ICARDA/IFAD NILE VALLEY PROJECT

Results of the Agro-economic Survey of Faba Bean Production in Minya Governorate, Egypt

1979/80

International Center for Agricultural Research in the Dry Areas

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RESULTS OF THE AGRO-ECONOMIC SURVEY OF FABA BEAN PRODUCTION IN MINYA GOVERNORATE, EGYPT

1979/1980

Abdul Bari Salkini[1/]
David Nygaard[2/]
Abdel Mawla Basheer[3/]
Mustafa Abdel Aziz[4/]

The International Center for Agricultural Research
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1/ Agricultural Economist, Farming Systems Program, ICARDA, Syria.

2/ Program Leader, Farming Systems Program, ICARDA, Syria.

3/ Research Chief, Research Institute for Agricultural Ecoconomics, Cairo, Egypt.

4/ Assistant Researcher, Research Institute for Agricultural Economics, Cairo, Egypt.

PREFACE

This report presents the results of the first agro-economic survey of faba bean production in Minya governorate, by the Nile Valley Project.

The survey was conducted by Abdel Mawla Basheer and Mustafa Abdel Aziz, and the results presented at the First Annual Coordination Meeting of the Nile Valley Project, Cairo, 1980.

Abdul Bari Salkini was responsible for the analysis of the survey data and the writing of this report. The work was guided throughout by David Nygaard.

We would like to thank Helmi Farrage and staff of the Agricultural Research Station in Minya, who conducted the interviews with farmers; Peter Walker and Mireille Abdelnour for assistance with the statistical analysis of data; Marica Boyagi for typing this report; and Elizabeth Bailey for comments and editing of drafts.

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SUMMARY

1. This report discusses the socio-economic survey work underway in Egypt as part of the ICARDA/IFAD Nile Valley Project on faba beans. The study intends to (a) identify the yield gap between actual and potential yields on farmers' fields, (b) calculate the economic costs and returns of the recommended level of inputs compared with farmers practices and determine how much of the yield gap can be economically recovered, and (c) identify the factors which may constrain farmers from using the most profitable level of inputs. This will be accomplished through an understanding of current practices, as well as the social, economic and institutional factors affecting faba bean production.

2. The farm survey included nineteen farmers who had project trials on their land (TFs) and 32 non-trial farmers (NTFs). A statistical analysis of selected production variables and yields revealed that there was no significant difference between the TFs and NTFs and subsequently, when discussing trial results, the TFs can be considered as reasonably representative of farmers in the study area.

3. Farm size ranged from 0.1 ha to 19.7 ha, with an average of 2.6 ha, which is over three times the average for Minya province (0.72 ha). Faba beans are one of the major crops in the study area; farmers allocated 20.8 percent of their total cropped area to faba beans. Other major crops are maize (20.7 percent), cotton (20.3 percent), wheat (15.3 percent), clover (9.4 percent) and sugar cane (5.7 percent). Per farm area under faba beans ranged from 0.1 to 6.3 ha, with an average of 0.9 ha. Principal rotations in the area are: maize-faba bean-cotton, maize-faba bean-maize, or cotton-faba bean-soya bean.

4. Faba beans are planted on mainly good soils. Eighteen percent of farmers reported problems with soil or drainage and these resulted in yields 37 percent lower than the overall samples average yield.

5. Faba beans are mainly sown early (during October), though 29 percent of farmers planted in the first half of November and eight percent in the latter half. Early planting, in October, increased yields by nine percent. The majority of farmers sow two rows per ridge, following ploughing and leveling. On average, two seeds are planted per hill, and hill spacing ranges from seven to 50 cm, with an average of 19 cm.

6. Seed rate varied from 124 to 250 kg/ha with an average of 175 kg/ha. No positive association was found between seed rate and yield in the sample. However, research workers recommend a much higher seed rate of about 325 kg/ha.

The majority of farmers (51 percent) purchased seeds through their co-operative societies, 22 percent in the market and 27 percent used seed from their own stocks. Seed from the cooperative societies is available on credit which must be repaid after harvest.

7. Fertilization by manure is not a common practice in the study area. Only 22 percent of the sample applied manure at a rate of 240 to 720 m^3/ha. No significant association was found between manure application and yield.

Chemical fertilizers (phosphorus and nitrogen) are used by most farmers; 44 percent applied phosphorus and 73 percent applied nitrogen. The rate of phosphorus fertilizer adopted by the sample farmers was 446 kg/ha of single super phosphate, i.e., 69.4 kg of P_2O_5. This is slightly lower than the recommended rate of 71.4 kg/ha P_2O_5. Levels of phosphorus application significantly affected yields over a larger part of the study area; plots receiving P_2O_5 at rates close to the recommended rate yielded 17 percent more than those receiving lower levels.

Rates of nitrogen fertilizer application varied widely among farmers, (28 to 167 kg/ha of N), and only five percent of the sample used the recommended rate of 35.7 kg/ha of N, i.e., 77 kg/ha of Urea (46.5 percent N). The average rate of N used by farmers was more than double this recommended rate; 89 percent of farmers used more than the recommended rate. This is an unwarranted extra cost since rates above the recommended level did not lead to an increase in yield.

8. Most farmers' irrigation of faba beans (after the closure of canals) was in keeping with research recommendations (every 25 days). Before the closure however most farmers imposed a measure of water stress on their crop with a 40 day interval of watering. While researchers believe that water stress at early stages of growth has a harmful effect, farmers do not. About 41 percent of the sample farmers complained of a water shortage particularly in Abou Kurkas district.

9. Orobanche was reported as a problem by 27 percent of the sample. Other weeds predominating in the study area are Convolvolus and/or Euphorbia. Hand weeding is the common practice of weed control. Forth-five percent of farmers weeded twice, 31 percent once, 12 percent three times and 4 percent did continuous weeding. Plots with no, or a low incidence,of weeds gave higher yields than those with a moderate or high severity of weed incidence.

Pests and diseases are rarely encountered in the study area. Only two farmers of Abou Kurkas district reported the incidence of Aphids in their faba bean plots. They effectively controlled the pest by application of Malathion. Slight incidences of Bruchids were observed.

10. Harvesting is done manually, mostly in the first half of April, while threshing is performed mechanically about thirteen days from cutting.

11. Credit to buy seed, chemical fertilizer and Rhizobial inoculant is available from the Bank of Development and Credit through the cooperative societies in the villages. The input limits of 185 kg/ha of seed, 56 kg/ha of P_2O_5 and 28 kg/ha of N imposed by the Bank are too low and some farmers purchase further supplies in the market often at higher prices.

12. Grain yields ranged from 0.92 to 3.67 ton/ha and averaged 2.55 ton/ha. About 41 percent of the sample had lower yields than average. This indicates one potential for increasing total production, i.e., by closing the gap between existing yields on farmers fields. A second approach to increased production is that of overcoming the gap, identified by the on-farm trials scientists, between potential and actual yields on the farm. Potential farm yield is the yield obtained by adopting recommended technologies on farmers' fields, while the actual farm yield is that obtained using current practices. Straw yield averaged 3.4 ton/ha while some plots surpassed four ton/ha.

13. Marketing of faba beans is controlled by government, through fixed quotas; in 1980 the quota was 1.29 ton/ha. Quotas may be reduced in years of low production.

14. Average cost of production was 346 LE/ha. Operational costs constitute about 48 percent of total costs, the major operational cost being for irrigation. Faba bean production is profitable; average net revenue per hectare was LE 234.

INTRODUCTION

Faba beans are currently grown on about 110,000 hectares in Egypt and produce about 245,000 metric tons of beans. Thus yields are about 2.2 tons per hectare.[1/]

In 1979, domestic demand for faba beans was 7 percent higher than production for the country (Ibrahim, et al., 1980). It is not possible, under present conditions in Egyptian agriculture, to achieve considerable increases of production by means of "horizontal expansion", i.e., by increasing the cultivated area, due to limitations imposed by land requirements for other crops. Therefore, this excess demand will have to be met by higher yields from the existing area. To meet this demand, the Nile Valley Faba Bean Project is developing a research approach to study yield constraints in faba beans.

The Nile Valley Faba Bean Project has, as one of its most important focuses, experimentation on farmers' fields. One goal of such an effort is to understand the constraints faced by these farmers which prevent them from obtaining higher yields. A second goal is to develop techniques and methods that will overcome these constraints and significantly increase faba bean production and producers' incomes in these areas. Many of these constraints are technical in nature and the effort of the Nile Valley Project is devoted to a better understanding of these technical issues. In order to determine where improvements can be made, the project also recognizes that some of these constraints will be of a socio-economic nature. Increasing faba bean productivity will require simultaneous efforts by production scientists and social scientists, which aim at understanding and perhaps improving the socio-economic as well as technical environment in which production takes place.

1/ FAO Production Statistics: These figures are three year averages for 1976-1978. Note that Egyptian Government Statistics show yields to be slightly less at about 2.05 tons per hectare for the same three years.

This report discusses the socio-economic survey work underway in Egypt. This component of the Nile Valley Project was designed to complement and supplement the work of the production scientists. It aims at providing information that will be (a) useful to those making decisions on the allocation of research efforts regarding future on-farm research in Egypt and (b) helpful to technical scientists, social scientists and policy makers in their attempts to improve faba bean productivity throughout the country.

The study intends to (a) identify the yield gap between yields on farmers' fields,using traditional practices, and yields using recommended levels of inputs, (b) calculate the economic costs and returns of the recommended level of inputs compared to the farmers' levels and determine how much of the yield gap can be economically recovered, (c) describe the social, economic and institutional characteristics which may constrain farmers from using the most profitable levels of inputs. To accomplish this we must understand current practices, as well as the social, economic and institutional environments under which faba beans are produced.

The report is divided into five sections. Socio-economic characteristics of farmers, production practices, and yields are discussed. A comparison is made of farmers that had project trials with those that did not, in order to determine, among other things, if there were any substantial differences between the two groups which would affect any conclusions drawn from the trial results. The costs and returns of faba bean are discussed in Chapter 5. Finally, a discussion of the implications, lessons and recommendations for the project concludes the report.

1. SELECTION OF THE SAMPLE

In the first cropping year of the project in Egypt a set of trials were conducted in 26 farmers' fields in Minya governorate. These trials are discussed in detail in a report by Nasseib, et al. (1980). It was felt that a valuable addition would be to gather information from these trial farmers (TFs) as well as other non-trial farmers (NTFs) in the area in order to (1) have a basic set of data available on the production practices and the socio-economic circumstances of these farmers, (2) assess the representativeness of the trial farmers by comparing these farmers with their neighbours and (3) determine the relevant economic parameters of faba bean production and disposal so that an economic interpretation of the agronomic results can be made.

Therefore 51 farmers were visited in Minya province in May 1980 shortly after the faba bean harvest. The survey included nineteen farmers who had project trials on their farms and 32 farmers in the neighbourhood. A questionnaire was administered to all these farmers and information on production practices, costs of these practices and income received from faba bean production was collected, as well as general data about the farmer, his family and his farm. Each farmer was visited once and the interview lasted approximately one hour. (See Appendix I for a copy of the questionnaire.)

The trial sites were originally chosen by the technical team from the Food Legume Research Section of the Agricultural Research Center and the On-Farm Trial Testing Unit in Minya governorate. In order to get accurate yield estimates on farmers' fields, crop cuttings were made on fields adjacent to the trials at 19 of the 26 sites (these fields belonged to the trial farmers). Seven farmers had already harvested their own faba bean fields before the crop cutting team arrived. These farmers were not surveyed since there was no way to verify the yields on these fields. In addition, crop cuttings were

made on fields of 32 other farmers. These farmers were chosen randomly from lists available from the village cooperatives. Approximately two farmers were chosen from each of the 19 villages that had on-farm experiments. Therefore, the farmers interviewed by the survey team were already involved in the project in one way or another and the credit for this selection, always a problem in survey work, should go to the technical scientists involved in the project.

Since there is very little information available at the farm level on the production of faba beans in Egypt, some discussion of the characteristics of the sample farmers, their farms and the techniques used in faba bean production may be useful. It is important to note at the outset, however, that the sample was not chosen so as to be representative of Minya governorate or even the two districts surveyed, Samaloot and Abou Kurkas. The research funds that would be required to do a representative survey are considerably more than were available and the benefits of such a survey would not be as directly applicable to the project nor as useful to the production scientists involved. We caution the reader not to be too eager to over-generalise from the data presented in this section. Rather, it will only give some idea of the magnitude of the parameters involved until more data become available.

2. SOME GENERAL SOCIO-ECONOMIC CHARACTERISTICS OF THE SAMPLE FARMERS

2.1 Family structure, education and labour

The average age of the sample farmers was 47 years. Although there is no statistical difference in average age between TFs and NTFs, a frequency distribution indicates that there are more younger farmers in the NTF group. Sixty-four percent of these farmers are under 50 years of age compared with 44 percent of the TFS. (See Table 1.)

Table 1. Distribution of farmers by age categories (percentages).

Age Category	Abou Kurkas District		Samaloot District		Total sample		
	NTFs	TFs	NTFs	TFs	NTFs	TFs	Total
20-29	4.6	0	0	12.5	3.0	3.6	3.9
30-39	22.8	20	18.2	25.0	21.2	22.1	21.6
40-49	31.8	30	54.5	0.0	39.4	16.7	31.4
50-59	13.6	30	18.2	37.5	15.2	33.3	21.6
60-69	13.6	10	9.1	25.0	12.1	16.7	13.7
70-79	13.6	10	0.0	0.0	9.1	5.6	7.8
TOTAL	100.0	100	100.0	100.0	100.0	100.0	100.0

Table 2 gives details of family structure, education, and sources of income. Forty-seven percent of the farmers were literate. Literacy was higher among TFs than NTFs. This discrepancy was greatest in Samaloot district where 75 percent of the TFs,compared with only 18 percent of the NTFs,could read.

Table 2. Details of family structure, education and income.

	Abou Kurkas District		Samaloot District		Total sample		
	NTFs	TFs	NTFs	TFs	NTFs	TFs	Total
FAMILY STRUCTURE							
Farmer age	49	48	45	46	47	48	47
Family members	7	7	7	10	7	8	7
Family members currently resident on farm	5	5	6	9	5	6	6
Family members working on farm	3	3	2	2	3	3	3
EDUCATION							
% of farmers - literate	45	60	18	75	36	67	47
INCOME SOURCES							
% income from farm	91	81	87	72	91	77	85
% income from other agricultural sources	0	0	0	4	0	1	1
% income non-agricultural sources	9	19	13	24	9	21	14
Distribution of farmers according to agricultural income categories							
100% income from farm	4	30	73	37.5	67	34	55
80-90% income from farm	18	40	9	0	15	22	17.5
50-75% income from farm	18	30	9	37.5	15	33	21.5
less than 50% income from farm	0	0	9	25	3	11	6

Only one farmer in the sample was not married. Family size ranged from two to 20, with an average of seven. TFs, in general, have relatively larger families (78 percent of the TFs compared with only 48 percent of the NTFs have seven or more members). The average number currently residing on the farm was six persons but only 45 percent of the family membership was actively involved in work on the farm. Only two of the farmers in the sample hired permanent agricultural labour and these are relatively large land holders. The first was a TF from Samaloot district who has 15 hectares and hires three permanent labourers. The second was a NTF from Abou Kurkas district with six hectares employing two labourers. However, most of the sample farmers, particularly the larger ones, hire daily workers to carry out some of their agricultural operations. Seeding, fertilizer application, irrigation and crop cutting is frequently done by hired labour. Daily wages for these labours ranged from LE 0.50 to 1.50 depending on location, season, type of operation and labour supply. Average daily wages were about one pound for a man and half that for a young boy.

2.2 Family income

Farmers in the sample have a variety of income sources. On average, farm income contributed 85 percent of total family income. NTFs were more dependant on their farms for their livelihood than TFs; farm income contributed 91 percent and 77 percent, respectively, of total income. For more than half the farmers (55 percent) farm income was the sole source of family income. Again, the percentages is lower for TFs, as shown in Table 2. The highest proportion of farmers depending solely on their farms for income were NTFs in Samaloot district (73 percent).

2.3 Farm holding size

Farm size varies widely among the farmers in the study area, ranging from 0.1 to 14.7 hectares, with an average of 2.6 hectares. The average farm holding size of the sample is more than three times the average (0.72 hectares) for Minya province as a whole (Ministry of Agriculture, 1979). TFs, on average, are larger (4.4 hectares) than NTFs (1.8 hectares). The group with the largest holdings were TFs in Samaloot, with 5.1 hectares, while NTFs of Abou Kurkas were the smallest group with only 1.5 hectares. About 50 percent of the sample's total area was rented, 46 percent owned and four percent sharecropped. These proportions differed slightly but not significantly from one district to another and from one group to another (see Table 3).

Table 3. Farm tenure and distribution of farmers by farm size.

	Abou Kurkas		Samaloot		Total sample			Minya[1/] province
	NTF	TF	NTF	TF	NTF	TF	Total	
	% farmers							
Farm size (ha)								
< 0.43	22.7	10	27.3	0	24.2	5.6	17.6	46.2
0.43 - 1.26	36.4	30	27.3	25	33.3	27.8	31.5	37.8
1.27 - 2.1	18.2	10	18.2	0	18.2	5.5	13.7	7.9
2.2 - 4.2	18.2	20	18.2	12.5	18.2	16.5	17.6	6.1
> 4.2	4.5	30	9.0	62.5	6.1	44.5	19.6	2.0
TOTAL	100.0	100	100.0	100.0	100.0	100.0	100.0	100.0
	hectares							
Total farm size	1.5	3.8	2.1	5.1	1.8	4.4	2.6	0.72
- owned	0.7	2.1	0.7	2.1	0.7	2.1	1.2	
- rented	0.7	1.6	1.3	2.7	1.0	2.1	1.3	
- shared	0.1	0.1	0.1	0.3	0.1	0.2	0.1	

1/ Ministry of Agriculture (1979).

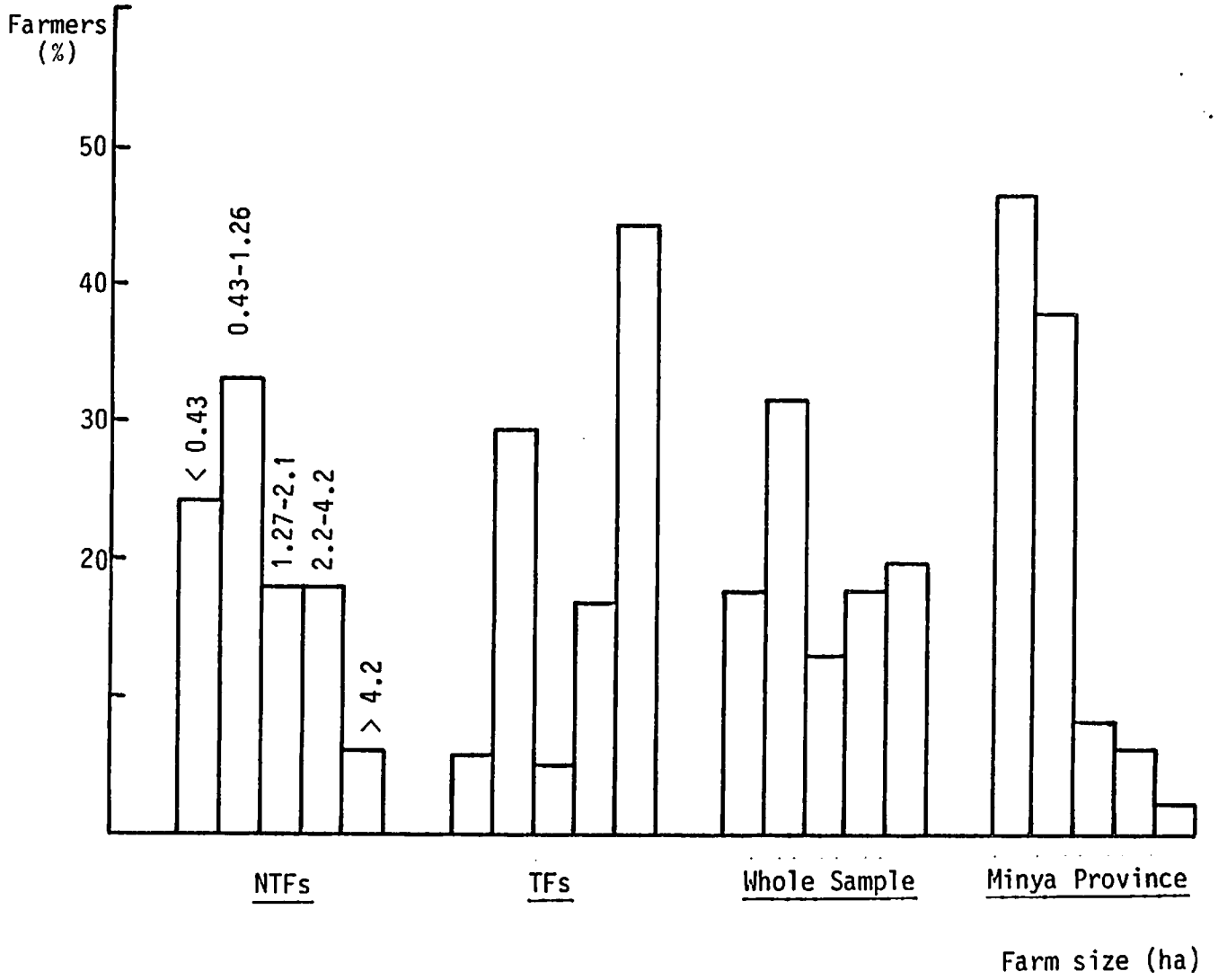
A frequency distribution of holding size shows that 44.5 percent of TFs, compared with 6 percent of NTFs, are larger than 4.2 hectares. Note that only two percent of all farms in Minya province are this large (Ministry of Agriculture, 1979). Similar differences are also found with respect to very small farms. Farmers with 0.4 hectares or less were represented by 5.6 percent and 24.2 percent of TFs and NTFs, respectively, and 17.6 percent of the total sample, compared with 46 percent of Minya province as a whole. This is illustrated in Figure 1. It is also worth noting that 92 percent and 90 percent of farmers in Minya province and Egypt, respectively, are smaller than the sample average.

Thus, in conclusion, it should be recognized that the TFs have farms that are significantly larger than those of randomly sampled farmers in the study, and this bias is even greater when TFs are compared with the average holding size for Minya province.

2.4 Farm animals and machinery

The majority of farmers in the sample possess very small numbers of livestock and draught animals. Average numbers per farm were 1.4 buffalo and/or cows, 1.8 sheep and/or goats and one donkey. There was no difference between TFs and NTFs with respect to number of dairy cattle and only a slight difference in draught animal numbers, but there was considerable difference in sheep and/or goat numbers. On average, TFs owned 4 sheep/goats while NTFs owned less than one. Nine farmers (18 percent) of the sample have no livestock, three (six percent) possess only one or two sheep/goats, 30 percent own one buffalo/cow, and 45 percent have two to four buffalo/cows. Farmers of Abou Kurkas district possess more livestock than Samaloot farmers. Four farmers in this district own 18 and 62 percent of the total buffalo/cows and sheep/goats respectively. Sixteen farmers (31 percent) of the farmers do not possess donkeys, eleven (21 percent) have two to three and the rest (45 percent) own one donkey.

Figure 1. Distribution of farmers by farm size: sample compared with Minya Province.[1/]



1/ Data provided by Ministry of Agriculture (1979).

Farmers in the sample own few pieces of agricultural machinery and implements such as tractors, irrigation pumps, threshers and plows, etc. The majority hire machinery services for their farm operations from either private owners or cooperatives, since they only own manual equipment for irrigation, land preparation and planting. A few farmers complained about the shortage of machinery services although most of them felt that the shortage of labour was more important.

Four farmers (eight percent) in the sample reported that they own tractors, and five (10 percent) own irrigation pumps. Due to the fact that TFs were larger than NTFs, they possess a larger proportion of machinery, i.e., 75 percent of tractors and 50 percent of the irrigation pumps. (Tractors owned by cooperatives are excluded from these calculations.)

2.5 Other general information

All villages in the sample have sources of clean drinking water either from municipalities (70 percent) or from pumps (30 percent). The former source is more common in Samaloot district. Ninety percent of the villages in the sample and 80 percent of farmers have electricity in their houses. Schools are available for all children; 88 percent of the farmers have a school in the village and 12 percent have one within 2-3 km. Small medical centers are also commonly available.

Cooperative societies that supply agricultural services are widely found in the study area. Farmers can hire machinery, obtain credit for seed and fertilizer purchases and can market some of their products through these societies. Most of the villages have a small market place in the village itself; a few have to travel 0.5-5.0 km to a market. Local markets are set-up one day each week, usually on Tuesday, Wednesday or Thursday. Transporting to the market place was by either foot, donkey or motorised vehicles, although vehicle transport is rare.

3. FARMING ENVIRONMENT AND PRODUCTION PRACTICES

3.1 Faba bean area

The faba bean area in the 1979/80 season varied widely within the study area, ranging from 0.1 and 6.3 hectares, with an average of 0.9 hectares, per holding, i.e., 35 percent of total farm area was sown to faba beans. TFs allocate a larger area of this crop than NTFs, 1.6 and 0.6 ha respectively. This is most likely due to the fact that TFs have larger holdings. Averages of faba bean areas for the different groups in the sample are presented in Table 4.

Table 4. Average farm size and faba bean area.

	Abou Kurkas		Samaloot		Total sample		
	NTFs	TFs	NTFs	TFs	NTFs	TFs	Total
1) Average area of faba beans (ha)	0.5	1.6	0.7	1.6	0.6	1.6	0.9
2) Average area of farm holding (ha)	1.5	3.8	2.1	5.1	1.8	4.4	2.6
% of farm holding under faba beans	33.3	42.1	33.3	31.4	33.3	36.4	34.6

The standard deviation for the total faba bean area is 1.221 and the coefficient of variance is 133 percent. This is a further indication of the wide dispersion in the areas allocated to faba beans.

Total production of faba beans ranged from 0.155 ton to 18.4 tons. Average production was 1.15 tons for NTFs, 4.36 tons for TFs and 2.28 tons for the total sample.

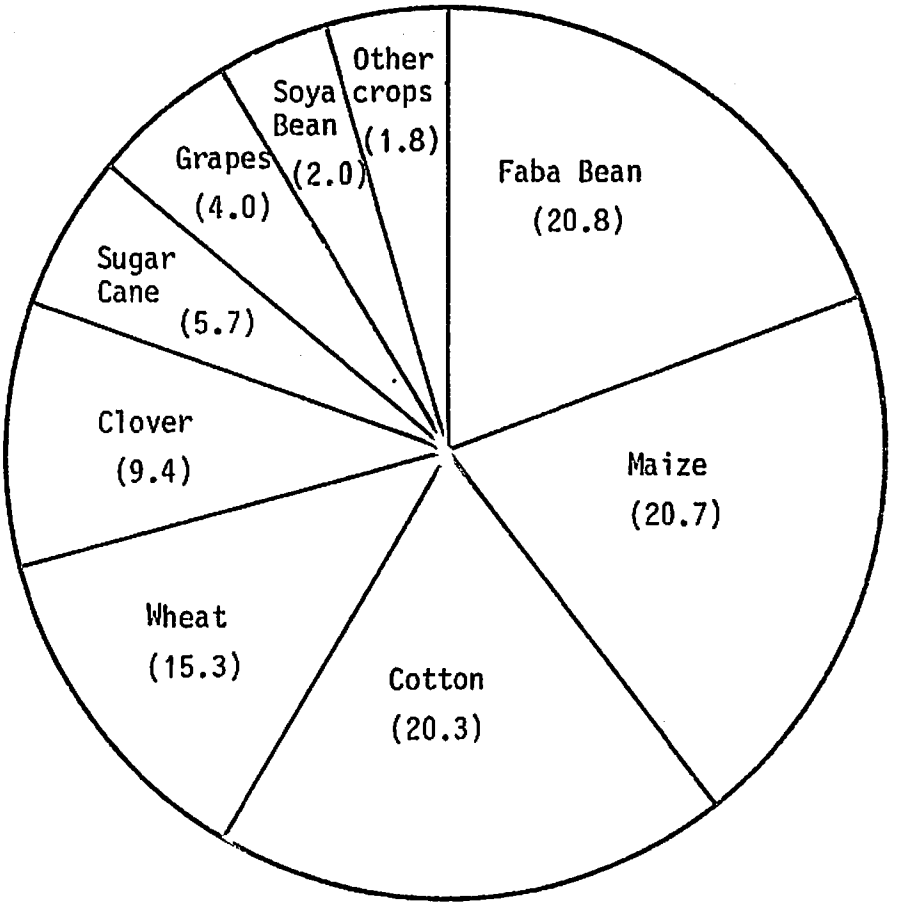
3.2 Cropping patterns and rotations

Major crops grown in the study area are: faba beans, wheat and clover as winter crops; maize, cotton and soya beans as summer crops; sugar cane and grapes as perennial crops. Although the total farm area of the sample was 133.4 hectares, the cropped area was 250.8 hectares, giving a cropping intensity of 188 percent. Faba beans are the major winter crop in the study area, the second being wheat and then clover; these crops covered 45.6 percent, 33.4 percent and 20.6 percent of the total winter cropped area, respectively. Faba beans, maize and cotton are equally important with respect to land allocation. Details of crop area allocation are presented in Table 5 and Figure 2.

Table 5. Crop allocation.

Crop	Area (ha)	% of total cropped area	% of total farm area
Faba beans	52.1	20.8	39.1
Wheat	38.3	15.3	28.7
Clover	23.5	9.4	17.6
Maize	52.0	20.7	39.0
Cotton	51.0	20.3	38.2
Sugar cane	14.4	5.7	10.8
Soya beans	5.0	2.0	3.7
Grapes	10.1	4.0	7.6
Other crops	4.4	1.8	3.3
TOTAL	250.8	100.0	188.0

Figure 2. Cropping allocation (% of total cropped area).



Predominant crop rotations in the study area are:

(1) Maize - Faba Beans - Cotton
(2) Maize - Faba Beans - Maize, and
(3) Cotton - Faba Beans - Soya beans

Crops such as wheat, clover, sunflower and others are also introduced into the rotations.

For the 1979/80 season, 63 percent of faba bean plots in the sample followed maize, 23 percent followed cotton, six percent followed soya beans and eight percent followed other summer crops. Subsequent crops to faba beans were maize (about 51 percent), cotton (27 percent), soya beans (14 percent), and other crops (eight percent).

Rotations according to the crops preceding and following faba beans are shown in Table 6. There are only minor differences among groups.

Table 6. Preceding and subsequent crop to faba beans. (percentages of plots)

	Abou Kurkas		Samaloot		Total sample		
	NTFs	TFs	NTFS	TFs	NTFs	TFs	Total
Preceding crop - maize	73	60	55	50	67	56	63
cotton	18	20	27	38	21	28	23
soya beans	0	0	18	12	6	5	6
others	9	20	0	0	6	11	8
Subsequent crop - maize	55	50	36	63	49	56	51
cotton	36	30	9	25	27	28	27
soya beans	0	0	55	12	18	5	14
others	9	20	0	0	6	11	8

3.3 Soil conditions and drainage problems

Soils in the study area were mostly heavy clay. Nine-two percent of the farmers reported soils of this type. The other eight percent (all NTFs) reported soils that had a lighter texture and lighter colour (yellowish). Eighteen percent of the sample farmers complained about drainage problems and salinity.

Table 7. Distribution of farmers by soil type and drainage problems (percentages).

	Abou Kurkas		Samaloot		Total sample		
	NTFs	TFs	NTFs	TFs	NTFs	TFs	Total
Soil type - heavy clay	95	100	78	100	88	100	92
light	5	0	27	0	12	0	8
Drainage problem - No	73	70	100	100	82	83	82
Yes	27	30	0	0	18	17	18

As one would expect drainage problems seriously affected productivity. Yields for 78 percent of farmers with a drainage problem were less than two ton/ha; 45 percent of these farmers produced less than 1.3 ton/ha. Since average yields in the sample were 2.55 ton/ha, drainage is certainly a production constraint for those areas affected (about 14 percent of the total sample area). Average yields of problem soils amounted to 63 percent of the total sample average yield.

3.4 Planting method

This study, as well as agronomic research findings, showed no significant relation between recommended land preparation (tillage, levelling and ridging) and yield although different practices do occur. Complementary research concludes, "it seemed that a complete tillage system contributed negatively or at least did not benefit the bean crop" (ICARDA/IFAD, 1980). Most of the farmers (69 percent) planted their faba beans on ridges after complete tillage and slightly more, 78 percent, of the trials farmers follow this practice. Sixteen percent of the farmers grow faba beans on the ridges of the preceding crop (normally maize or cotton), nine percent place the seeds in separate hills and six percent follow the plow dropping the seeds in the ground. Differences between farmers according to planting method are shown in Table 8.

Table 8. Distribution of farmers according to planting method (in percentages).

	Abou Kurkas		Samaloot		Total sample		
Planting method	NTFs	TFs	NTFs	TFs	NTFs	TFs	Total
With land preparation and ridging	59	70	73	88	64	78	69
On ridges of preceding crop	9	30	18	12	12	22	16
Placement in hills	18	0	9	0	15	0	9
Dropping behind the plow	14	0	0	0	9	0	6

About half the farmers plant faba beans on both sides of the ridge, 23 percent on both sides and the top of the ridge, six percent at one side of the ridge, and 18 percent use no ridges at all. However, no positive relation was found between planting technique and yields; average yields were 2.50, 2.37, 2.40 and 2.65 ton/ha for farmers planting faba beans on one side, two sides, two sides and top of the ridge, and without ridging, respectively.

Only six percent of the sample farmers broadcast their seeds; the rest place the seed in separate hills. Twenty-seven percent planted one seed per hill, 63 percent two seeds and only four percent planted three seeds per hill. Average distance between hills was 19 cm, with a range of seven to 50 cm.

Table 9. Distribution of farmers by plant placement on ridge and number of seeds per hill. (in percentages)

	Abou Kurkas		Samaloot		Total sample		
	NTFs	TFs	NTFs	TFs	NTFs	TFs	Total
Plant placement							
one side	5	0	18	0	9	0	6
both sides	36	70	73	50	49	61	53
both sides and top	36	30	0	12	24	22	23
no ridges	23	0	9	38	18	17	18
No. of seeds per hill							
one seed	50	20	9	0	36	11	27
two seeds	41	80	82	75	55	78	63
three seeds	0	0	0	25	0	11	4
broadcast	9	0	9	0	9	0	6
Average distance between hills (cm)	20	18	19	15	19	17	19

3.5 Planting Date

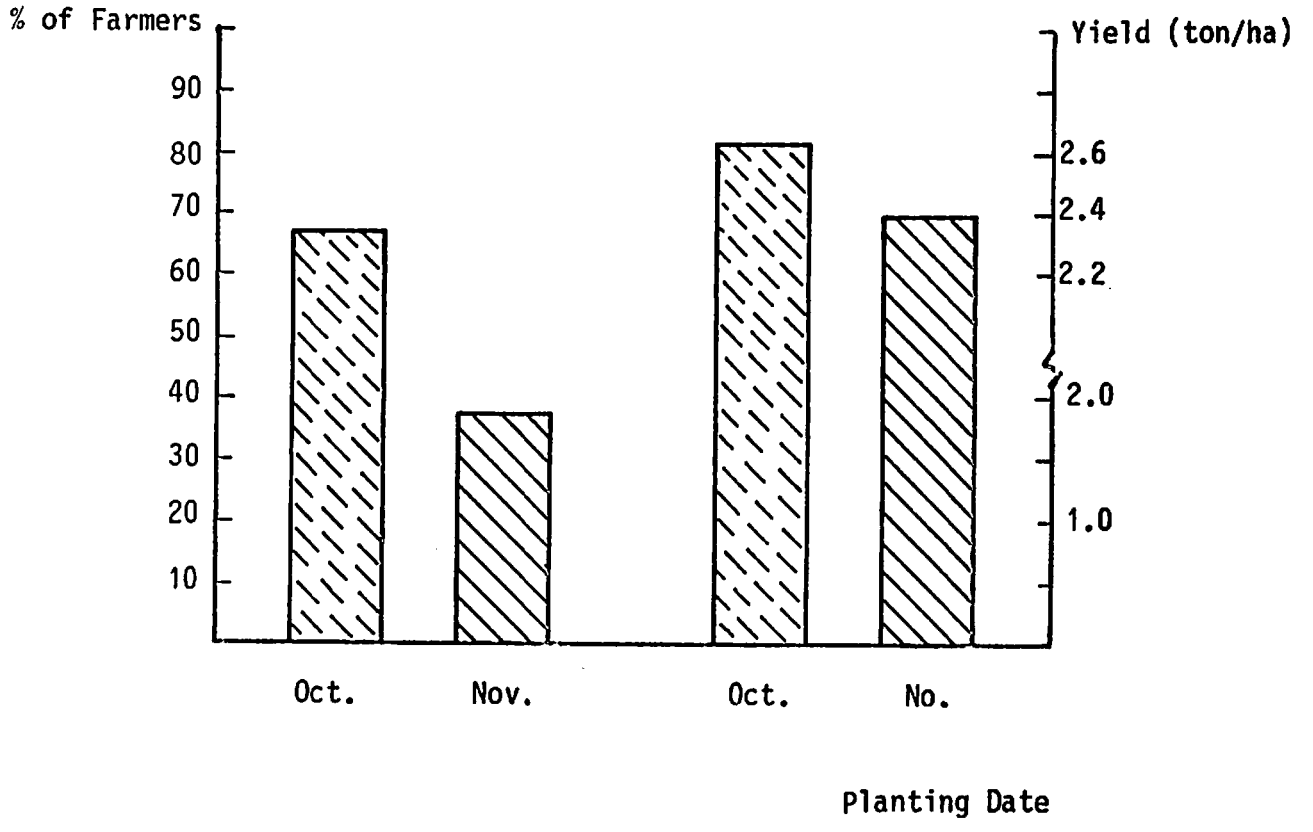
It has been observed that grain yield is increased by delaying sowing date of faba beans from October to mid-November. However, an association between late sowing and aphid attack was also observed (ICARDA/IFAD, 1980). Only eight percent of farmers sowed their faba beans in the second half of November, 29 percent in the first half of November and 63 percent in October. TFs, in general, appear to sow earlier than NTFs. Twenty-eight percent of the TFs sowed their faba beans in the first half of October and 44 percent in the second half of October, while only 15 percent of the NTFs sowed in the first half of October and 43 percent in the second half. Distribution of farmers by planting date is shown in Table 10.

Table 10. Planting date and yield.

% of farmers	Abou Kurkas		Samaloot		Total sample			Average Yield ton/ha
	NTFS	TFs	NTFs	TFs	NTFs	TFs	Total	
1st half of October	18	40	9	12	15	28	20	2.457
2nd half of October	23	30	82	63	43	44	43	2.604
1st half of November	50	10	9	25	36	17	29	2.390
2nd half of November	9	20	0	0	6	11	8	2.205
TOTAL	100	100	100	100	100	100	100	

An analysis of the relationship between planting date and yields shows that farmers planting during the second half of October received relatively higher yields than the earlier and later sowing dates. By grouping the sample farmers into two categories according to planting date, the first category including farmers planting faba beans during October and second including farmers planting during November, it was found that the earlier planting date produced a 0.213 ton/ha increase over the later planting.

Figure 3. Date of planting and yield



3.6 Seed source and seeding rate

About 51 percent of the sample farmers purchased their seed from the cooperative societies, 27 percent used their own stocks and 22 percent purchased seed from the market. Seeds of the cooperative societies are treated and thus control Bruchid infestation. "Samples of seeds from farmers of Minya province showed Bruchid infestation at a rate of 13.2 percent while samples from warehouses of the Development and Credit Bank showed an infestation rate of 9.9 percent" (ICARDA/IFAD, 1980). In addition, farmers can obtain credit for seed purchases from cooperative societies and repay these loans after crop harvesting. This is, of course, another advantage for farmers, particularly those with limited financial resources. Although TFs are likely to have greater financial resources than NTFs, a larger percentage of TFs purchased their seeds with credit from cooperative societies (see Table 11).

Most of the sample farmers plant faba beans in relatively low populations; average seeding rate for the sample as a whole was about 175 kg/ha. Thirty-five percent of the sample farmers used less than 155 kg/ha, 59 percent used between 175 and 200 kg/ha and only six percent used a seed rate higher than 200 kg/ha. Table 22 shows very small differences between the different groups of farmers with respect to seeding rate.

Table 11. Distribution of farmers by seed source, seed rate and Rhizobia inoculation. (in percentages)

	Abou Kurkas		Samaloot		Total sample		
	NTFs	TFs	NTFs	TFs	NTFs	TFs	Total
Seed source							
from cooperative	36	60	55	76	42	66	51
from market	28	20	18	12	24	17	22
farmer's own stock	36	20	27	12	24	17	27
Seed rate (kg/ha)							
124-155	32	40	36	18	33	39	35
175-200	64	60	55	50	61	56	59
more than 200	4	0	9	12	6	5	6
Rhizobia inoculation							
No	100	100	73	87	91	94	92
Yes	0	0	27	13	9	6	8

From field measurements conducted by the project team of the Nile Valley Project, it was found that the plant populations(17.2 plant/m²) on farmers' fields were half of the recommended plant population (35 plant/m²). It is noteworthy that one of the agronomic conclusions is that "high plant densities (42 and 50 plant/m²) had no advantage over the medium density 33/m², and may be spacing and distribution of seeds is more important than the quantity" (Ibrahim et al., 1980).

No positive association was found between seed rate and yield in the sample. The highest yields (on average, 2.87 ton/ha) were obtained by farmers using 155 kg/ha. The lowest yields (average, 2.28 ton/ha) were obtained by farmers using the highest seeding rates of 185-250 kg/ha. However, correlation analysis indicates that only one significant negative relation exists, i.e., for NTFs of Abou Kurkas district (r= -0.556) Other coefficients were 0.142 for NTFs of Samaloot, -0.0008 for TFs of Abou Kurkas and -0.216 for TFs of Samaloot.

Table 12. Average yields of faba beans according to seeding rate.

Seed rate (kg/ha)	No. of farmers		Average yield (ton/ha)
	No.	%	
124	10	19.6	2.45
155	8	15.7	2.87
185	28	54.9	2.28
185-247	5	9.8	2.28
TOTAL	51	100.0	2.55

This calls into question the reason why low plant population was considered a major yield constraint and therefore included in the on-farm trials. The on-farm trials were planted at 41.7 plant/m^2 despite the fact that experiment station research work showed that this rate had no yield increasing effect over a rate of 33 plant/m^2. Optimum plant population (or seed rate), however, needs to be re-tested and re-established and is still to be considered one of the major research areas of the on-farm trials. If optimal seeding rate does still need further research it must be decided whether the on-farm trials are the proper place for such work.

Rhizobia inoculation was not commonly practised by the sample farmers. Just eight percent inoculated their faba bean seeds and all of these applications were in Samaloot district. Rhizobia inoculation apparently contributed positively to seed yield at several sites of the on-farm trials (Ibrahim et al., 1980). If it is shown in the future trials that this is the case the Bank of Development and Credit may be encouraged to inoculate the seed they distribute. The relationship between inoculated seed and nitrogen fertilizer requirements also requires further study.

3.7 Fertilizer use

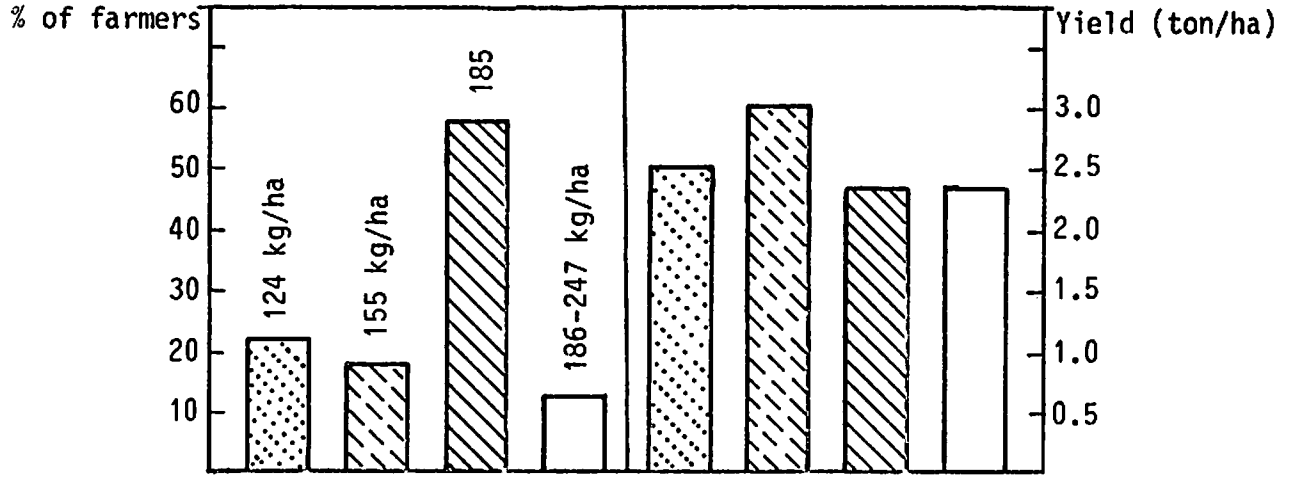
Manure

The application of chemical fertilizer (phosphorus and nitrogen) rather than manure was more common in the study area. Only 22 percent of farmers applied manure, applications ranging from 240 to 720 m^3/ha. These farmers were all NTFs. Nine of the eleven farmers applying manure spread it before planting (during land preparation operations), while the remaining two incorporated it into plant hills early in the growing season. Statistical parameters revealed larger differences among farmers according to manure application (sd=170 and cv=210%). However, the average rate of manure for the eleven farmers who applied it was 375 m^3/ha. No significant association was found between manure application and yield (correlation coefficient=-0.08) Average yields of 1.95 ton/ha on these plots was even lower than the sample average of 2.5 ton/ha.

Table 13. Distribution of farmers by manure application. (percentages)

	Abou Kurkas		Samaloot		Total sample		
	NTFs	TFs	NTFs	TFs	NTFs	TFs	Total
Application - Yes	32	0	37	0	33	0	22
No	68	100	63	100	67	100	78
Time of application - spread before planting	71	-	100	-	82	-	82
- incorporated in soil after planting	29	-	0	-	18	-	18

Figure 4. Distribution of farmers by seed rates and corresponding yields



Phosphorus fertilizer

Ninety-four percent of the farmers in the study area applied phosphorus fertilizer. However, there was a wide variation in the rate of application, as is shown in Table 14. Single super phosphate (15.5 percent of P_2O_5) was applied at an average rate of 446 kg/ha, i.e., 69.4 kg/ha of P_2O_5. This is only slightly lower than recommended: "it is recommendable to incorporate phosphorus fertilizer at a rate of 71.4 kg/ha of P_2O_5 (460 kg/ha of single super phosphate) in the soil before planting" (Nasseib et al., 1980).

Table 14. Rates of phosphorus fertilizer application (kg/ha of single super phosphate).

	Abou Kurkas		Samaloot		Total sample		
	NTFs	TFs	NTFs	TFs	NTFs	TFs	Total
Mean (kg/ha)	400	546	500	371	434	476	446
Standard deviation (kg/ha)	192	230	190	278	194	261	218
Coefficient of variation %	48	42.2	38.1	75	44.8	55.7	49

TFs applied phosphorus fertilizer at relatively higher rates (73.9 kg/ha of P_2O_5) than recommended, while NTFs applied slightly less (67 kg/ha). Table 15 gives frequency distribution of the farmers in the sample according to use of phosphorus fertilizer. About half the sample farmers used less P_2O_5 than is recommended, 21 percent applied the recommended dose and 30 percent applied more than recommended.

Table 15. Distribution of phosphorus fertilizer use (% of farmers).

	Abou Kurkas		Samaloot		Total sample		
	NTFs	TFs	NTFs	TFs	NTFs	TFs	Total
Application - Yes	95	100	100	75	97	89	94
No	5	0	0	25	3	11	6
Distribution of farmers by phosphorus fertilizer rates							
Super phosphate P_2O_5							
0 kg/ha 0.0	4	0	0	25	3	11	6
250 kg/ha 38.8	23	20	9	12.5	18	17	18
360 kg/ha 55.8	33	10	37	12.5	33	11	25
475 kg/ha 73.6	28	20	18	12.5	25	17	21
600 kg/ha 93.0	4	10	9	12.5	6	11	8
715 kg/ha 110.8	4	30	18	25.0	9	28	16
More than 715 kg/ha >110.8	4	10	9	0	6	5	6

It is concluded elsewhere that "increasing the rate of fertilization over the recommended rate did not lead to any increase in crop yield" (Hanissa, 1980). The results of this survey show that yields on plots having recommended rates of P_2O_5 were higher than yields on plots with lower rates of P_2O_5. Furthermore, plots fertilized with rates of P_2O_5 greater than recommended did not show higher yields (see Table 16). This supports Hanissa's findings.

Table 16. Phosphorus fertilizer levels and yields.

Fertilizer level	Farmers No.	Farmers %	Average yield ton/ha
Less than recommended	25	49.0	2.210
Equal to recommended	11	21.6	2.590
More than recommended	15	29.4	2.590

Correlation analysis showed a significant positive association between phosphorus fertilization and yield for NTFs of Abou Kurkas and TFs of Samaloot district (coefficients were 0.50 and 0.48 respectively), but not for NTFs in Samaloot and TFs in Abou Kurkas (coefficients were 0.20 and -0.10 respectively).

Ninety percent of farmers broadcast their phosphorus fertilizer, the remaining farmers incorporated it into the soil. Fifty nine percent applied phosphorus before planting, seven percent at planting and 34 percent after planting.

Nitrogen fertilizer

Nitrogen fertilizer plays a lesser role in increasing production than phosphorus fertilizer. Twenty-seven percent of farmers did not apply any nitrogen. The highest number of non-users were found among NTFs of Samaloot district (82 percent); the lowest ratio was that of NTFs of Abou Kurkas district (five percent). Most of farmers (60 percent) broadcast nitrogen while 40 percent incorporated it into the soil around the plant hills. Sixty-two percent applied their nitrogen all at once, either before or just after the closure of the canal. The remaining 38 percent added nitrogen in two dressings,once 4-6 weeks after sowing and a second during the month of February.

Table 17. Distribution of nitrogenous fertilizer use (% of farmers).

	Abou Kurkas		Samaloot		Total sample		
	NTFs	TFs	NTFs	TFs	NTFs	TFs	Total
Application - Yes	95	80	18	75	70	78	73
No	5	20	82	25	30	22	27
Method of application							
- broadcast	45	50	100	100	55	71	60
- incorporated into the soil	55	50	0	0	45	29	40
No. of applications							
one	33	100	100	100	39	100	62
two	67	0	0	0	61	0	38

Urea (46.5 percent N) was the most common form of nitrogen fertilizer used; Nitrokina (33 percent N) and Ammonium Nitrate (31 percent N) were also used. Quantities of nitrogen applied varied widely among farmers from 28 to 167 kg/ha. Only 5.4 percent of those applying nitrogen used the recommended level. A similar proportion used less and the rest, 89 percent, added more fertilizer than recommended. Average rates were 79 kg/ha of N, over twice the recommended rate. The recommendation is "to dress nitrogenous fertilizer at the rate of 35.7 kg/ha of N, i.e., 77 kg/ha of Urea, under plant hills before the first watering (about 30 days after planting date)" (Nasseib et al., 1980).

Figure 5. Rates of P_2O_5 application

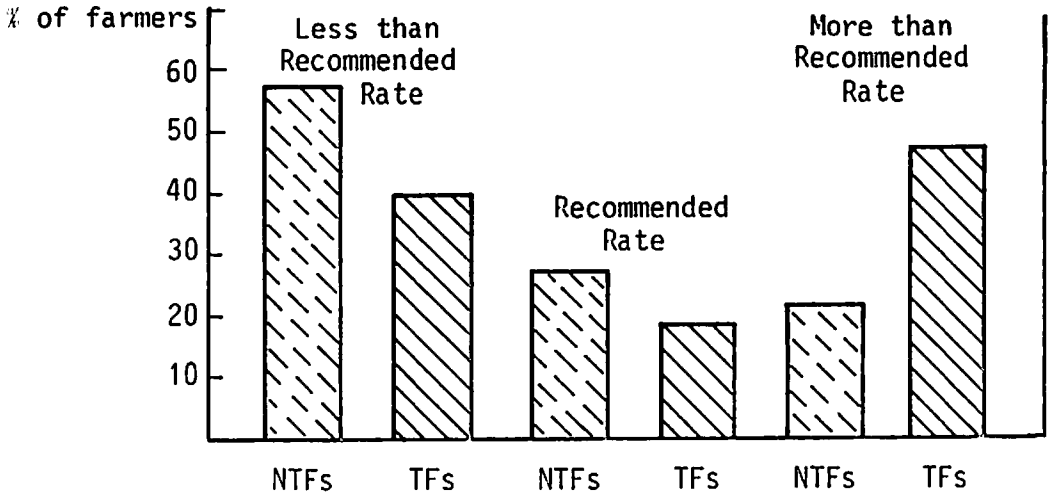
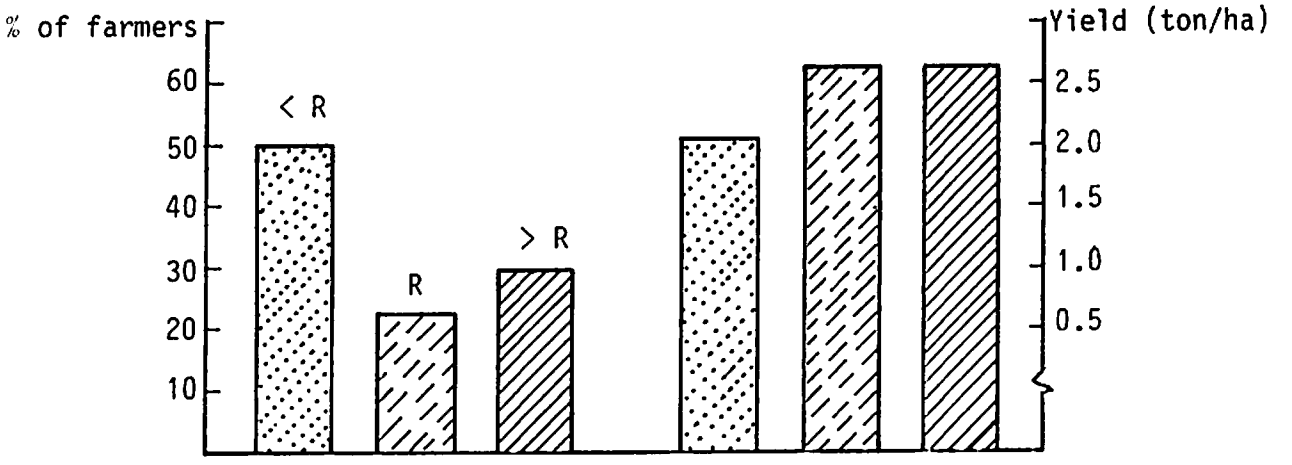


Figure 6. Levels of P_2O_5 and yields



R: Recommended rate
> R: More than recommended rate
< R: Less than recommended rate

Table 18. Rates of nitrogenous fertilizer application.

Statistical parameters	Abou Kurkas		Samaloot		Total sample		
	NTFs	TFs	NTFs	TFs	NTFs	TFs	Total
Mean kg/ha of Urea	173	104	19.5	158	122	127	124
Standard deviation kg/ha	99	69	44	132	111	102	107
CV %	57	66	225	83	109	80	87

It is evident from Table 18 that, despite the big differences in nitrogenous fertilizer use between NTFs and TFs at the district level, these differences are negligible when the districts are combined. The distribution by nitrogenous fertilizer use (Table 19), however, projects a better picture of these differences. Only four percent of the sample farmers applied the recommended rate while 65 percent used more, with about 30 percent applying at a rate 2.5 to 4 times the recommended level.

Table 19. Nitrogen fertilizer use (percentages).

Applied rate of Urea (kg/ha)	Abou Kurkas		Samaloot		Total sample		
	NTFs	TFs	NTFs	TFs	NTFs	TFs	Total
0	5	20	82	25	31	22	27
Less than 80	5	0	0	13	3	6	4
80 (recommended)	5	10	0	0	3	6	4
80-120	45	60	9	13	33	38	35
180	5	0	9	0	6	0	4
240	22	10	0	37	15	22	18
360	13	0	0	12	9	6	8
TOTAL	100	100	100	100	100	100	100

Simple analysis shows that yields increased with the rate of N fertilizer up to the recommended level. Applications over this level did not lead to any further increase in yield. In fact farmers who used very high levels of N obtained lower yields as shown in Table 20.

Table 20. Nitrogen fertilizer levels and yields.

N fertilizer level	Farmers		Average yield ton/ha
	No.	%	
0	14	27	2.21
Less than recommended	2	4	2.58
Recommended	2	4	3.32
More than recommended	33	65	2.43
TOTAL	51	100	2.55

Correlation analysis revealed a significant positive association ($r=0.86$) between N fertilization and yield in the case of Samaloot's TFs only. This association was actually negative for Abou Kurkas NTFs ($r=-0.43$).

Fertilizer distribution in Egypt is the monopoly of the Development and Credit Bank, and faba bean production is allocated 56 kg/ha of P_2O_5 and 28 kg/ha of N. Due to the fact that many farmers apply higher rates of fertilizer, an active parallel market exists in Minya province. Price levels of this market were 73 percent and 43 percent above the Bank rate for P_2O_5 and N respectively.

3.8 Irrigation

Irrigation is generally considered as one of the most important factors affecting crop productivity. Timing, quantity of water applied, and the number of irrigations required by the crop, are crucial questions affecting crop performance. The majority of sample farmers (55 percent) gave their plots of faba beans four waterings, 39 percent gave five waterings and the other six percent gave six. Farmers of Abou Kurkas district tend to give more waterings than Samaloot farmers. In Abou Kurkas two to three irrigations before the canal closure and two to four irrigations after the closure are common, whereas in Samaloot one to two and two to three irrigations before and after the closure of the canal is the rule.

On most of the farms faba beans were subjected to water stress during the early stages of growth. Average number of days between two waterings, before the canal closure, was 40 days (range=20-50 days). "Reducing this water stress seemed to contribute largely to total seed and straw yield gaps. Data obtained from experiments clearly show that moisture stress greatly affects the yield of faba beans. As moisture stress increased, grain yield decreased and this decrease was found to be sharp when irrigation water was applied at 80 percent depletion" (Tawdross, 1980). After the closure, farmers' irrigation intervals coincided with research recommendations, i.e., every 26 days (range=15-40 days). "Research recommends one watering every 25 days" (Nasseib, et al., 1980). In general, faba bean yields responded to the number of irrigations through the pod development stage (February and March). Mean values of treatments having three irrigations during this period yield 0.22 ton/ha more than those having only two irrigations during the same period (Tawdross, 1980).

Figure 7. Level of nitrogenous fertilizer application for TFs and NTFs

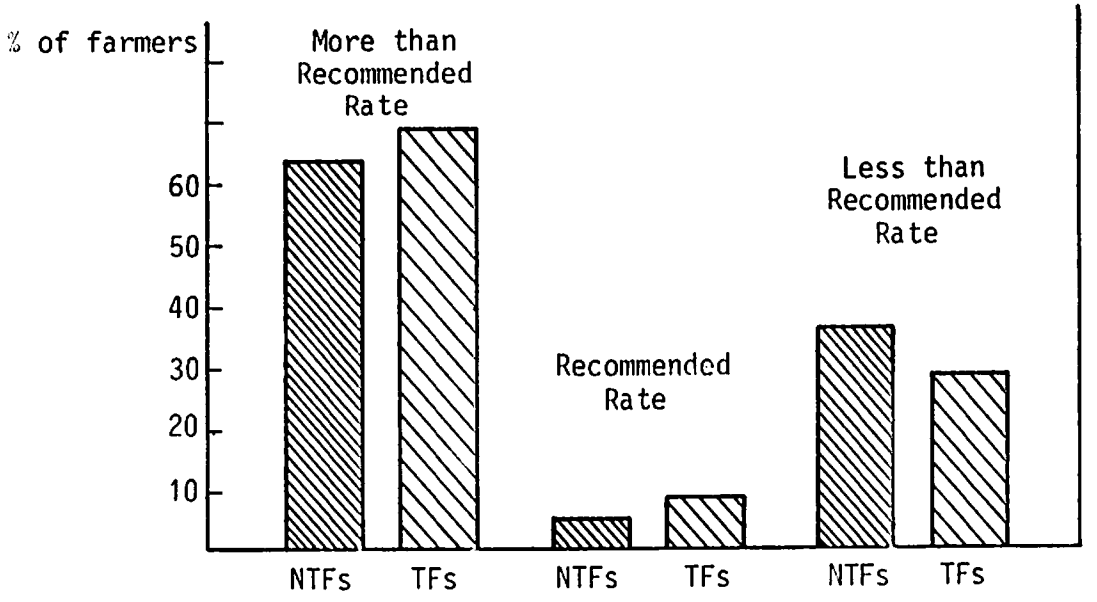
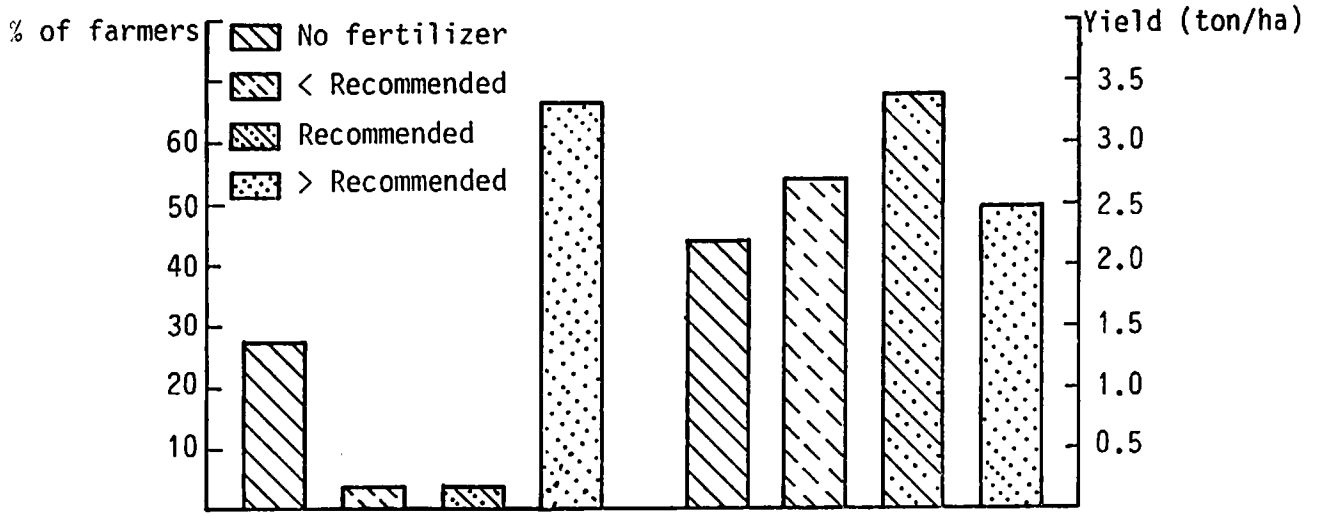


Figure 8. Rates of nitrogen and corresponding yields



About 41 percent of the sample farmers complained of a water shortage. This problem was more common in Abou Kurkas district. Most farmers (88 percent) used mechanical facilities (water pumps) to irrigate their crops. More detailed information on irrigation of faba beans is presented in Table 21.

Table 21. Irrigation of faba beans: number of irrigations, irrigation intervals and method of irrigation.

	Abou Kurkas		Samaloot		Total sample		
	NTFs	TFs	NTFs	TFs	NTFs	TFs	Total
No. of irrigations (% of farmers)							
4	59	30	73	50	64	39	55
5	32	60	27	50	30	55	39
6	9	10	0	0	6	6	6
No. of irrigations							
Before canal closure	2-3	2-3	1-2	1-2	1-3	1-3	1-3
After canal closure	2-4	2-4	2-3	3	2-4	2-4	2-4
TOTAL	4-6	4-6	4-3	3-5	4-6	4-6	4-6
Average No. of days between two waterings							
Before canal closure	43	40	35	40	40	40	40
After canal closure	25	24	31	25	27	25	26
Water shortage (% of farmers)							
No	55	40	73	75	61	56	59
Yes	45	60	27	25	39	44	41
Irrigation Method (% of farmers)							
Mechanical	91	90	73	100	85	94	88
Manual	9	10	27	0	15	6	12

Farmers who give six irrigations obtained a higher yield (average: 2.87 ton/ha, i.e., 0.3 ton/ha increase over the total sample average) over other farmers. Four irrigations after the canal closure also achieved higher yields than those who gave three or two waterings (yield averages were 2.87, 2.45 and 2.34 kg/ha respectively). Correlation analysis, however, did not reveal any significant relationship between the number of irrigations and yield.

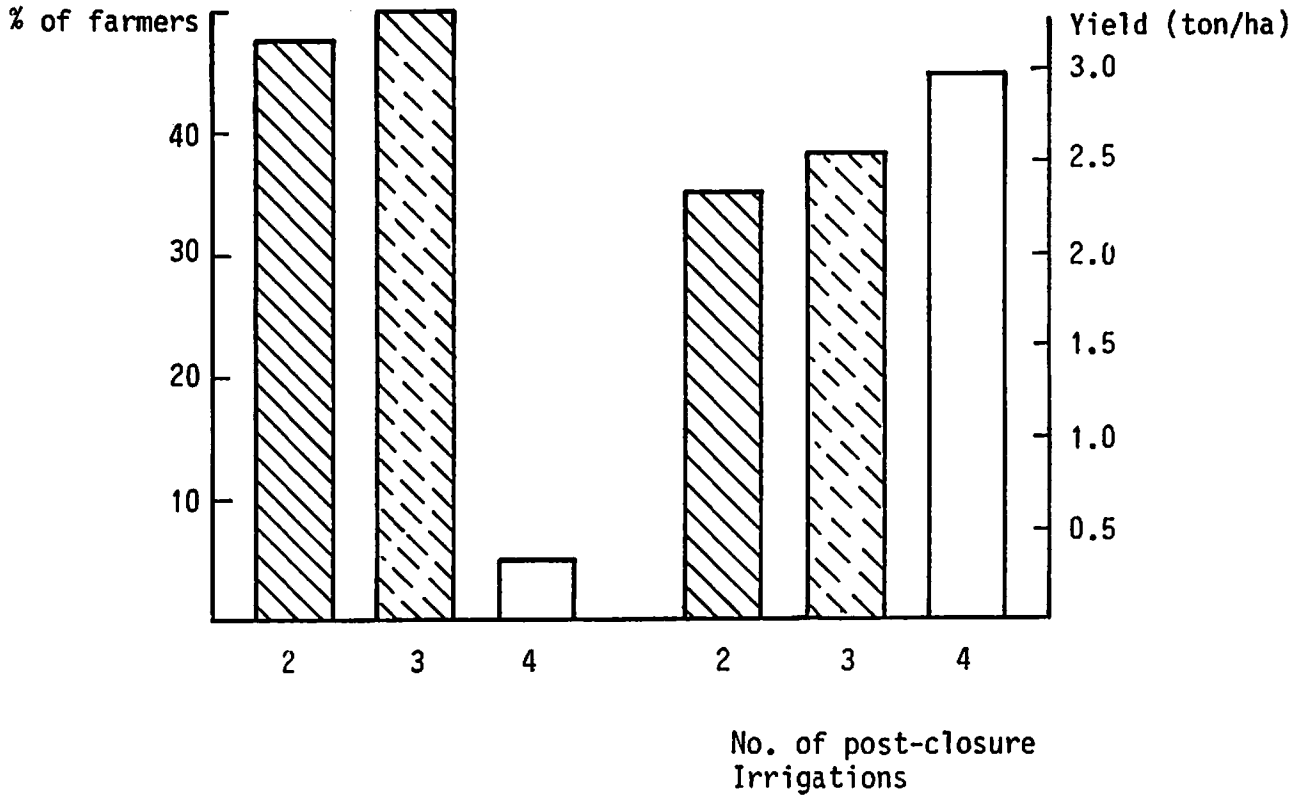
3.9 Weed incidence and control

"The loss of grain yield of faba beans due to weed competition was estimated at about 34 percent" (ICARDA/IFAD, 1980). Identifying flora and incidence of weeds and effective methods of control is important in order to improve productivity. Fifty-five percent of the sample farmers reported a high or moderately severe weed incidence in their field of faba beans, 41 percent reported a low level of weed incidence and only four percent claimed to have a clean field.

"Orobanche parasitism menacingly endangers the production of faba beans. In Egypt, many areas that were devoted to such important leguminous crops have been deserted because of Orobanche parasitism" (Lahran, et al., 1980). Although Orobanche has the most devastating effect, it is second in terms of occurance of infestation in the study area. The first was Convolvolus with 41 percent of the farmers reporting its incidence compared to 27 percent for Orobanche, and 14 percent for Euphorbia.

Handweeding, mostly by hoe, was the common practice of weed control. None of the farmers used any herbicides as they were either unknown of or unavailable. Manual weeding is becoming a problem due to the relatively scarce supply of labour. Forty-five percent of the sample farmers weeded their fields of faba bean plots twice, 31 percent once, 12 percent three times and a few, four percent, did four weedings. NTFs, in general, practise more heavier weeding than TFs. (See Table 22.)

Figure 9. Number of post closure irrigations and yields



Research work on weed control, particularly Orobanche, is looking at chemical application and the breeding of tolerant varieties. The main findings of this research are as follows:

(1) Application of Lancer (glyphosate) as post-emergence foliar spray gave a pronounced effect at a rate of 0.238 litre/ha per spray, beginning at flowering. Such a treatment accounted for a significant reduction of Orobanche and an increase in yield.

(2) The use of Kerb (pronamide), once, 4 weeks after sowing as a foliar spray at the rate of 9.52 kg/ha with ample spray volume (2500 litre/ha) also gave significant results.

Table 22. Distribution of farmers by weed infestation severity, weed flora and number of weedings (percentages).

	Abou Kurkas		Samaloot		Whole sample		
	NTFs	TFs	NTFs	TFs	NTFs	TFs	Total
1. Weed infestation severity							
high	41	50	9	0	30	28	29
moderate	23	10	36	38	27	22	26
low	36	40	46	50	40	44	41
none	0	0	9	12	3	6	4
2. Weed flora							
Orobanche	18	50	37	13	24	33	27
Convolvolus	64	30	18	25	49	28	41
Euphorbia	9	0	9	50	9	22	14
Others	9	20	27	0	15	11	14
No weeds	0	0	9	12	3	6	4
3. No. of weedings							
0	0	0	18	25	6	11	8
1	18	40	36	50	24	45	31
2	55	40	46	25	52	33	45
3	18	20	0	0	12	11	12
4	9	0	0	0	6	0	4
Average No. of weedings	2	2	1	1	2	1	1-2

(3) Faba bean c.v. family 402 was in some cases found to have a potential tolerance to Orobanche parasitism as compared with Giza 2 and Giza 4 cvs.

(4) Amex, Cobex and Treflan herbicide appeared to give effective weed control (Zahran et al., 1980).

As expected, the analysis of yield in relation to weed infestation severity in the study area revealed a negative association. Farmers having the highest yields were those who had the lowest severity of weed incidence, as demonstrated in Figure 10 and Table 23.

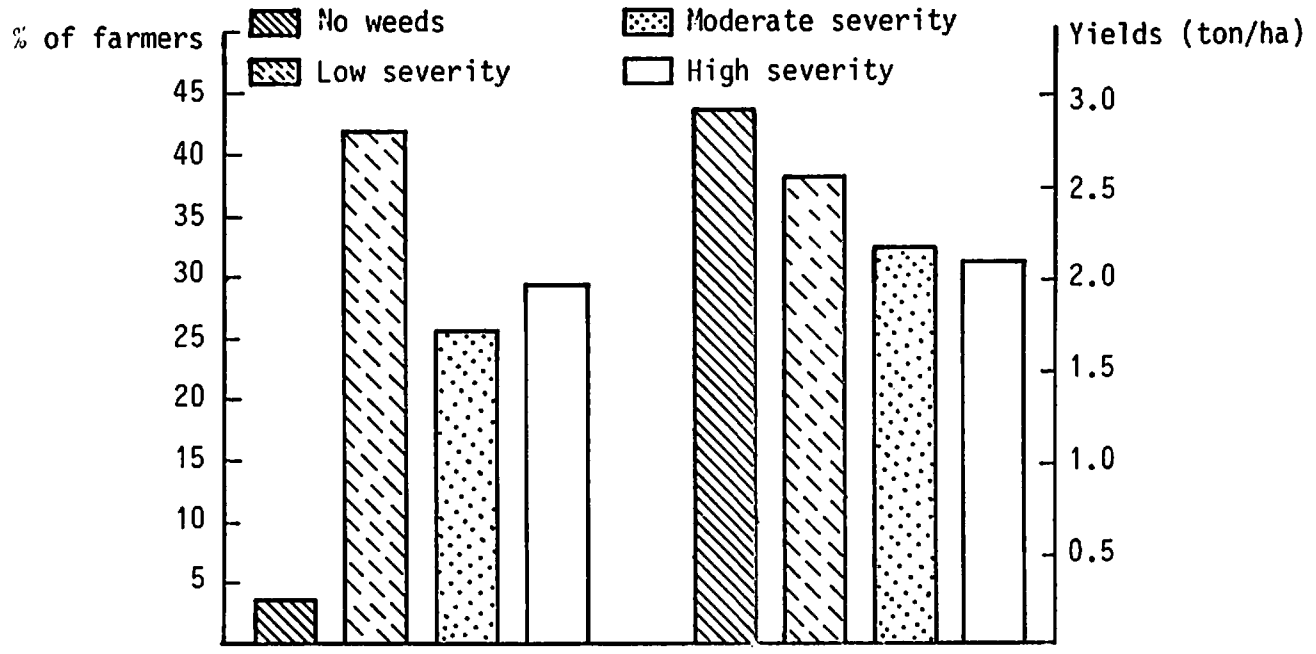
Table 23. Relationship between weed incidence severity and yield of faba beans.

Level of weed infestation severity	Farmers		Yield (ton/ha)
	No.	%	
None	2	4	2.850
Low	21	41	2.415
Moderate	13	26	2.150
High	15	29	2.060

3.10 Pests and pest control

The major pests of faba beans are Aphis craccivora DKOCH, and Liriomyza congesta (Becker) (ICARDA/IFAD, 1980). However, these and other pests rarely exist in the study area. None of the Samaloot district farmers, and only two farmers of Abou Kurkas district, reported the incidence of aphids in their fields and applied Malathion to control the pest; the treatment was reported to be effective. Tamaron (phosphorus insecticide) E.C. 600 at the rate of two per thousand was found to be effective in controlling aphids (ICARDA/IFAD, 1980).

Figure 10. Relationship between weed infestation severity and yield



Samples of faba bean seed from farmers stocks in Minya province showed 13.2 percent to be damaged by Bruchids (ICARDA/IFAD, 1980).

3.11 Harvest

The majority of farmers (80 percent) harvested their faba beans during the first half of April, 18 percent during the second half of April and two percent during the first half of May. TFs generally harvested a little earlier than NTFs and farmers of Samaloot district harvested their beans earlier than those in Abou Kurkas district.

All the sample farmers threshed faba beans by machine on average about thirteen days after cutting. Farmers in Abou Kurkas district threshed slightly later (15 days after harvest) than those in Samaloot district (10 days after harvest). The amount of seed lost during harvest is very low (25-50 kg/ha) as a result of the careful handling in these operations.

3.12 Finance and credit

The Bank of Development and Credit offer, through cooperative societies, credit to buy seed, chemical fertilizer and Rhizobial inoculent. The majority of the sample farmers expressed their dissatisfaction with the quantities of inputs available from the Bank. Supplies are limited to 185 kg/ha of seed, 360 kg/ha of phosphorus fertilizer (55.8 kg/ha P_2O_5) and 60 kg/ha of Urea (27.9 kg/ha N). The farmers would prefer not to have these limits; they also stressed the need to have the inputs available at the right time as this is often not the case. Farmers must also ensure that they sell sufficient quantities of their bean crop to cover their debts and credit repayments. As a result, a parallel market for these inputs is active due to the disequilibrium in supply and demand which exists in some areas. The differences in market and government prices as reported by sample farmers are shown in Table 24. These price differences should be borne in mind as the study proceeds. In particular, they make economic analyses, such as partial budgeting, difficult.

Table 24. Differences in government and market prices.

Item	Market price	Government price
P_2O_5	0.33	0.19
N	0.215	0.15
Seed	0.210	0.161

For inputs not provided by the Bank, and for some farm operations, farmers have to pay cash; an exception is those operations done by the cooperative society.

3.13 Marketing

Faba beans is one of the crops partially controlled by the government through the cooperative societies in the villages. Farmers have to deliver fixed or pre-determined amounts of grain per hectare at a price often lower than that predominating in the market. The amount for 1979/80 season was 3.5 Irdeb /feddan (1.29 ton/ha), or about 50 percent of their production, at a price of 161.3 LE/ton. On the other hand, the market price was around LE 210 per ton or 30 percent more than the fixed price. Some farmers sold their beans at even higher prices of up to 226 LE/ton. The quota of faba beans ordered by the government is reduced if there is a production failure. In such a situation, estimations are made by an ad-hoc committee of government officials.

There are, of course, ways to avoid the system which some farmers achieve more successfully than others. The trial farmers, for example, sold more than three-quarters of their production in the market while the non-trial farmers were required to sell more than 56 percent of their output to the cooperative societies at the formal price. There were strong complaints by farmers regarding this system.

A small proportion of faba bean output is retained by the farmers, either for food or feed purposes. This percentage was about 11 percent and five percent of total output for NTFs and TFs, respectively.

4. YIELD

4.1 Grain

Yields on farmers' fields[1/] varied widely across the sample, ranging from 0.92 to 3.67 ton/ha with an average of 2.55 ton/ha. TFs attained higher yields (2.77 ton/ha) than NTFs (2.24 ton/ha). Although one cannot definitely explain from the data available these differences in productivity, possible factors include different (1) resources, (2) inputs, (3) levels of management and (4) economies of scale in faba bean production. Table 25 summarizes the yields obtained by farmers from 1977/78 to 1977/80. and show that they were more or less constant over the three years.

Table 25. Average yields of faba beans 1977/78 - 1979/80 (per hectare).

	Abou Kurkas		Samaloot		Total sample		
Year	NTFs	TFs	NTFs	TFs	NTFs	TFs	Total
1977/78	2.34	2.55	2.55	2.93	2.45	2.77	2.55
1978/79	2.34	2.55	2.66	2.93	2.45	2.77	2.55
1979/80	2.29	2.66	2.00	2.93	2.24	2.77	2.77
Standard deviation							0.7
Coefficient of variation							29%

The distribution of farmers by yield, and the relationship with faba bean area is shown in Table 26. Though larger areas of faba beans often had higher yields than smaller areas, there is no statistical evidence to confirm this. In a correlation analysis coefficients were -0.37 and 0.17 for NTFs and TFs respectively.

1/ Yields on experimental plots are considered later.

Forty-nine percent of farmers, comprising 41 percent of the sample area, had yields lower than the sample's average of 2.55 ton/ha. This indicates one potentiality for increasing the total production -- a gap that one may be able to close.

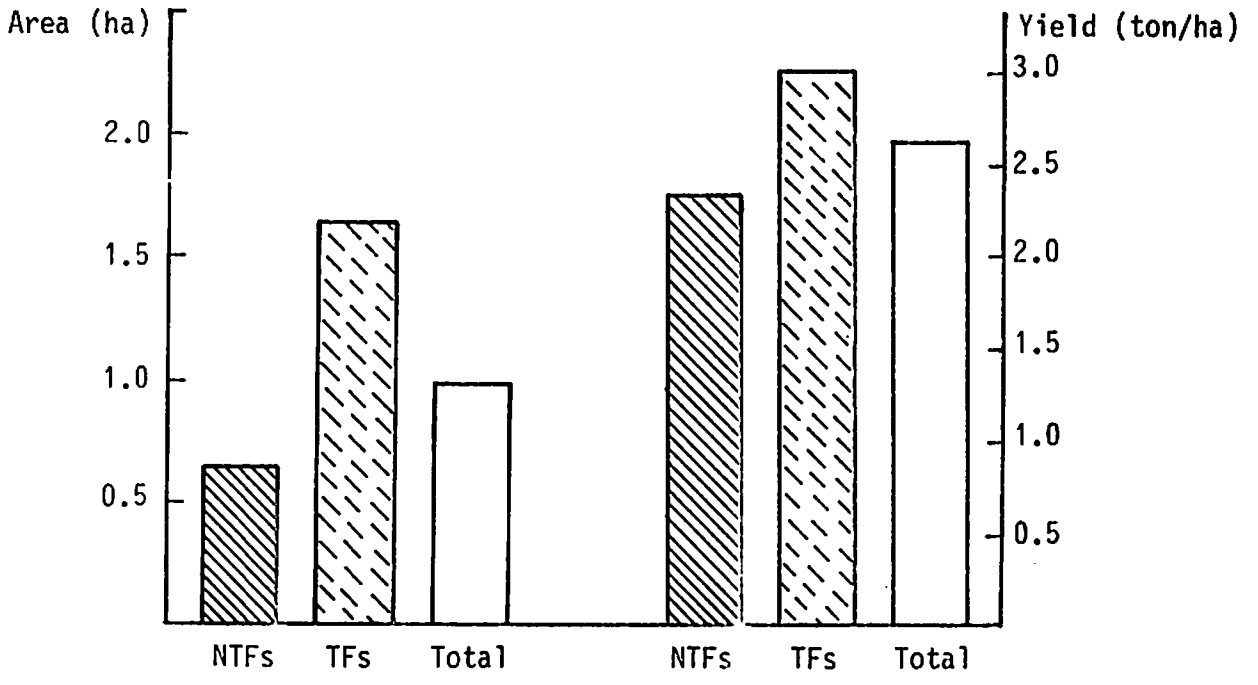
Table 26. Distribution of farmers and faba bean area according to yield.

YIELD (ton/ha)	NTFs			TFs			Total sample		
	Farmers (%)	Area (%)	Area (ha)	Farmers (%)	Area (%)	Area (ha)	Farmers (%)	Area (%)	Area (ha)
< 1.0	3.0	2.3	0.42	0.0	0.0	0.0	2.0	0.9	0.42
1.01-1.84	33.0	53.8	0.90	11.1	11.2	1.58	25.5	28.2	1.00
1.85-2.57	21.3	20.4	0.54	22.2	6.4	0.45	21.5	12.0	0.51
2.58-3.32	42.4	23.5	0.31	61.6	72.2	1.84	49.0	52.8	1.00
> 3.32	0.0	0.0	0.0	5.6	10.2	2.85	2.0	6.1	2.85
TOTAL	100.0	100.0	0.6	100.0	100.0	1.60	100.0	100.0	0.90

4.2 Straw

Straw is a secondary product but, as fodder for farm animals, has economic importance. It contributes about 17 percent of the total value of the crop. This percentage was higher (19 percent) for NTFs, due in part to their relatively lower grain yields. Average yield of straw in the study area was about 3.4 ton/ha although some plots surpassed four ton/ha. The lowest average yield of straw was reported by NTFs in Abou Kurkas while the highest was achieved by TFs of Samaloot (2.9 and 4.1 ton/ha respectively). Though most farmers use faba bean straw as a dry fodder for their animals, surplus quantities could be sold at a price of about 24 Egyptian pounds per ton.

Figure 11. Average faba bean area and yield, 1979/80



The results of the on-farm trials of the Nile Valley Project conducted in the study area revealed a higher potential for increasing straw yields than grain yields (Nasseib, et al., 1980). Average straw yield for 23 experimental sites, using a recommended level of tested factors, i.e., fertilizer, population and variety, amounted to 6.863 ton/ha. This is double the present average yield in the study area. Some sites even yielded three times this average.

4.3 Yield gaps

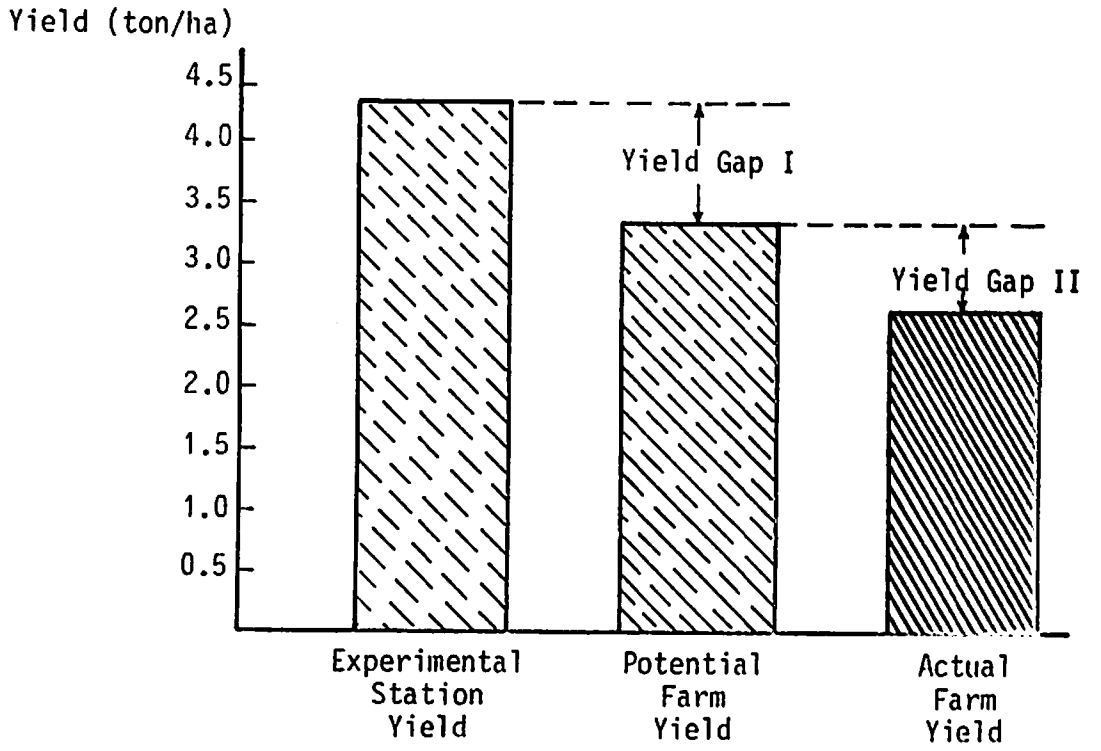
The yield gap analysis, developed at IRRI,[1/] identifies two components: Gap I is the gap between experimental station yields and potential yields on farmers' fields. This component cannot be recovered as it is due to physical differences between the two locations. It is important, therefore, to focus research endeavours on the second component of the yield gap, i.e, the difference between potential and actual yield in the same farmers' field. This second component (Gap II) exists mainly due to (a) biological constraints and (b) socio-economic constraints. The principal components of these two major constraints are listed under Figure 12.

An estimate can be made of the potential for increasing faba bean production in Minya province by comparing on-farm trial results with farmers results (Gap II). The average yield for trial plots with recommended levels of all inputs was 3.10 ton/ha of grain and 6.86 ton/ha of straw. In the same trials on plots using farmers' levels of inputs yields were less; 2.77 ton/ha for grain and 5.65 for straw.[2/] Finally, on farmers' fields, yields were reported at 2.55 ton/ha for grain and 3.40 ton/ha for straw.

1/ The concept of yield gaps is discussed in de Datta et al., (1978).

2/ Average yields of 23 On-farm trial sites.

Figure 12. Yield gap between experimental station yield, potential and actual farm yield



Yield Gap I: Between experimental station yield and potential farm yield. It is due to:

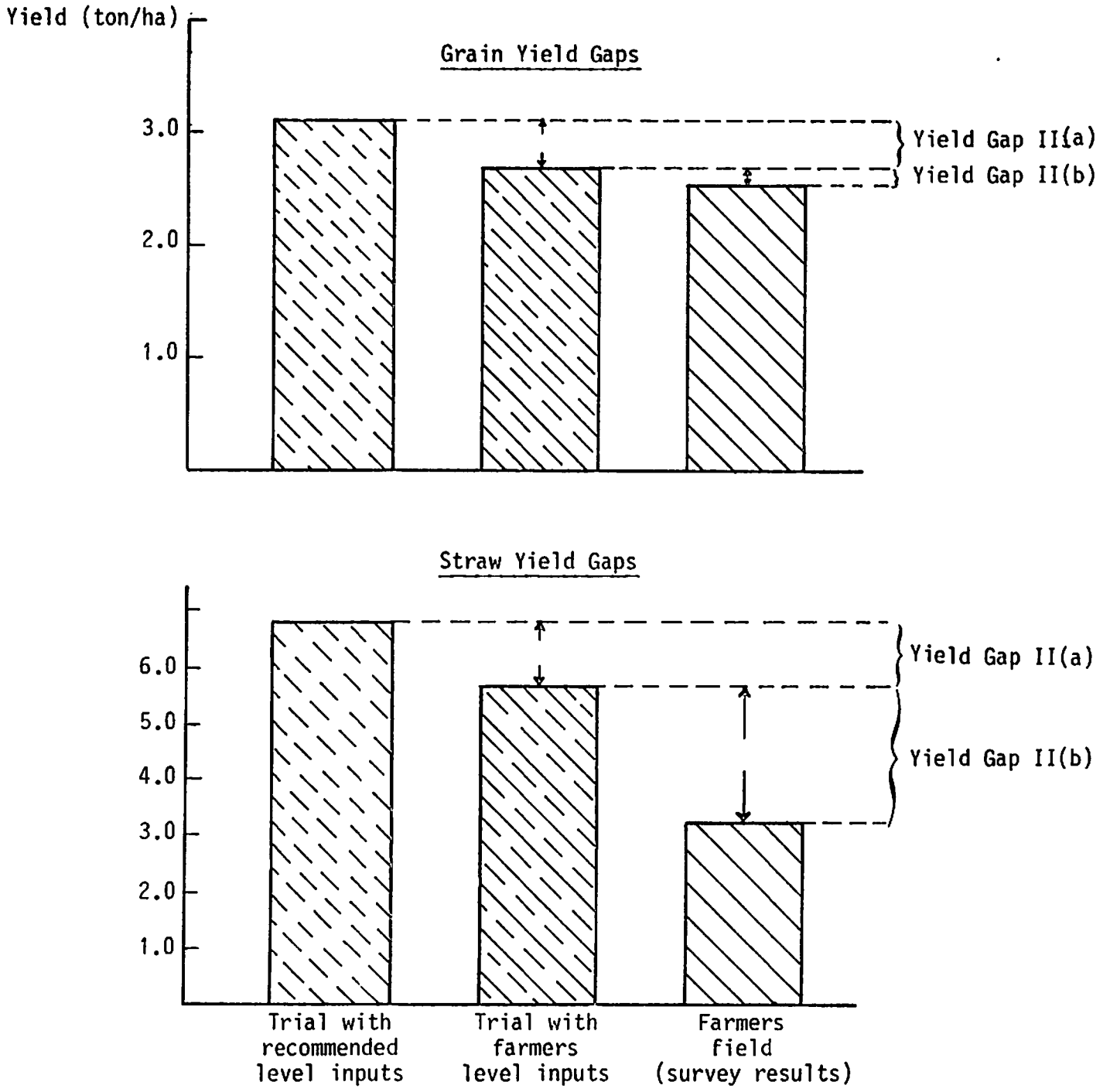
(1) non transferable technology, and
(2) environmental difference.

Yield Gap II: Between potential and actual farm yield. It is due to:

(1) biological constraints such as: variety, weeds, pests and diseases, water, problem soil and fertility, and

(2) socio-economic constraints such as: costs and returns, credit, tradition and attitudes, knowledge, input availability and institutions.

Figure 13. Grain and straw yield gaps on farmers' fields



Yield Gap II(a): Attributable to new input levels.
Yield Gap II(b): Attributable to differences in management.

Therefore there is a total gap of 550 kg/ha for grain. This can be divided into two parts; 220 kg/ha attributable to management and 330 kg/ha attributable to a new input combination. The total gap for straw is larger at 3,450 kg/ha (see Figure 13). Straw is not weighed by farmers and therefore the figures reported in the survey were only estimates. Nevertheless, straw does have economic value and future work will need to take this by-product into account.

Total faba bean area in Minya province was 30,930 hectares (Ibrahim et al., 1980). In order to indicate the importance of closing the yield gap as identified in the first year of the Nile Valley Project, the gap multiplied by the number of hectares gives a 17,000 ton increase in faba bean production for Minya province alone. It is too risky to use this data for other provinces in Egypt though information on Kafr El Sheikh will be available after the 1980/81 season. Also a second year's data and experience will strengthen these results. Even with these initial findings, however, the value of closing these gaps becomes obvious. It is certainly possible to produce enough faba beans to meet the domestic demand of Egypt's current population, but scientists are still faced with the problem of increasing productivity to meet a rapidly expanding population.

4.4 Representativeness of trial farmers

It is important to know whether the TFs are similar to the average farms in the area before the researcher can in anyway generalize his results. Comparing several crucial factors of agro-economic environment and production practices is one way to determine whether the TFs are significantly different from the NTFs. Levels of seed, P_2O_5 and N, number of irrigations, the faba bean area and yields were used to make this comparison. Differences between TFs and NTFs

in terms of means and standard deviations were statistically tested. The results are shown in Table 27. The differences were not significant and thus we can consider the TFs as reasonably representative of farmers in the study area. Researchers on the on-farm trials in Minya province can therefore have some confidence that the trial data has application elsewhere.

Table 27. Statistical parameters of selected variables for TFs and NTFs.

Farmers Group	Area of FB (ha)		Seed rate (kg/ha)		P_2O_5 (kg/ha)		N (kg/ha)		No. of Irrigatns		Yield (ton/ha)	
	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.
NTFs	0.56	0.57	174	20.6	434	194	122	111	4.4	0.61	2.30	0.71
TFs	1.56	1.75	175	30.3	469	261	127	102	4.7	0.59	2.70	0.63
t	0.48										0.35	
Signi-ficancy	N.S.		N.S.		N.S.		N.S.		N.S.		N.S.	

t statistics = 2.69 and 2.014 (at 0.01 and 0.05 levels of significance).

5. COST AND RETURNS

5.1 Costs of production

Average cost of production per hectare of faba beans in the sample area was about 346 LE/ha.[1/] TFs have higher production costs than NTFs (370 and 330 LE/ha respectively). Material inputs, such as seed, manure and chemical fertilizer constitute 20 percent of production costs, operational costs 48 percent and land 32 percent. There is not much difference between TFs and NTFs in the distribution of production costs as is shown in Table 28.

Table 28. Composition of production costs.[a]

	NTFs		TFs		Total sample	
	LE/ha	%	LE/ha	%	LE/ha	%
Material inputs	67.5	20.5	67.5	18.3	67.5	19.4
Operations	157.5	47.7	181.5	49.0	167.5	48.2
Land rent	105.0	21.8	121.0	32.7	113.0	32.4
TOTAL	330.0	100.0	370.0	100.0	348.0	100.0

a. These calculations are made on only a portion of the sample since some questionnaires were incomplete. Future work should emphasize the importance of collecting good data on costs of various operations.

The major operational cost is irrigation; it forms about 20 percent of the total operational costs, while fertilizer application is least expensive at 4.00 LE/ha or 2.4 percent of the total (see Table 29).

1/ Land rent as a real cost to tenant farmers and as an opportunity cost for owner farmers is included in costs of production.

Table 29. Operational costs.

	Cost (LE/ha)	% of total
Land preparation	25.7	15.3
Seeding	15.3	9.1
Fertilizer application	4.0	2.4
Irrigation	32.8	19.6
Weeding	15.7	9.4
Harvest: cutting	27.7	16.5
transport	5.7	3.4
threshing	22.8	13.6
cleaning and bagging	17.9	10.7
TOTAL	167.6	100.0

Most of the farmers, particularly those with larger holdings, complained of the shortage of labour and, consequently, the high level of wages they have to pay. All production operations, except threshing and some land preparation, are done manually. Mechanization for some of these operations, particularly seeding, weeding and harvesting would reduce labour bottlenecks.

5.2 Revenue and profitability

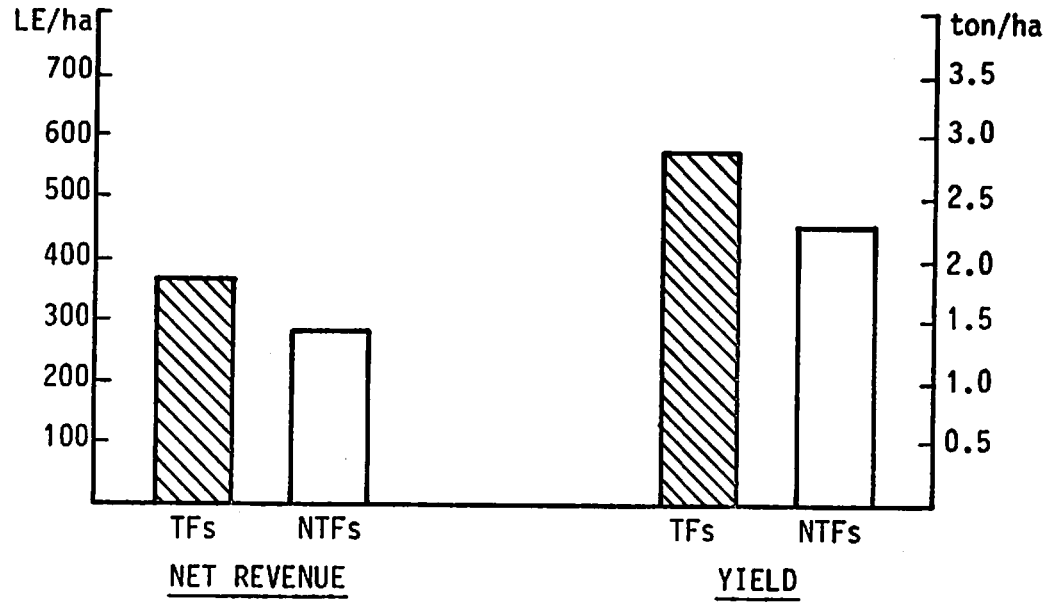
Faba bean production is profitable. On average, net revenue per hectare of faba beans amounted to LE 234. TFs gained more per hectare than NTFs even though the cost of production per hectare for the former was higher. This is due to (a) higher yields and (b) lower proportions of the output being sold to government at the lower prices. Average net revenue[1/] per hectare of TFs was 32 percent higher than NTFs while average yields of TFs were only 23 percent higher than NTFs. This is illustrated in Figure 14. More details on gross and net revenue is shown in Table 30.

1/ Net revenue excluding rent.

Table 30. Profitability of faba bean production (LE/ha).

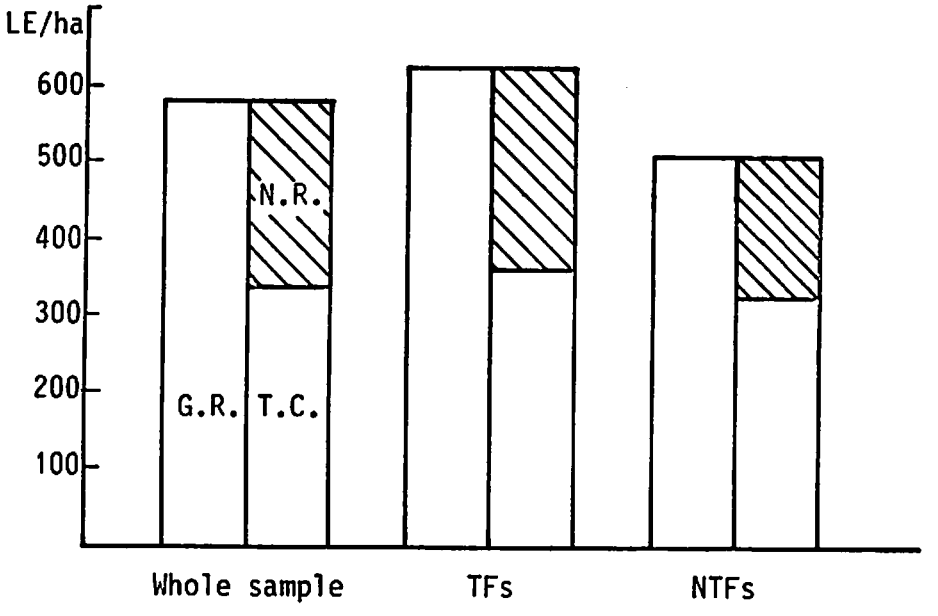
	NTFs	TFs	Total sample
Grain sold to government	188	200	194
Grain sold in market	240	348	306
Sub-total	428	548	500
Straw revenue	84	79	82
Gross revenue	512	627	582
Production cost (rent excluded)	225	249	235
Net revenue (rent excluded)	287	378	347
Rent	105	121	113
Net revenue for tenant farmers	182	257	234

Figure 14. Differences in yields and net revenue[1/] between TFs and NTFs



1/ Net revenue excludes rent.

Figure 15. Total costs (T.C.)[1/], gross (G.R.) and net revenue (N.R.)



1/ Total costs include rent

CONCLUSIONS

1. The survey data reveals great variations between and within the two districts with regard to resource availability and environment, production practices, and relative prices of inputs and output. Therefore, it is suggested that agronomic research activities should be as location specific as possible, so as to take account of these variations.

2. Some parts of the study area are highly infested with Orobanche. Due to the predetermined rotations imposed by government, farmers in these areas cannot choose to drop faba beans from their rotations. In such Orobanche infested areas faba beans perform very poorly. Continuing cultivation of faba beans and other hosts simply aids the further development and spread of this parasitic weed. Hence it is important that the government imposed rotations be made more flexible to take account of specific problems.

3. The current levels of inputs, particular fertilizers, provided by the Bank of Development and Credit are not adequate. If the input levels recommended by faba bean scientists are to be adopted, the present limits would have to be raised from 55.8 kg/ha to 71.9 kg/ha of P_2O_5 and from 27.9 kg/ha to 35.7 kg/ha of N, and if farmers are to adopt the recommended seed rate, the Bank will have to almost double its seed allocation.

4. As most farmers appear to believe that there is an advantage in imposing a degree of water stress in the early stage of growth, this issue should receive more intensive research in order to establish its effect on production.

5. Major constraints in production in the study area are mostly infrastructural. Supplies of inputs provided by the Bank that are inadequate and often not available at the right time; partially controlled marketing of the product by government; inappropriate predetermined rotations imposed by government especially in areas highly infested by Orobanche; and the recent occurance of labour shortages in some areas, are some examples. Biological constraints, on the other hand, such as inferior seed, incidence of pests and diseases, and problems with soils and soil fertility, were not extensive.

Managerial constraints, relating to experience and knowledge of practices such as sowing date, fertilizer application and irrigation, appear to be negligible, although variations between farmers do exist.

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APPENDIX

QUESTIONNAIRE OF THE FARM SURVEY OF FABA BEAN PRODUCTION IN MINYA PROVINCE

1979/1980

ICARDA/IFAD NILE VALLEY PROJECT

For Improving Faba Beans Production

QUESTIONNAIRE OF BROAD BEANS PRODUCTION IN MINIA PROVINCE, CROP YEAR 1979/1980

Farmer Name _____ Famer No. _____

District _____ Village _____

Date _____ Interviewer _____

I. Faba Beans Area

This Year 1979/80 _____ F _____

Last Year 1978/79 _____ F _____

1977/78 _____ F

II. Soil Type

What is the soil type of faba beans plots (this year)? _____

(1) Heavy clay (2) Yellow (3) Sandy

Are there any drainage problems in faba beans soils? Yes _____ No _____

III. Previous Crop and Rotation

What was the previous crop, this year, in faba beans plots? _____

Did you apply fertilizer to that previous crop? Yes _____ No _____

If yes, describe (according to the following):

Fertilizer	Type or Kind	Date of Application Month	Week	Method of Application	Quantity kg/F
Manure					
Super Phosphate (1)					
(2)					
Nitrogen (1)					
(2)					

IV. Faba Beans Plantation

How did you plant faba beans this year? _____

(1) After land preparation and ridging, (2) On cotton or maize ridges without land preparation

(3) Broadcast in blocks, (4) In holes within plots, (5) Dropping behind the plow.

In case of (hrathi) plantation, do you soak seeds in water before planting?

Yes _____ No _____

If yes, how long? _____

In case of planting on previous cotton or maize ridges, what was the ridging rate or distance for each? Cotton _____ ridge/qassaba, Maize _____ ridge/qassaba

In case of planting on ridges, do you plant on: (1) one side ____ (2) Both sides ____, (3) three sides ____.

Is your faba beans intercropped with other crops

Yes, with _____ sugar cane No _____

_____ berseem

_____ helba

_____ other

Land Preparation and seeding

If there are any land preparation operations for faba beans, (describe as follows);

OPERATION	Describe Implements	Date		Labor Source (1) family (2) Hired	COST EL/F		
		Month	Week		Equipments	Labour	Total
Ploughing - 1							
Cultivation - 2							
Cultivation - 3							
Land Levelling							
Ridging							
Seeding & covering							

Are there any problems with land preparation operation? Yes _____ No _____

If yes, describe _____

V. Seed

What is your seed variety? _____

What is your seed source? _____

(1) own stock, (2) exchange with neighbour, (3) purchase from coop. (4)purchase from market

If not purchased from the cooperative, why? _____

If (1), own stock, how and where do you store your seed? _____

_____

Are there any storage problems? _____

(1) stores insects, (2) deficient storage facilities, (3) others, descrie

_____

Did you use storage insecticide for your seed? Yes _____ No _____

If yes, name _____ quantity _____ Price _____

If our recommended variety proved better yield than yours, would you try planting it?

Yes _____ No _____

If no, why? _____

What is your seeding rate? _____ kilah/F

If our recommended seeding rate proved better physical and economic yield, would you try adopting it next season? Yes _____ No _____

Did you prepare your seed in any way before planting? _____

(1) cleaning, (2) Dressing, (3) soaking in water (4) inoculation with Azot•Bacter

How may seeds do you put in one hole: one ___ two___ three ____ four ____ and, why? _____

What is the distance between two holes? _____ cm (estimate)

VI. Fertilization of Faba Beans

Did you use fertilizer in faba beans plantation? Yes _____ No _____

If yes, describe (according to the following table)

Fertilizer	Type	Date of Application		Method of Application	Quantity kg/F	Price EL/kg	Where purchased	COST / F		
		Month	Week					Material	Equipment	Total
Manure										
Phosphate										
Nitrogen (1)										
(2)										
Mixed or compound										

Did you cash or credit your provision of fertilizer? Cash _____ Credit _____

If credit, where from _____ and cost of credit _____

Why did you use the above mentioned rates of fertilization? _____

_____

If our recommended rates or levels of fertilization proved better physical and economic output, would you try adopting them? Yes _____ No _____

If No, why? _____

Are there any problems with fertilizer acquisition? Yes _____ No _____

If yes, describe _____

Are there any probelms with fertilizer use or application?

Yes _____ No _____

If yes, describe _____

Who advises you on fertilizer use? _____

Has this advice been useful? Yes _____ No _____

If No, why? _____

VII. Irrigation

How many times did you irrigate faba beans before the closure of the canals (including planting irrigation)? _____ times

How many times did you irrigate faba beans after the closure of the canal? _____ times

If the farmer is familiar with water stress on faba beans production (ask him), why?

_____

How many days were, usually, between successive irrigations? _____ days

Are there any deficit, shortage or problem with irrigation?

Yes _____ No _____

If yes, describe _____

What is your irrigation method? (1) easy by hand _____ (2) by machine _____

What is the cost of one irrigation? _____ EL/F

VIII. Weed Control

What is the (normal) weed population in faba beans plots? (1) high _____

(3) moderate _____ (3) low _____ (4) None _____

What factors mostly affect weed population in faba beans plots? _____

_____

(1) soil type, (2) rotation, (3) No. of cultivations, (4) planting time,

(5) seed preparation, (6) seed rate, (7) fertilizer use, (8) other, describe

_____

What are the most important kinds of weeds that are or have been a probelm in faba beans plots? (1) Orobanche _____ (2) _____ (3) _____

How did you control weeds? (1) manual ___ (2) chemical _____ (3) mix. _____

If manual, how many times? _____ when _____

No. of labor/day per feddan _____ wage/day _____ EL/Labor

Cost of weeding _____ EL/F

If chemical, names of herbicides (1) _____ quantity _____ price _____

(2) _____ quantity _____ price _____

No. of application _____ when _____

Method of application _____ cost of application - labor _____ EL/F

material _____ EL/F

equipment _____ EL/F

Total _____ EL/F

Is there any yield loss due to weeds in your faba beans this year?

Yes _____ No _____

If yes, how much _____% loss (estimate)

What did you do with the weeds you manually control? _____

(1) nothing (2) feed to animal (3) as a feul (4) other, describe _____

Is Orobanche currently affecting faba beans production? Yes_____ No _____

If yes, how does it affect yield? _____ %loss (estimate)

Is there anything you can do to try and control Orobanche?Yes _____ No _____

If yes, descrine _____

IX. Pest Control

What are the most important kinds of pests that have infested your faba beans this year? (1) aphids _____ (2) _____ (3) _____

Did you control them chemically? Yes _____ No _____

If yes, name of chemicals (1) _____ quantity _____ price _____

(2) _____ quantity _____ price _____

No. of applications _____ method of application _____

Cost of application - poisons _____ EL/F

equipment _____ EL/F

Labor _____ EL/F

TOTAL _____ EL/F

Is there any yield loss of faba beans this year due to pest ? _____% loss (esitmate

X. Diseases

What are the most important faba beans diseases you have found affecting production? (if annes are not known, describe symptoms)

(1) _____ (2) _____ (3) _____

Did you try control them? Yes _____ No _____

If yes, chemicals'name (1) _____ quantity _____ price _____

(2) _____ quantity _____ price _____

Method of application _____ cost of application - poisons _____ EL/F

equipment _____ EL/F

Labor _____ EL/F

TOTAL _____ EL/F

Is there any yield loss due to diseases in faba beans production? ____% loss(estimate)

XI. Harvest

OPERATION	Method	Labor Source		No. of labor/day per feddan	Wage/ day	COST/Feddan		
		Family	Hired			Labor	Equipment	Total
(1) Harvest								
(2) Transport to threshing flour								
(3) Threshing								
(4) Winnowing, cleaning, bagging								
(5) Disposal or marketing								

How long are the plants left in the field after harvest and before transporting to the threshing floor? _____ days, and why _____

_____

Did you have any difficulty this year finding labor during the harvest period?

Yes _____ No _____

If yes, describe _____

_____

What percent of grains is lost during the harvest process (from cutting to bagging)?

_____% loss (estimate)

Are there any problems with:

(1) harvest Yes _____ No _____, if yes, describe _____

(2) transport Yes _____ No _____, if yes, describe _____

(3) Threshing Yes _____ No _____, if yes, describe _____

(4) Winnowing Yes _____ No _____, if yes, describe _____

(5) Marketing Yes _____ No _____, if yes, describe _____

XII. Yields

Green broad beans	(this year)	_____	ton/F	Price _____ EL/kg
	normal	_____	ton/F	
	Maximum	_____	ton/F	
Dry grains	(this year)	_____	Irdeb/F	Price _____ EL/kg
	normal	_____	Irdeb/F	
	maximum	_____	Irdeb/F	
Straw	(this year)	_____	load/F	
	normal	_____	load/F	
	maximum	_____	load/F	

Do you consider your normal yield (1) less than average _____ (2) average _____

(3) more _____

What are the limiting factors to increasing yields? _____

(1) soil type, (2) seed variety, (3) seeding rate, (4) seeding date, (5) land preparation, (6) irrigation, (7) fertilizer, (8) plant protection of weeds, pests, diseases, (9) other, describe _____

What is the distance between your faba beans field and the nearest bee-hives?

_____km

What are the prioritized problems of faba beans production facing you?

(1) _____

(2) _____

(3) _____

How can the Nile Valley Project help you in improving faba beans produciton? _____

_____

_____

GENERAL INFORMATION

Land rent _____ EL/F Land Tax _____ EL/F

Lan allocation: Total area _____ feddan, Form of land tenure _____

Faba Beans	Wheat	Clover	Other winter crops	Cotton	Maize	Sugar cane	Other summer crops	Vegetables	Tree Crop	Total (feddan)

Farmer age _____ years. Education _____ years Literate Yes ____ No _____

Family size _____ Currently in household _____ family members working in farm holding _____

Family income (1) Farm ____% (2) Agric.-non farm _____ % (3) Non agric _____ %

Do you belong to a cooperative society? Yes _____ No _____ if No, why _____

_____

Electricity _____ Running water _____ Distance from market _____

General transport used _____

Are you ready to cooperate with the Nile Valley Project in having some experiments on your faba beans land next year? No _____ yes _____ 6 qeerat

_____ 9 qeerat

General comments on interviewee: (to be completed after the interview)

A) articulate (1) very _____ (2) less _____ (3) in between _____

B) gave factual information (1) good _____ (2) bad _____ (3) in between _____

C) socio-economic status (1) wealthy _____ (2) poor _____ (3) moderate _____

D) candidate for experimental trials (1) good _____ (2) not _____ (3) preferable _____