						
Midlands	consumption				209	25	119
	seed						
Masvingo	consumption				117	6	49
	seed						

This page is referring to
Tables 1 and 2.

Source

Central Statistical Office.

N.B. The 2 tables do not agree. The top table was used to provide data for the maps of bean intensity because of the obvious error in Mashonaland Central in the bottom table.

ZIMBABWE National bean production on commercial farms 1976-1983

	'76	'77	'78	'79	'80	'81	'82	'83
Small commercial farms Beans for consumption								
Farm number	1720	1694	1438			1340	1099	1096
Beans area(ha)	988	1100	885			715	574	691
Beans tonnes	613	557	566			469	276	86
kg/ha	621	506	639			666	480	125
Large commercial farms Beans for seed								
Farm number	46	35	23	34	42	24	22	23
Beans area(ha)	413	250	284	378	201	168	299	234
Beans tonnes	183	104	68	154	104	102	109	99
kg/ha	443	433	239	407	517	607	365	423
Large commercial farms Beans for consumption								
Farm number	291	229	134	198	176	76	57	47
Beans area(ha)	1495	1209	697	1157	932	449	651	321
Beans tonnes	554	498	229	452	564	264	297	377
kg/ha	371	412	329	391	605	588	456	1174

Source Central Statistical Office

Soya and Groundnuts for comparison. (large commercial)

	'76	'77	'78		'80		'83
Soya (tonnes)	44,300		69,403		89,403		78,571
Soya (kg/ha)	1,808		2,010		1,800		1,440
Groundnuts(tonnes)	9,600		5,800		10,700		8,547
Groundnuts(kg/ha)	2,250		2,290		2,780		2,810

ZIMBABWE National bean production on commercial farms 1976-1983

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