STUDY OF THE HIGH YIELDING VARIETIES PROGRAMME IN MYSORE (*RABI* 1967-68)
MEXICAN WHEAT IN BIJAPUR DISTRICT

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FOREWORD

This report presents the results of an investigation carried out by the Agro-economic Research Unit of the Institute for studying the High Yielding Varieties Programme in the Bijapur district of Mysore State in the Rabi season of 1967-68. This is the second in the series of such investigations in Mysore region undertaken by the Agro-economic Research Unit, at the instance of the Ministry of Food and Agriculture, Government of India.

The crop selected for the study is Mexican wheat. It could be seen that within a short period, Mexican wheat occupied an important place in the irrigated agriculture of the district. It replaced local irrigated wheat and to some extent irrigated jowar too. Acceptance of the improved practices which are associated with higher yields is not uniform. Non-availability of the institutional credit appears to be the major constraint in that respect. The expansion of the area under the Mexican wheat or any other high yielding variety crop depends upon the availability of the irrigated land. As the irrigated area makes a very small proportion of the total cultivated area in the district, Mexican wheat, though successful, has no special importance in the total agricultural economy of the district.

We hope that the present report will be a useful addition to the growing literature on this subject.

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PREFACE

The Agro-Economic Research Unit at the Gokhale Institute of Politics and Economics, Poona, undertook a series of studies on the high-yielding varieties programme during 1966-67 to 1968-69, in the States of Maharashtra and Mysore, at the instance of the Ministry of Food and Agriculture, Government of India. The study presented in this report is the second in the series undertaken in Mysore. The first study was carried out in Mandya district during the Rabi season of 1966-67, and dealt with the high-yielding variety of paddy. The present study concerns with the Mexican wheat in Bijapur district during 1967-68.

Besides growing major grain crops like jowar and bajra, Bijapur is also known for its wheat crop, especially under dry conditions. The major objective of this study was therefore to examine the possibility of the expansion of the area under Mexican wheat in a dry region. The other objectives of the study were the examination in depth of the planning and implementation of the programme at the district, taluka and village levels, cost of cultivation and credit requirement, relative profitability of growing the high-yielding variety and other related problems.

In this investigation, a number of persons - officials and non-officials - co-operated with us while conducting the field work. I wish to express my gratitude to all the officials at different levels and the selected farmers who earnestly extended their co-operation in conducting this investigation.

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CHAPTER I

ORGANIZATION OF THE HYV PROGRAMME IN THE BIJAPUR DISTRICT

1.1 Introduction

Mexican wheat, which was introduced in the Rabi season of 1966-67 under the Seed Multiplication Programme, was thriving well in the Bijapur district during the Rabi season of 1967-68. According to the officials, the farmers were voluntarily coming forward to grow Mexican wheat as it was both high yielding and disease resistant. Compared to the other high yielding crops, cost of cultivation of Mexican wheat was quite less.

In Bijapur, the provisional figures regarding the achievement of the area under Mexican wheat showed that it had already crossed the target. Many farmers, especially in the eastern and the southern talukas had grown Mexican wheat under the rain-fed conditions. The two distinguishing qualities of Mexican wheat, namely, high yielding and disease resistance, were fairly demonstrated to the farmers in the Rabi season of 1966-67 when the variety was introduced under the Seed Multiplication Programme. The partial failure of the local wheat during that season due to 'rust' disease gave an occasion for the farmers to understand the comparative advantages of growing Mexican wheat. It was, therefore, decided to select the Bijapur district for the study of the Mexican wheat with a view to assessing the organization and implementation of the high yielding varieties programme in general and the working of the programme with respect to Mexican wheat in particular.

1.2 Programme for Growing Mexican Wheat in Mysore

According to the Season and Crop Report of the Mysore Government for the year 1963-64 the total area under wheat was 770,150 acres of which 26,037 acres amounting to 3.38 per cent of the total area was under irrigation. The total area under wheat was 3.95 per cent of the total area under food crops and 2.85 per cent of the total cropped area. Wheat was predominantly grown in the North Karnatak districts of Dharwar, Belgaum and Bijapur which reported 78 per cent of the area under wheat in the State. The Hyderabad-Karnatak districts of Bidar, Gulbarga and Raichur reported 21 per cent of the total area and in the rest of the districts, wheat was not grown at all or grown on a very small scale.

In the Rabi season of 1966-67 the Mexican wheat was introduced in the State under the High Yielding Varieties Programme. The area programmed was 4,400 acres and covered the predominantly wheat growing areas of North-Karnatak and Hyderabad Karnatak. The Deputy Directors of Agriculture in the respective districts were instructed to propagate the variety on irrigated area and procure the seed from the growers for the seed multiplication purpose. Except in Dharwar where the variety was propagated under the rain-fed condition, in all the other districts, it was introduced as an irrigated crop.

The varieties introduced during that year were Sonara-64 and Larma Roza. The seeds of both these varieties were imported from Uttar Pradesh. Quantity of seed required for the programmed area of 4,400 acres was about 1,700 quintals whereas the availability of the seed at the time of sowing was less than half of the required quantity. The achievement during that season was therefore only 57 per cent of the target.

During the Rabi season of 1967-68, the seed procured by the Agricultural Department as well as that held by the farmers for further propagation was estimated at 9,000 quintals. The Government imported about 1,000 quintals of the seed from Uttar Pradesh. The total quantity of the seed available in the State at the time of sowing was estimated to be sufficient for the programmed area of 24,000 acres. Table 1.1 presents the area programmed in 1966-67 and 1967-68 and the area achieved in 1966-67 for Mexican wheat in different districts of Mysore.

In view of the additional requirement of the fertilizers for the crops grown under the High Yielding Varieties Programme, the Director of Agriculture estimated the requirement as:

Ammonium Sulphate	137,459 metric tons
Superphosphate	88,999 metric tons
Muriate of Potash	27,773 metric tons

These estimates were made exclusively for the crops grown under the High Yielding Varieties Programme during the year 1967-68. The contention of the officials in the Agricultural Department is that only 50 per cent of the State's requirement of the fertilizers is fulfilled by the Central Fertilizer Pool. For instance, the total demand for the nitrogenous fertilizers in 1965-66 was 279,766 metric tons as against the allotment of only 129,393 metric tons by the Central Fertilizer Pool. Similarly, in 1966-67 the demand was 444,897 metric tons as against the supply of 182,258 metric tons. As a large number of farmers usually do not use the fertilizers at the recommended doses, the real shortage of the fertilizers, the officials contend, is not visible at the farmers' level.

1.3 Characteristics of Bijapur District

The Bijapur district is situated in the northern part of the Mysore State. It lies between north latitude 15°20' and 17°28' and east longitude 74°59' and 76°28'. The climate of the district is generally dry and healthy. The district is liable to famine and drought due to the large variations in the rainfall from year to year. The taluka-wise rainfall and the district average for the year 1963 is given in Table 1.2. The variation of rainfall from year to year is large. The actual rainfall in the district during the five year period from 1957 to 1961 was as follows:

Year	Rainfall (mm)
1957	670.6
1958	531.2
1959	496.4
1960	639.4
1961	493.1

Table 1.1 : Targets and Achievements of Mexican Wheat in Different Districts of Mysore (Area in Acres)

District	Total area under wheat (1963-64)	Irrigated area under wheat (1963-64)	Target for Mexican wheat (1966-67)	Achievement of Mexican wheat (1966-67)	Target for Mexican wheat (1967-68)	(4) as per cent of (2)	(5) as per cent of (4)	(6) as per cent of (2)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Bangalore	-	-	-	-	-	-	-	-
Kolar	29	-	-	-	-	-	-	-
Tumkur	48	15	-	-	-	-	-	-
Mysore	16	16	-	-	-	-	-	-
Mandya	-	-	-	-	-	-	-	-
Hassan	-	-	-	-	-	-	-	-
Shimoga	352	-	-	-	-	-	-	-
Chickmagalur	596	220	-	-	-	-	-	-
Chitradurga	989	203	-	-	-	-	-	-
Bellary	1,487	180	-	-	4,000	-	-	269.00
Dharwar	275,086	6	800	325	4,000	0.29	40.62	1.45
Belgaum	123,821	8,623	1,000	803	4,000	0.81	80.30	3.23
Bijapur	203,381	7,906	600	345	4,000	0.30	57.50	1.97
Bidar	17,725	6,279	1,000	520	4,000	5.64	52.00	22.57
Raichur	88,826	338	500	400	2,000	0.56	80.00	2.25
Gulbarga	57,811	2,251	500	101	2,000	0.87	20.20	3.45
South Kanara	-	-	-	-	-	-	-	-
North Kanara	3	-	-	-	-	-	-	-
Coorg	-	-	-	-	-	-	-	-
Total	770,150	26,037	4,400	2,494	24,000	0.57	56.68	3.12

Table 1.2 : Rainfall in Bijapur District (1963)

Taluka	Rainfall (mm)
Badami	705.6
Bagalkot	706.6
Bagewadi	530.6
Bijapur	721.0
Bilgi	783.7
Hungund	730.8
Indi	895.3
Jamkhandi	524.8
Muddebihal	721.9
Mudhol	503.8
Sindgi	685.2
District average	682.6

The rivers, Bhima, Krishna, Doni, Ghataprabha and Malaprabha traverse through the district. In the absence of any major irrigation scheme, the water from these rivers cannot be used for agricultural purpose. The soil mainly consists of light to deep black soil and is very fertile. As Table 1.3 reveals, only 2.94 per cent of the sown area is irrigated mainly by wells. Irrigation is possible from the Government canals during the four months of the rainy season only. Hence the canal irrigation is not useful for growing the Mexican wheat which is a Rabi crop.

Table 1.3 : Sources of Water Supply and the Area Irrigated in Bijapur (1963-64)

Source of water	Area in acres
Government canals	17,396
Private canals	-
Tanks	4,898
Wells	75,106
Other sources	574
Total net area irrigated	97,974
Irrigated area cropped more than once	9,139
Gross area irrigated	107,113
Percent of net area irrigated to net area sown	2.75 percent
Percent of gross irrigated area to gross sown area	2.94 percent

Table 1.4 gives the area under different crops in the Bijapur district during 1963-64. The gross-cropped area in the district during that year was about 36.3 lakh acres. More than 77 per cent of that area was used for the food crops. About 50 per cent of the gross-cropped area was under jowar, 15 per cent under bajra and 6 per cent under wheat. The total area under the irrigated crops was about

107,000 acres and 79 per cent of that area was under food crops. The area under irrigated wheat was about 8,000 acres, or more than 7 per cent of the total cropped area under irrigation. In the Rabi season of 1967-68, it is estimated that nearly 60 per cent of the area under the irrigated wheat was brought under the Mexican variety.

Table 1.4 : Area Under Different Crops in the Bijapur District (1963-64) (Area in Acres)

Crop	Total cropped area	Percentage	Area irrigated	Percentage	(4) as percentage of (2)
(1)	(2)	(3)	(4)	(5)	(6)
Rice	14,778	0.41	5,845	5.46	39.55
Jowar	1,790,226	49.27	45,436	42.42	2.53
Bajra	540,937	14.89	310	0.29	0.06
Maize	6,520	0.20	5,412	5.05	83.00
Wheat	203,381	5.60	7,906	7.38	3.89
All food crops	2,810,645	77.36	84,328	78.73	3.00
All non-food crops	822,674	22.64	22,785	21.27	2.77
Total cropped area	3,633,319	100.00	107,113	100.00	2.95

Under the conditions of poor rainfall and negligible irrigation facilities, per acre yield of the food grain crops is quite less. Table 1.5 presents the per acre yield of some food grain crops in the district during the year 1963-64. Along with the current yields of different crops during the year of reference, the corresponding standard yields are also given with a view to understanding the annual yield divergences. The per acre yield of wheat, for instance, during the year 1963-64, was only 138 kgs. which was nearly half of the standard yield of 230 kgs.

Table 1.5 : Per Acre Yield of Some Food Grain Crops in the Bijapur District (1963-64)

Crop	Standard yield (kg.)	Current yield (kg.)
Rice	332	195
Jowar - Kharif	276	136
- Rabi	426	193
- Total	394	179
Maize	407	257
Wheat	230	138
Bajra	245	118

1.4 Programme for Growing Mexican Wheat in Bijapur District

The Deputy Director of Agriculture, Bijapur, was in overall charge of the organization and the implementations of the High Yielding Varieties Programme at the district level. He was assisted by the Technical Assistant and the other subject-matter specialists. None of these technical personnel was, however, recruited specifically for the High Yielding Varieties Programme. The Deputy Director of Agriculture (i) distributed the district target of the area under the High Yielding Varieties Programme over different talukas, (ii) arranged for the supply of the seed and the nitrogenous fertilizers; and (iii) rendered technical advice to the farmers by organizing the farmers' training courses. In these functions, he was assisted by the Technical Assistant and the subject-matter specialists. In the following paragraphs, we describe how these functions were carried out during the Rabi season of 1967-68.

The district targets for different high yielding varieties crops were, in the first instance, worked out by the Director of Agriculture at the State level. These targets were presumed to be fixed on the basis of the following two considerations: (a) Total acreage under the crop during the corresponding previous seasons and (b) Existence of the potentialities for the development of the high yielding varieties in the district, namely, irrigation, network of cooperatives, etc. Usually, these targets were accepted by the Deputy Director of Agriculture at the district level. Under certain circumstances, there is scope for the Deputy Director of Agriculture either to increase or reduce the target fixed for any crop according to the special circumstances of the district. In the case of the Bijapur district, the targets fixed by the Director of Agriculture were accepted totally. The figures regarding the targets and achievements of the High Yielding Varieties Programme in the Bijapur district are presented in Table 1.6. The target of the High Yielding Varieties Programme in 1966-67, for both Kharif and Rabi seasons, was 51,100 acres and the achievement was 20,866 acres, or 41 per cent of the target. The achievement was remarkably good in respect of hybrid maize and Mexican wheat and was very poor with hybrid jowar and hybrid bajra. In the subsequent year, i.e. 1967-68, the target of the hybrid jowar was increased by 75 per cent and that of the hybrid bajra was of the same size despite the utter failure of these two varieties during the previous year. Surprisingly, the target of the hybrid maize was reduced by 1,000 acres to 19,000 acres. The target of the Mexican wheat was increased sufficiently and it was decided upon the availability of the seed in the district.

As the total target of the High Yielding Varieties Programme was increased by 36 per cent in 1967-68, without any improvement in the implementation of the programme, achievement of the target made only a marginal improvement. The achievement as the percentage of the target in 1967-68 was only 33 per cent. In the case of the individual crops, their relative position of achievement was in favour of the Hybrid maize and the Mexican wheat. The achievement in respect of the hybrid maize

Table 1.6 : Targets and Achievements of the High Yielding Varieties Programme in the Bijapur District (Area in Acres)

Crop	Total cropped area (1963-64)	Area irrigated (1963-64)	H.Y.V.P. target for 1966-67	H.Y.V.P. achievement for 1966-67	(5) as percent of (4)	H.Y.V.P. target for 1967-68	H.Y.V.P. achievement for 1967-68	(8) as percent of (7)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Rice	14,778	5,845	-	-	-	-	-	-
Jowar	1,790,226	45,436	20,500	3,543	17.28	36,000	1,203	3.34
Bajra	540,937	310	10,000	217	2.17	10,000	171	1.71
Maize	6,520	5,412	20,000	16,761	83.80	19,000	17,500	92.10
Wheat	203,381	7,906	600	345	57.50	4,000	4,050	101.25
All food crops	2,810,645	84,328	51,100	20,866	40.83	69,000	22,924	33.22
All non-food crops	822,674	22,785	-	-	-	-	-	-
Total cropped area	3,633,319	107,113	-	-	-	-	-	-

was 92 per cent whereas it was 101 per cent in respect of the Mexican wheat. On the other hand, the achievement of the hybrid jowar and the hybrid bajra were very negligible being only 3.34 per cent and 1.71 per cent respectively.

Except Mexican wheat, the seeds of the other crops in the High Yielding Varieties Programme were available in excess of the demand. The seeds of the hybrid maize, hybrid jowar and hybrid bajra were produced in the district by the registered seed growers and the seeds procured by them were processed at Jamkhandi by the government-owned seed processing unit under the strict supervision of the personnel of the National Seed Corporation of India. The processed seeds were put in small bags and with the seal of the National Seed Corporation of India, were sold to the farmers through the cooperatives. The processing of the seeds, i.e. tests taken in respect of their purity, germination percentage and further treatment with fungicides, was done only in respect of the hybrid seeds. Mexican wheat, which is an exotic variety, was not processed in the way the hybrid seeds were processed. The Government authorised the cooperatives to procure the seed from the growers and after treating it with fungicides, to sell it to the farmers.

During the Rabi season, of 1966-67, Mexican wheat was grown on 345 acres of land in the Bijapur district. It was mainly grown by the registered seed growers under the supervision of the staff of the Agricultural Department, for the multiplication of the seed. The estimated production was 2,415 quintals and out of this, more than half was procured and processed by either the cooperatives or the Agricultural Department staff for further distribution during the 1967-68 season. As the seed available with the Agricultural Department and the farmers was just sufficient for sowing an area of about 5,000 acres, the extension officials were advised to limit their field to the irrigated area only. It was later on experienced that many farmers who were willing to grow Mexican wheat under the irrigated conditions did not get seed in time. Such farmers brought seed from the seed growers in the neighbouring district of Belgaum. About 1,000 acres were sown under Mexican wheat with the seed brought from Belgaum. According to the later estimation, nearly 6,000 acres were brought under Mexican wheat as against the target of 4,000 acres. The official figures at the time of the investigation, however, showed that only 4,050 acres were brought under Mexican wheat.

About 7,500 tons of different types of nitrogenous fertilizers were distributed through different service societies, mainly for growing the food crops. Indents were not sent separately for the nitrogenous fertilizers required for the High Yielding Varieties Programme.

Two training programmes in each taluka were organized for extending the knowledge of the improved cultivation practices associated with the crops grown under the High Yielding Varieties Programme. The subject-matter specialists prepared a list of the standard cultivation practices for the use by the farmers. A brief account of the standard cultivation practices for growing Mexican wheat, as recommended by the subject-matter specialists of the Agricultural Department for the use of the farmers in the district is given below:

(a) Selection and Treatment of the Seed:

In the High Yielding Varieties Programme, dwarf Mexican wheat varieties yield high and do not lodge even with heavy doses of fertilizers and irrigation water. Farmers were advised to obtain the seed from the cooperatives or the extension offices. The seed supplied from these sources was treated with an organo-mercurial compound. In case the seed is bought directly from the growers, the farmers were advised to treat the seed themselves with Ceresan or Agrosan powder at the rate of 3 grams per 1 kg. of seed.

(b) Pre-sowing Tillage Practices:

The farmers were advised to bring the soil to a fine tilth by ploughing deep and running a harrow. It was recommended to plough by an iron plough for 2 times and harrow for 4-5 times to bring the soil to a fine tilth. As the Mexican wheat was susceptible to the soil-born diseases, it was advised to treat the soil by broadcasting 10 per cent B.H.C. at 10 kg. per acre before final ploughing.

(c) Manuring Practice:

It was recommended to apply 8 to 10 cartloads of farm yard manure before the second ploughing. As far as possible, the compost manure should be used.

(d) Fertilizing Practice:

Farmers were advised to give heavy doses of fertilizers. The recommended doses of fertilizers and the time of application are given in Table 1.7. It was recommended that about 2/3 of the nitrogenous fertilizer and phosphatic and potassic fertilizers should be applied at the time of sowing and the rest 1/3 of the nitrogenous fertilizer should be applied three weeks after sowing.

(e) Sowing:

Sowing should be done between 25th of September and 15th of October. It was recommended to drill the seed shallow, not more than 2 inches deep, in rows 6 inches to 9 inches apart, at the rate of 40 kg. per acre when there is enough moisture in the soil.

(f) Watering:

Watering should be given at an interval of 12 days until the seed formation takes place. The timing of the most important waterings is given below:

First watering	::	21 days after sowing
Second watering	::	40 days after sowing
Third watering	::	60 days after sowing
Fourth watering	::	80 days after sowing
Fifth watering	::	90 days after sowing

(g) Crop Protection Measures:

Mexican wheat is susceptible to the pests like flee beetles and stem borers. Flee beetles affect the crop during the first five weeks only. It is recommended to spray B.H.C. 10% powder to protect the crop from the flee

beetles. The quantity prescribed is 15 kg. per acre. In the case of the stem-borer, it is recommended to spray endrine 3 times at an interval of one week.

Table 1.7 : Recommended Doses of Fertilizers and the Time of Application for Mexican Wheat in Bijapur

Time of application	N P K requirement (in kg.) N	P	K	In what form the fertilizers should be used (Quantity of the type of fertilizers in kg)
Immediately before sowing or at the time of sowing	26	20	15	A) 130 Ammonium Sulphate + 130 Superphosphate + 25 Muriate of Potash Or B) 58 Urea + 130 Superphosphate + 25 Muriate of Potash
Three weeks after sowing	14	00	00	A) 70 Ammonium Sulphate Or B) 30 Urea
Total	40	20	15	A) 200 Ammonium Sulphate + 130 Superphosphate + 25 Muriate of Potash Or B) 87 Urea + 130 Superphosphate + 25 Muriate of Potash

1.5 Organization of Cooperative Credit

There are 1259 villages in the Bijapur district and all of them have been brought under the cooperative fold. The total number of cooperative service societies, of both large and small size, serving these villages was 1008 by the end of June, 1967.

Considering the growth of the cooperative movement in the district, the departmental set-up has been reorganized recently. Under the new set-up, a Deputy Registrar is placed in charge of the whole district and he is assisted by three Assistant Registrars stationed at Bijapur, Bagalkot and Jamkhandi respectively. The reorganized set-up is expected to stimulate the expansion programme of the co-operative movement and improve its efficiency.

In the year 1966-67, the District Central Co-operative Bank advanced Rs.26,088,340 as short term loans to the farmers as seen in Table 1.8. The collection of these loans until the end of June, 1967, amounted to only Rs.13,412,294 or 51.41 per cent of the amount issued. The taluka-wise recoveries varied from 24.26 per cent in the case of Sindgi taluka to 78.58 per cent in the case of Jamkhandi taluka. The recovery percentages appear to be higher in the predominantly irrigated talukas of Bijapur, Bagewadi, Hungund, Badami, Jamkhandi, Mudhol, Bilgi and

Mahalingpur. In the rest of the talukas which are situated in the eastern and north-eastern part of the District and are liable to drought due to uncertainty of rainfall, the recovery percentages are significantly less.

Out of the total amount of Rs.26,088,340 issued as short term loans during 1966-67, an amount of Rs.47,795 was allotted to the participants in the High Yielding Varieties Programme. The recovery, in the case of this amount, however, was as small as Rs.4,025 or only 8.42 per cent of the amount issued. The poor recovery of the loans advanced to the participants in the High Yielding Varieties Programme is believed to be due to the utter failure of some of the crops like hybrid jowar and hybrid bajra.

Table 1.8 : Short Term Loans Advanced During 1966-67 by the District Central Cooperative Bank, Bijapur and the Recoveries as on 30.6.1967

Taluka (1)	Issued Rs. (2)	Collection Rs. (3)	Balance Rs. (4)	(3) as percent of (2) (5)
Bijapur	3,469,296	1,781,035	1,688,261	51.33
Sindgi	2,524,719	612,527	1,912,192	24.26
Indi	3,742,711	1,748,338	1,994,373	46.71
Bagewadi	3,092,072	1,648,422	1,443,650	53.31
Muddebihal	1,951,673	810,572	1,141,101	41.53
Bagalkot	1,254,729	598,051	656,678	47.66
Hungund	2,405,032	1,429,168	975,864	59.42
Badami	1,868,300	1,126,992	741,308	60.32
Jamkhandi	2,023,367	1,589,980	433,387	78.58
Mudhol	1,744,482	907,441	837,041	52.01
Bilgi	1,467,063	744,999	722,064	50.78
Mahalingpur	544,896	414,769	130,127	76.11
Total	26,088,340	13,412,294	12,676,046	51.41

The District Central Cooperative Bank did not provide for any special rate of credit for the participants in the High Yielding Varieties Programme. The normal rate of credit advanced to the farmers was Rs.25 per acre. The participants in the High Yielding Varieties Programme received credit almost at the same rate with variations in certain irrigated pockets. According to the officials at the Cooperative Department, the participant farmers were not very enthusiastic about the credit facilities provided by the District Central Cooperative Bank. The officials at the Agricultural Department, however, felt that the cooperative machinery was quite lethargic in meeting the additional credit needs. This fact was brought out in a brief note on "The Agricultural Activities in Bijapur Taluka for 1967-68" written by the Block Development Officer, Bijapur. A paragraph in that note reads as follows:

"As regards the sanction of loans in connection with the High Yielding Varieties Programme, the District Central Cooperative Bank authorities have not given full co-operation.

About 120 crop loan applications were forwarded for the sanction of loans out of which only one-sixth of the applications were sanctioned during the Kharif Season".

This shows, in short, that there was little coordination between the Agricultural and the Cooperative Departments.

CHAPTER II

WORKING OF THE PROGRAMME IN THE SELECTED TALUKAS AND VILLAGES

2.1 Programme for Growing the Mexican Wheat in the Selected Talukas

For the selection of the talukas and the villages for the enquiry, the district level officials were contacted. To start with, we wanted to select a taluka where the Mexican wheat was mainly grown under the irrigated conditions and another taluka where it was mainly grown under the rainfed conditions. As the propaganda efforts of the extension officials in the dry region were not intensive and as the supply of seed and chemical fertilizers was not properly organized there, we were advised to select two talukas where the Mexican wheat was grown mainly under the irrigated condition. After consulting the taluka-wise targets and achievements of different crops under the High Yielding Varieties Programme in the district as presented in Table 2.1, we decided to select Jamkhandi and Bijapur talukas where the Mexican wheat was receiving good response from the farmers.

Table 2.1 : Talukawise Targets and Achievements of Different Crops in Bijapur Under H.Y.V.P. 1967-68 (Area in Acres)

Taluka	Mexican Wheat		Hybrid Jowar		Hybrid Maize	
	Target	Achievement	Target	Achievement	Target	Achievement
Bijapur	800	1,000	1,000	27	300	123
Sindgi	800	1,200	1,000	1	200	-
Indi	800	800	1,000	3	300	-
Bagewadi	500	300	600	3	300	17
Muddebihal	300	100	600	-	300	12
Bagalkot	100	250	400	8	100	25
Hungund	100	200	300	-	100	-
Badami	100	140	300	-	100	-
Jamkhandi	200	470	800	120	1,000	420
Mudhol	200	290	500	33	1,000	950
Bilgi	100	100	500	8	300	43
Mahalingpur	-	-	-	-	-	-
Total	4,000	4,850	7,000	203	3,000	1,590

The target of acreage under Mexican wheat in the Bijapur taluka was 800 acres and the seed required was estimated at 280 quintals. During the previous year, the area under Mexican wheat was about 25 acres which was covered under the Seed Multiplication Programme. The total production of Mexican wheat in that year was estimated at 200 quintals. The Taluka Marketing Society had procured only 80 quintals from the growers under the Seed Multiplication Programme. The village level workers were instructed to arrange for the local arrangement of the seed distribution during the current season. It was, however, felt that even with this arrangement, it was not possible to supply the Mexican wheat seed to all such farmers. The Block Development Officer, therefore, contacted the growers and the primary societies in the neighbouring Athani taluka of the Belgaum district in his personal capacity and procured sufficient seed for the needy farmers. The quantity of seed so procured was however not known.

Fertilizers were not distributed separately for the high yielding varieties crops. The nitrogenous fertilizers, the distribution of which is controlled by the State, was stocked to the extent of 1100 metric tons in the form of Ammonium Sulphate and Urea. The phosphatic and potassic fertilizers were distributed by the private merchants as well as the service cooperatives whereas the nitrogenous fertilizers were solely distributed by the cooperatives.

In Jamkhandi taluka, the Mexican seed available with the Taluka Marketing Society was about 80 quintals. It was more than sufficient for the target of 200 acres. But the target was obviously under-estimated as the number of farmers willing to grow the Mexican wheat appeared to be quite high. The Block Development Officer found the available seed insufficient vis-a-vis the demand and arranged for the supply of seed from the farmers and the primary societies in the neighbouring Athani taluka of the Belgaum district.

About 1600 tons of the nitrogenous fertilizers were stocked by the primary societies. The fertilizers were mainly used for the irrigated crops. There were private dealers in town places who were dealing with the phosphatic and the potassic fertilizers as well as the fertilizer mixtures.

2.2 Organization of the Programme in the Selected Villages

The following four villages, two from Bijapur taluka and the other two from Jamkhandi taluka were selected for the enquiry:

Taluka	Village	Area in sq.miles	Population
Bijapur	Babaleshwar	29.5	8,000
	Honwad	30.7	5,500
Jamkhandi	Hunnur	3.8	5,400
	Terdal	20.2	12,500

In Bijapur taluka, the Mexican wheat was grown in 47 villages. Out of these, it was only in Babaleshwar and Honwad that the number of farmers sowing the Mexican wheat

was significantly big enough to select these villages for our enquiry. In Babaleshwar, 32 farmers had sown the Mexican wheat and 113 farmers had sown the local varieties, and the corresponding numbers for Honwad were 26 and 98 respectively. Similarly, in Jamkhandi taluka, out of 39 villages where the Mexican wheat was sown, it was only in Hunnur and Terdal that we found the number of farmers sowing the Mexican wheat was quite big enough. There were 10 farmers in Hunnur who had sown the Mexican wheat and 21 had sown the local wheat. In Terdal, 34 farmers had sown the Mexican wheat and 19 the local wheat. We, therefore, selected these two villages from Jamkhandi taluka for our enquiry. A remarkable characteristic of all these four villages is that they are quite big in size with their populations varying from 5,400 in the case of Hunnur to 12,500 in the case of Terdal. In the following paragraphs, we describe the organization and working of the High Yielding Varieties Programme with special reference to Mexican wheat in the selected villages.

Figures regarding the total cropped area and the Mexican wheat in the selected villages in Rabi 1967-68 are given in Table 2.2. It is seen that the area under Mexican wheat (irrigated) as per cent of the area under total wheat (irrigated) varied from 55 per cent in respect of Hunnur to 87 per cent in respect of Babaleshwar. On the other hand, the area under Mexican wheat (unirrigated) as per cent of the total area under wheat (unirrigated) was not significant for all the four villages. This shows that the Mexican wheat was sown mainly as an irrigated crop.

In Babaleshwar, the target for the Mexican wheat was fixed at 70 acres whereas the achievement was 74 acres. The village level worker played an important role in achieving the target. During the previous year, the Mexican wheat was grown by one progressive farmer on an area of 4 acres under the Seed Multiplication Programme. The yield was estimated at 23 quintals. The Block Development Officer had instructed the village level worker to arrange for the distribution of the seed locally. In fact, to achieve the target of 70 acres, at least 25 quintals of seed was required. The progressive farmer who possessed the seed had already passed on 10 quintals of seed to two of his relatives staying in different villages in the same taluka. The village level worker personally went to Athani in the Belgaum district and arranged for the supply of 15 quintals of seed to the needy farmers in Babaleshwar. The fertilizer required was supplied from the prevailing stock of the primary society and there was no scarcity. The insecticides, however, were not stocked as the village level worker felt that there was no need for them.

In Honwad, the leadership at the Panchayat and the cooperative society level played an important role in introducing the Mexican wheat in the village. The cultivators in this village were mainly small holders and they were guided by the chairman of the Grampanchayat who was a big farmer and was a follower of progressive cultivation practices. The target for the Mexican wheat was 30 acres in this village and the achievement was 32 acres. As seed was not available within the village, the chairman of the Grampanchayat approached the taluka marketing society for the supply of the seed. About 10 quintals of seed was required to achieve the target in this village. The taluka

Table 2.2 : Area Under High Yielding Varieties in the Selected Villages (Rabi 1967-68)
(Area in Acres)

	Selected villages in Bijapur Taluka		Selected villages in Jamkhandi Taluka	
	Babaleshwar	Honwad	Hunnur	Terdal
Total cropped area	17,869	18,807	2,323	11,673
Total cropped area in Rabi	13,876	17,328	1,989	8,317
Area under local wheat (irrigated)	11	13	18	16
Area under Mexican wheat (irrigated)	74	32	22	44
Area under local wheat (unirrigated)	2,315	2,500	137	673
Area under Mexican wheat (unirrigated)	6	2	1	1
Area under hybrid jowar in Rabi	2	-	1	-
Area under Mexican wheat (irrigated) as per cent of total area under wheat (irrigated)	87	71	55	73
Area under Mexican wheat (unirrigated) as per cent of area under total wheat (unirrigated)	Not significant	Not significant	Not significant	Not significant
Number of farmers growing Mexican wheat	32	26	18	34
Number of farmers growing hybrid jowar in Rabi	1	-	1	-

marketing society, however, supplied only 4 quintals. The chairman, therefore, personally went to Athani in the Belgaum district and brought about 7 quintals of seed on his own and distributed it in the village. Nitrogenous fertilizers were also not supplied in sufficient quantity to this village. According to the advice of the chairman, the farmers mainly used the fertilizer mixtures which they bought from the private merchants in Bijapur.

The target for growing the Mexican wheat in Hunnur was 30 acres whereas the achievement was only 22 acres. An active leadership at the Panchayat or the cooperative society level was conspicuous by its absence. Even the village level worker, according to some farmers in the village, did not give adequate attention to the implementation of the programme. Instead of staying in the village, the village level worker was staying in Jamkhandi, at a distance of 4 miles. He was not readily available to the cultivators whenever they were in need of his help and guidance. There were, however, some progressive farmers in the village who were giving guidance to the other farmers. Even the supply of seed and fertilizer mixture was arranged by these farmers.

Terdal being a big village, there was multiple leadership at the Panchayat and the cooperative societies level. There were in all 4 primary service cooperative societies. The village level worker also played an important role in implementing the programme. The target for growing the Mexican wheat in this village was 25 acres whereas the achievement was 44 acres. Seed was, in majority of the cases, locally supplied. In some cases, seed was purchased from the primary cooperative service society at Kudchi in the neighbouring Belgaum district. Supply of the nitrogenous fertilizers was quite adequate. There were merchants in this village who distributed the fertilizer mixtures.

CHAPTER III

CHARACTERISTICS OF THE SELECTED FARMERS AND LAND-USE

3.1 Selection of the Farmers

The working of the programme was studied at the farmers' level in the selected villages through a sample survey. The objectives laid down in this sample survey were aimed at getting to know the relative positions of the participant and the non-participant farmers as regards the (a) land utilization, (b) cropping pattern, (c) expenditure over the input items like seeds, fertilizers, farm-yard manures and the human and bullock labour, (d) credit availability for crop production, (e) differential yield rate and the market value, and (f) the acceptance of the recommended cultivation practices and their relationship with the yield rate. Besides these objectives which directly relate to the crop production, we also made a study of the attitudes of the farmers who participated in the programme.

The sample of the cultivators selected for the study included 60 participants in the HYVP and 40 non-participants, in all 100 cultivators in the district. These cultivators were selected from the four villages referred to in Section 2.2. The procedure followed in selecting the cultivators was according to the method known as stratified random sampling. All the participants in each of the selected villages were arranged in a descending order according to their respective area under Mexican wheat and the population was divided into five equal groups. From each of these stratified groups, 3 farmers were randomly selected in the case of Babaleshwar and Honwad villages, 2 farmers in the case of Hunnur and 4 farmers in the case of Terdal. To start with, we selected 15 participants from Babaleshwar and Honwad each, 10 participants from Hunnur and 20 from Terdal - in all 60 participants. In the case of non-participants, the farmers growing local wheat in each village were arranged in a descending order according to their respective size of holding and were divided into five groups. From each group, two farmers were randomly selected. In Hunnur and Terdal, to give a proportionate representation of the non-participants vis-a-vis the participants, we followed a slightly different way. In Hunnur, the non-participant farmers arranged in descending order according to their respective size of holding were divided into 4 groups and from each group, two farmers were randomly selected. In Terdal, on the other hand, the farmers were divided into six groups and two farmers were randomly selected from each group. Thus, 10 farmers who were non-participants were selected from Babaleshwar and Honwad each, eight from Hunnur and 12 from Terdal. At the time of investigation, we however, found that a non-participant farmer from Hunnur had grown Mexican wheat. In the same village, it was found that in one of the participants family, there were two agricultural business units separately managed by two brothers respectively. Both of them had sown Mexican wheat. For the sake of our study, they were treated as belonging to two different families. Thus in Terdal, at the final stage of our investigation, there were 22 participants and 11 non-participants as against 20 and 12 respectively according to the original selection.

This altered the total number of participants selected in the district from 60 to 62 and that of the non-participants from 40 to 39. Thus there were in all 101 farmers selected for the study at the time of investigation as against the original selection of 100 farmers. Table 3.1 presents the figures in respect of the selection of the farmers in different villages.

Table 3.1 : Selection of the Farmers in Different Villages

Taluka	Village	Participants		Non-participants		Total number of selected farmers
		Total	Selected	Total	Selected	
Bijapur	Babaleshwar	32	15	113	10	25
	Honwad	26	15	98	10	25
Jamkhandi	Hunnur	10	10	21	8	18
	Terdal	34	22	19	11	33
Total		102	62	251	39	101

A schedule was canvassed to all the 101 farmers as selected and the relevant data on land utilization, cropping pattern, farm-inputs for different varieties of the crops, credit arrangement, production and marketing of farm products, the opinion of the farmers regarding the growing of Mexican wheat and the acceptance of the standard cultivation practices by the participants, were collected. The schedule is presented in Appendix at the end of this report.

3.2 Characteristics of the Selected Farmers

In Table 3.2, the selected farmers are distributed in six groups according to size of holding, namely, holdings

Table 3.2 : Classification of the Selected Participants and Non-participants According to Size of the Cultivated Holdings

	Size of holding (acres)		Babaleshwar	Honwad	Hunnur	Terdal	Total
VI	Upto 10	A	1	-	3	2	6
		B	2	-	1	3	6
V	10.1 - 20	A	2	4	3	9	18
		B	1	-	1	4	6
IV	20.1 - 30	A	2	3	3	5	13
		B	-	3	3	3	9
III	30.1 - 50	A	3	2	-	4	9
		B	2	3	1	1	7
II	50.1 - 75	A	3	3	1	2	9
		B	3	2	1	-	6
I	75.1 & above	A	4	3	-	-	7
		B	2	2	1	-	5
Total		A	15	15	10	22	62
		B	10	10	8	11	39

A = Participants B = Non-participants

over 75.1 acres coming in the Group I, 50.1 to 75.0 acres in Group II, 30.1 to 50.0 acres in Group III, 20.1 to 30 acres in Group IV, 10.1 to 20.0 acres in Group V and upto 10.0 acres in Group VI. Generally, farmers belonging to all the size groups in all the four villages participated in the programme. In Honwad, none of the farmers belonging to Group VI participated in the programme. Contrary to this, in Hunnur and Terdal, none of the farmers from Group I participated in the programme.

Frequency distribution of the selected farmers according to caste as presented in Table 3.3 showed that out of 62 participants, 41 were Lingayats, the major cultivating caste in the region, Brahmins and Jains reporting 6 each, 4 Marathas, 3 Muslims and one each from Kurubars & Uppars. Of the 39 non-participants, 24 were Lingayats, 4 Kurubars, Brahmins, Jains and Muslims reporting 3 each, and Uppars and Marathas one each. This shows that all the major castes engaged in cultivation in the region have participated in the programme.

Table 3.3 : Castewise Distribution of the Selected Farmers in Different Villages

Caste	Babaleshwar		Honwad		Hunnur		Terdal		Total	
	A	B	A	B	A	B	A	B	A	B
Brahmin	2	1	1	-	-	-	3	2	6	3
Lingayat	12	8	8	6	8	6	13	4	41	24
Maratha	1	-	2	-	1	1	-	-	4	1
Kurubar	-	1	1	1	-	1	-	1	1	4
Uppar	-	-	1	1	-	-	-	-	1	1
Muslim	-	-	2	2	-	-	1	1	3	3
Jain	-	-	-	-	1	-	5	3	6	3
Total	15	10	15	10	10	8	22	11	62	39

A = Participants B = Non-participants

It was hypothesized that the part-time farmers who pursued some other occupation like trade, service etc. along with farming were better adopters of the innovations in farming because (i) extra financial resources are available to them; (ii) they are better educated; and (iii) their contacts with the extension officials are better. The classification of the participants and the non-participants according to full-time and part-time farming would show to what extent the part-time farming influenced the rate of participation in the H.Y.V.P. Table 3.4 gives the distribution of

Table 3.4 : Distribution of the Selected Farmers According to Full-time and Part-time Farming

Village	Full-time farmers		Part-time farmers	
	A	B	A	B
Babaleshwar	8	10	7	-
Honwad	11	10	4	-
Hunnur	3	7	7	1
Terdal	8	9	14	2
Total	30	36	32	3

A = Participants B = Non-participants

the selected farmers according to full-time and part-time farming. Out of 62 participants, 32 were part-time farmers whereas out of 39 non-participants, there were only 3 part-time farmers. This proves that part-time farming has influenced the participation rate in the HYVP.

Table 3.5 presents the figures in respect of average size of cultivated holding, of which area owned, area irrigated and area sown more than once for the participants and the non-participants in the selected villages. Average size of land holding for all the selected villages was 39.45 acres for the participants and 39.71 acres for the non-participants. It varies from 20.55 acres for Hunnur to 56.61 acres for Babaleshwar in the case of the participants and from 17.43 acres for Terdal to 56.35 acres for Honwad in the case of non-participants. The percentage of the land owned to the total cultivated holding was 88.92 per cent in the case of the participants and 85.90 per cent in the case of the non-participants for all the selected villages. These percentages varied from 50.80 per cent for Hunnur to 96.36 per cent for Babaleshwar in the case of participants and from 73.09 per cent for Terdal to 93.78 per cent for Babaleshwar in the case of non-participants. The average irrigated area per holding for all the selected villages was as high as 7.91 acres for the participants whereas it was only 1.54 acres in the case of the non-participants. It shows that the rate of participation in the programme highly depended upon the irrigational facilities available to the cultivators. This fact was also revealed in the percentage of the irrigated area to the total cultivated area which was 20.05 per cent for the participants and 3.88 per cent for the non-participants. The variation in these percentages was from 7.02 per cent for Honwad to 33.33 per cent for Terdal in the case of participants, and nil for Terdal to 6.36 per cent for Babaleshwar in the case of non-participants. The percentage of area sown more than once to the total cultivated area was 5.65 per cent for the participants and 1.75 per cent for the non-participants for all the selected villages. These percentages, however, varied from 1.47 per cent for Honwad to 9.60 per cent for Terdal in the case of participants and from 0.87 per cent for Babaleshwar to 2.68 per cent for Honwad in the case of non-participants.

In Table 3.6, figures are given in respect of the average size of holding, of which area owned, area irrigated and area sown more than once according to size of holding groups. Percentage of the area owned to the area cultivated was the lowest for the Group VI, namely, 58.62 per cent for the participants and 50.94 per cent for the non-participants. In the case of the other size groups the variation was from 80.99 per cent to 92.67 per cent for the participants and 69.45 per cent to 100 per cent for the non-participants. It is significant to note that the percentage of area irrigated to total cultivated area was remarkably higher in the case of the participants as compared to the non-participants. It was as high as 20 per cent for the participants as against only less than 4 per cent for the non-participants. In the case of the participants, the variation in these percentages for different size-groups is also significant. Higher the size of cultivated holding group, lower was the percentage of area irrigated. It was little less than 10 per cent in the case of size group I as against nearly 86 per cent for size group VI. Percentage of area sown more than once to total cultivated area was broadly related to the irrigated area for both participants and non-participants and to different size groups.

Table 3.5 : Land Utilization in the Selected Villages

Name of village		No.of cultivators	Total cultivated land	Total own land	Total irrigated land	Total area sown more than once	Average size of the cultivated holding	Of which owned	Percentage of the area owned to the cultivated holding	Of the cultivated holding area irrigated	Percentage of the area irrigated to the cultivated holding	Average area sown more than once	Percentage of the area sown more than once to the cultivated holding
			Acres	Acres	Acres	Acres	Acres	Acres	%	Acres	%	Acres	%
Babaleshwar	A	15	852-06	821-06	167-08	50-32	56.81	54.74	96.36	11.15	19.63	3.35	5.90
	B	10	503-22	472-10	32-00	4-16	50.35	47.22	93.78	3.20	6.36	0.44	0.87
Honwad	A	15	762-22	681-22	53-20	11-07	50.84	45.44	89.38	3.57	7.02	0.75	1.47
	B	10	563-22	464-02	16-10	15-06	56.35	46.40	82.34	1.62	2.87	1.51	2.68
Hunnur	A	10	205-20	104-15	61-10	16-24	20.55	10.44	50.80	6.12	29.78	1.66	8.08
	B	8	290-00	254-00	12-00	3-20	36.25	31.75	87.59	1.50	4.14	0.44	1.21
Terdal	A	22	625-24	568-01	208-24	59-39	28.44	25.82	90.79	9.48	33.33	2.73	9.60
	B	11	191-30	140-07	-	4-20	17.43	12.74	73.09	-	-	0.41	2.35
Total	A	62	2445-32	2175-04	490-22	138-21	39.45	35.08	88.92	7.91	20.05	2.23	5.65
	B	39	1548-34	1330-19	60-10	27-22	39.71	34.11	85.90	1.54	3.88	0.71	1.75

A = Participants

B = Non-participants

Table 3.6 : Land Utilization According to Size of Holding Groups

	Size group (Acres)		No.of cultivators	Total cultivated land	Total own land	Total irrigated land	Total area sown more than once	Average size of the cultivated holding	Of which owned	Percentage of the area owned to the cultivated holding	Of the cultivated holding area irrigated	Percentage of the area irrigated to the cultivated holding	Average area sown more than once	Percentage of the area sown more than once to the cultivated holding
				Acres	Acres	Acres	Acres	Acres	Acres	%	Acres	%	Acres	%
VI	Upto 10	A	6	42-20	24-35	36-20	8-22	7.08	4.15	58.62	6.08	85.68	1.43	20.20
		B	6	41-14	21-02	-	-	6.89	3.51	50.94	-	-	-	-
V	10.1-20	A	18	302-36	245-16	94-33	21-05	16.83	13.63	80.99	5.27	31.31	1.17	6.95
		B	6	100-08	75-25	4-00	0-16	16.70	12.00	75.45	0.67	4.01	0.07	0.42
IV	20.1-30	A	13	355-25	322-05	79-21	18-07	27.35	24.78	90.60	6.12	22.38	1.40	5.12
		B	9	226-20	213-00	15-00	21-06	25.17	23.67	94.04	1.67	6.63	2.35	9.34
III	30.1-50	A	9	402-36	402-36	91-16	30-27	44.77	41.49	92.67	10.16	22.69	3.41	7.62
		B	7	307-30	213-30	3-10	2-00	43.96	30.53	69.45	0.46	1.05	0.28	0.64
II	50.1-75	A	9	580-15	536-32	114-32	45-20	64.49	59.64	92.48	12.75	19.77	5.05	7.83
		B	6	397-02	397-02	16-00	-	66.17	66.17	100.00	2.67	4.04	-	-
I	75.1 & above	A	7	761-20	672-20	73-20	14-20	108.79	96.07	88.31	10.50	9.65	2.07	1.90
		B	5	476-00	410-00	22-00	4-00	95.20	82.00	86.13	4.40	4.62	0.80	0.84
	Total	A	62	2445-32	2175-04	490-22	138-21	39.45	35.08	88.92	7.91	20.05	2.23	5.65
		B	39	1548-34	1330-19	60-10	27-22	39.71	34.11	85.90	1.54	3.88	0.71	1.79

A = Participants B = Non-participants

3.3 Land Use and Cropping Pattern

Table 3.7 presents the distribution of gross cultivated area according to Kharif, Rabi and the annual crops for the selected families. Very high proportion of area devoted to Rabi crops concurs with the general phenomena of seasonal land utilization in Bijapur district. The uncertainty of the Kharif rainfall appears to be the major factor for the aversion of the farmers to use their land for the Kharif crops. On the other hand, the certainty of late monsoon rains added with the congenial climatic conditions during winter months have favoured the farmers to incline towards the Rabi crops. The area under the Rabi crops was 74 per cent of the gross cultivated land for the participants and 83 per cent for the non-participants. It is important to note that the availability of irrigational facilities has favoured such farmers to bring more land under the Kharif crops. The participants who had higher proportion of irrigated area used 22.5 per cent of the gross cultivated area for the Kharif crops, and nearly half of which was irrigated. On the other hand, the non-participants who were mainly dry cultivators used only 16.2 per cent of the gross cultivated land for the Kharif crops. The area used for the annual crops which mainly formed sugarcane and banana was quite insignificant and it again depended upon the availability of the irrigational facilities. In the case of the participants, it was 3.35 per cent of the gross cultivated area whereas for the non-participants it was only 0.62 per cent.

The variation in the use of land for the Kharif and Rabi crops in the case of different size of holding groups was also remarkable. For the participants, area under Kharif crops was distinctly higher for the smaller size groups as compared to the bigger size groups. The area under the Kharif crops was as high as 44 per cent of the total cultivated area for Group VI as against only 16 per cent for Group I. This variation is mainly explained by the extent of the irrigational facilities available, but there appear to be other factors like soil type, requirement of fodder etc. which, however, have minor influence.

Table 3.8 gives the figures regarding the cropping pattern of the selected families during the Kharif season. The figures are presented separately for the irrigated and the non-irrigated area. Maize, jowar and cotton (CO_2) jointly constituted 74 per cent of the irrigated cropped area for the participants as against the corresponding figures of 88 per cent for the non-participants. On the non-irrigated area, Bajari and the groundnuts were the most important crops during the Kharif season. They combinedly represented 93 per cent of the total dry-cropped area for the participants as against the corresponding figure of 83 per cent for the non-participants. The other minor crops grown in the Kharif season on irrigated land were groundnut, paddy, maize, fodder and vegetables. On the non-irrigated land, cotton, jowar, paddy (rainfed) and fodder are the other minor crops.

In Table 3.9, figures are given in respect of the cropping pattern of the selected families in Rabi season. On the irrigated land, wheat - both Mexican and local varieties, jowar and maize were the most important crops grown by the participants and the area covered under these

Table 3.7 : Distribution of Gross Cultivated Area According to Kharif, Rabi and the Annual Crops for the Selected Families for All Villages

(Figures in Acres)

Size of holding (acres)		Average per family						Annual crops	Total gross cultivated area		
		Kharif			Rabi				Irrigated	Non-irrigated	Total
		Irrigated	Non-irrigated	Total	Irrigated	Non-irrigated	Total				
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VI Upto 10	A	3.31 (36.78)	0.67 (7.44)	3.98 (44.22)	3.67 (40.78)	0.83 (9.22)	4.50 (50.00)	0.52 (5.78)	7.50 (83.33)	1.50 (16.67)	9.00 (100.00)
	B	- (-)	0.33 (5.04)	0.33 (5.04)	- (-)	6.22 (94.96)	6.22 (94.96)	- (-)	- (-)	6.55 (100.00)	6.55 (100.00)
V 10.1-20	A	3.14 (19.30)	1.99 (12.23)	5.13 (31.53)	2.23 (13.71)	8.18 (50.28)	10.41 (63.99)	0.73 (4.48)	6.10 (37.49)	10.17 (62.51)	16.27 (100.00)
	B	- (-)	0.58 (4.43)	0.58 (4.43)	0.58 (4.43)	11.85 (90.60)	12.43 (95.03)	0.07 (0.54)	0.65 (4.97)	12.43 (95.03)	13.08 (100.00)
IV 20.1-30	A	4.46 (16.70)	2.52 (9.44)	6.98 (26.14)	2.23 (8.35)	16.65 (62.36)	18.88 (70.71)	0.84 (3.15)	7.53 (28.20)	19.17 (71.80)	26.70 (100.00)
	B	1.04 (3.86)	4.83 (17.94)	5.87 (21.80)	1.12 (4.16)	19.60 (72.81)	20.72 (76.97)	0.33 (1.23)	2.49 (9.25)	23.43 (90.75)	26.92 (100.00)

Contd...

Table 3.7 : (Continued)

	Size of holding (acres)		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
III	30.1-50	A	5.04 (11.44)	4.87 (11.06)	9.91 (22.50)	4.45 (10.10)	28.12 (63.84)	32.57 (73.94)	1.57 (3.56)	11.06 (25.11)	32.99 (74.89)	44.05 (100.00)
		B	0.44 (1.07)	7.50 (18.20)	7.94 (19.27)	0.41 (0.99)	32.86 (79.74)	33.27 (80.73)	- (-)	10.85 (2.06)	40.36 (97.94)	41.21 (100.00)
II	50.1-75	A	5.58 (8.65)	8.28 (12.83)	13.86 (21.48)	5.89 (9.13)	41.68 (64.60)	47.57 (73.73)	3.09 (4.79)	14.56 (22.57)	49.96 (77.43)	64.52 (100.00)
		B	0.18 (0.30)	12.52 (20.69)	12.70 (20.99)	1.93 (3.19)	45.31 (74.87)	47.24 (78.06)	0.58 (0.95)	2.69 (4.44)	57.83 (95.56)	60.52 (100.00)
I	75.1 & above	A	2.64 (2.63)	13.57 (13.52)	16.21 (16.15)	6.53 (6.51)	76.14 (75.87)	82.67 (82.38)	1.47 (1.47)	10.64 (10.60)	89.71 (89.40)	100.35 (100.00)
		B	1.80 (2.08)	6.50 (7.50)	8.30 (9.58)	2.35 (2.71)	75.60 (87.24)	77.95 (89.95)	0.40 (0.47)	4.55 (5.25)	82.10 (94.75)	86.65 (100.00)
	Total	A	4.00 (10.46)	4.61 (12.05)	8.61 (22.51)	3.68 (9.62)	24.68 (64.52)	28.36 (74.14)	1.28 (3.35)	8.96 (23.42)	29.29 (76.58)	38.25 (100.00)
		B	0.66 (1.78)	5.36 (14.43)	6.02 (16.21)	1.02 (2.75)	29.86 (80.42)	30.88 (83.17)	0.23 (0.62)	1.91 (5.15)	35.22 (94.85)	37.13 (100.00)

Figures in the brackets are percentages to the gross cultivated areas.

A = Participants B = Non-participants

Table 3.8 : Cropping Pattern of the Selected Families in Kharif (Figures in Acres)

Irrigated Area

	Size of holding (acres)		Area under Kharif crops (Average per family)								Total
			Bajari	Ground-nut	Cotton CO2	Jowar	Paddy	Maize	Fodder	Vege-tables	
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VI	Upto 10	A	0.67 (20.24)	-	1.21 (36.56)	0.67 (20.24)	-	0.54 (16.31)	-	0.22 (6.65)	3.31 (100.00)
		B	- -	-	- -	- -	- -	- -	- -	- -	-
V	10.1-20	A	0.26 (8.28)	0.01 (0.32)	0.90 (28.67)	0.32 (10.19)	0.03 (0.95)	1.25 (39.81)	0.06 (1.91)	0.31 (9.87)	3.14 (100.00)
		B	- -	- -	- -	- -	- -	- -	- -	- -	-
IV	20.1-30	A	0.41 (9.19)	-	0.88 (19.73)	1.30 (29.15)	0.10 (2.24)	1.28 (28.70)	0.13 (2.91)	0.36 (8.08)	4.46 (100.00)
		B	0.19 (18.27)	-	0.11 (10.58)	0.31 (29.81)	-	0.33 (31.73)	-	0.10 (9.61)	1.04 (100.00)
III	30.1-50	A	0.38 (7.54)	-	0.78 (15.49)	1.60 (31.75)	0.17 (3.37)	1.67 (33.13)	0.22 (4.36)	0.22 (4.36)	5.04 (100.00)
		B	- -	-	- -	0.41 (93.18)	0.03 (6.82)	- -	-	-	0.44 (100.00)

Table 3.8 : (Continued)

	Size of holding (acres)		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
II	50.1-75	A	0.56 (10.04)	0.44 (7.88)	0.72 (12.90)	0.64 (11.47)	0.89 (15.95)	1.83 (32.80)	0.22 (3.94)	0.28 (5.02)	5.58 (100.00)
		B	- -	- -	- -	0.17 (94.44)	- -	- -	- -	0.01 (5.56)	0.01 (100.00)
I	75.1 & above	A	0.14 (5.30)	- -	0.81 (30.68)	1.36 (51.52)	- -	- -	- -	0.33 (12.50)	2.64 (100.00)
		B	- -	- -	0.34 (18.89)	- -	- -	1.46 (81.11)	- -	- -	1.80 (100.00)
	Total	A	0.38 (9.50)	0.07 (1.75)	0.87 (21.75)	0.90 (22.50)	0.18 (4.50)	1.19 (29.75)	0.11 (2.75)	0.30 (7.50)	4.00 (100.00)
		B	0.04 (6.06)	- -	0.07 (10.60)	0.17 (25.76)	0.01 (1.52)	0.34 (51.51)	- -	0.03 (4.55)	0.66 (100.00)

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Table 3.8 : (Continued)

Non-irrigated Area

	Size of holding (acres)		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VI	Upto 10	A	-	0.67 (100.00)	-	-	-	-	-	-	0.67 (100.00)
		B	0.25 (75.75)	0.08 (24.25)	-	-	-	-	-	-	0.33 (100.00)
V	10.1-20	A	0.51 (25.63)	1.20 (60.30)	0.01 (0.50)	0.08 (4.02)	0.19 (9.55)	-	-	-	1.99 (100.00)
		B	0.33 (56.89)	0.08 (13.79)	-	-	-	0.17 (29.31)	-	-	0.58 (100.00)
IV	20.1-30	A	0.31 (12.30)	1.75 (69.45)	-	-	-	0.15 (5.95)	-	0.31 (12.30)	2.52 (100.00)
		B	1.33 (27.54)	1.39 (28.78)	0.22 (4.55)	1.17 (24.22)	-	0.33 (6.83)	0.11 (2.28)	0.28 (5.80)	4.83 (100.00)
III	30.1-50	A	0.56 (11.50)	3.62 (74.33)	-	0.30 (6.16)	0.17 (3.49)	-	0.22 (4.52)	-	4.87 (100.00)
		B	2.15 (28.66)	4.71 (62.78)	-	0.36 (4.80)	-	0.14 (1.88)	-	0.14 (1.88)	7.50 (100.00)

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Table 3.8 : (Continued)

	Size of holding (acres)		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
II	50.1-75	A	5.22 (63.04)	3.06 (36.96)	-	-	-	-	-	-	8.28 (100.00)
		B	10.35 (82.67)	1.17 (9.34)	-	1.00 (7.99)	-	-	-	-	12.52 (100.00)
I	75.1 & above	A	7.86 (57.92)	5.29 (38.98)	-	0.28 (2.06)	0.14 (1.04)	-	-	-	13.57 (100.00)
		B	3.10 (47.69)	2.60 (40.00)	-	-	-	-	0.80 (12.31)	-	6.50 (100.00)
Total		A	1.94 (42.08)	2.35 (50.98)	-	0.10 (2.17)	0.10 (2.17)	0.03 (0.65)	0.03 (0.65)	0.06 (1.30)	4.61 (100.00)
		B	2.77 (51.69)	1.70 (31.72)	0.05 (0.93)	0.49 (9.14)	-	0.13 (2.42)	0.13 (2.42)	0.09 (1.68)	5.36 (100.00)

Figures in the brackets are percentages to the gross cultivated areas.

A = Participants B = Non-participants

Table 3.9 : Cropping Pattern of the Selected Families in Rabi (Figures in Acres)

Irrigated Area

	Size of holding (acres)		Area under Rabi crops (Average per family)									Total
			Mexican wheat (1)	Local wheat (2)	Jowar (3)	Gram (4)	Cotton (5)	Maize (6)	Hulaga (7)	Vege-tables (8)	Fodder (9)	(10)
VI	Upto 10	A	0.60 (16.35)	0.32 (8.72)	1.46 (39.78)	0.04 (1.09)	- -	1.17 (31.88)	- -	0.08 (2.18)	- -	3.67 (100.00)
		B	- -	- -	- -	- -	- -	- -	- -	- -	- -	-
V	10.1-20	A	1.26 (56.50)	0.36 (16.14)	0.07 (3.15)	- -	- -	0.38 (17.04)	- -	0.10 (4.48)	0.06 (2.69)	2.23 (100.00)
		B	- -	0.07 (12.07)	0.51 (87.93)	- -	- -	- -	- -	- -	- -	0.58 (100.00)
IV	20.1-30	A	0.77 (34.53)	0.63 (28.25)	0.30 (13.45)	0.15 (6.73)	- -	0.12 (5.38)	- -	0.15 (6.73)	0.11 (4.93)	2.23 (100.00)
		B	- -	0.41 (36.61)	0.54 (48.21)	- -	- -	0.03 (2.68)	- -	0.14 (12.50)	- -	1.12 (100.00)
III	30.1-50	A	1.30 (29.21)	0.53 (11.91)	0.89 (20.00)	0.61 (13.71)	- -	0.45 (10.11)	- -	0.44 (9.89)	0.23 (5.17)	4.45 (100.00)
		B	- -	0.21 (51.22)	- -	- -	- -	- -	- -	0.20 (48.78)	- -	0.41 (100.00)

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Table 3.9 : (Continued)

	Size of holding (acres)		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
II	50.1-75	A	1.96 (33.28)	1.44 (24.45)	0.42 (7.13)	1.00 (16.98)	0.08 (1.36)	0.39 (6.61)	- -	0.38 (6.45)	0.22 (3.74)	5.89 (100.00)
		B	- -	0.43 (22.27)	1.42 (73.58)	- -	- -	- -	- -	0.08 (4.15)	- -	1.93 (100.00)
I	75.1 & above	A	1.39 (21.29)	0.71 (10.87)	3.80 (58.19)	- -	- -	0.04 (0.61)	- -	0.38 (5.82)	0.21 (3.22)	6.53 (100.00)
		B	- -	- -	1.25 (53.19)	0.10 (4.26)	- -	- -	0.60 (34.04)	0.20 (8.51)	- -	2.35 (100.00)
	Total	A	1.22 (33.15)	0.63 (17.11)	0.83 (22.55)	0.27 (7.34)	0.01 (0.27)	0.38 (10.33)	- -	0.21 (5.71)	0.13 (3.54)	3.68 (100.00)
		B	- -	0.21 (20.59)	0.59 (57.84)	0.01 (0.98)	- -	- -	0.11 (10.76)	0.10 (9.61)	- -	1.02 (100.00)

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Table 3.9 : (Continued)

Non-irrigated Area

	Size of holding (acres)		Area under Rabi crops (Average per family)							Total
			Mexican wheat (1)	Local wheat (2)	Jowar (3)	Gram (4)	Cotton (5)	Maize (6)	Saf-flower (7)	(8)
VI	Upto 10	A	-	-	0.83	-	-	-	-	0.83
			-	-	(100.00)	-	-	-	-	(100.00)
		B	0.07	2.00	3.49	0.66	-	-	-	6.22
			(1.13)	(32.15)	(56.11)	(10.61)	-	-	-	(100.00)
V	10.1-20	A	0.02	0.17	6.93	0.08	0.98	-	-	8.18
			(0.24)	(2.08)	(84.72)	(0.98)	(11.98)	-	-	(100.00)
		B	-	1.50	9.60	0.42	0.33	-	-	11.85
			-	(12.66)	(81.01)	(3.55)	(1.78)	-	-	(100.00)
IV	20.1-30	A	0.46	0.58	13.39	1.15	0.38	-	0.69	16.65
			(2.76)	(3.48)	(80.43)	(6.91)	(2.28)	-	(4.14)	(100.00)
		B	-	2.00	15.00	1.38	0.78	-	0.44	19.60
			-	(10.20)	(76.53)	(7.05)	(3.98)	-	(2.24)	(100.00)
III	30.1-50	A	-	2.29	18.83	-	5.00	-	2.00	28.12
			-	(8.14)	(66.97)	-	(17.78)	-	(7.11)	(100.00)
		B	-	3.25	24.69	0.64	1.57	-	2.71	32.86
			-	(9.89)	(75.14)	(1.95)	(4.78)	-	(8.24)	(100.00)

Contd...

Table 3.9 : (Continued)

	Size of holding (acres)		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
II	50.1-75	A	- -	3.11 (7.46)	30.46 (73.08)	1.00 (2.40)	6.00 (14.40)	0.22 (0.53)	0.89 (2.13)	41.68 (100.00)
		B	- -	4.75 (10.48)	30.23 (66.72)	0.83 (1.83)	6.83 (15.07)	- -	2.67 (5.90)	45.31 (100.00)
I	75.1 & above	A	- -	3.86 (5.07)	53.42 (70.16)	0.71 (0.93)	6.86 (9.01)	- -	11.29 (14.83)	76.14 (100.00)
		B	- -	12.40 (16.40)	44.20 (58.47)	2.60 (3.44)	16.40 (21.69)	- -	- -	75.60 (100.00)
Total		A	0.10 (0.41)	1.39 (5.63)	18.09 (73.30)	0.49 (1.99)	2.74 (11.10)	0.03 (0.12)	1.84 (7.45)	24.68 (100.00)
		B	0.01 (0.03)	3.90 (13.06)	20.22 (67.72)	1.06 (3.55)	3.67 (12.29)	- -	1.00 (3.35)	29.86 (100.00)

Figures in the brackets are percentages to the gross cultivated areas.

A = Participants B = Non-participants

crops was more than 83 per cent of the total irrigated cropped area in the Rabi season for the participants. For the non-participants, local wheat, jowar and hulga were the most important crops covering about 89 per cent of the total irrigated cropped area in the Rabi season. A comparison of the cropping patterns on irrigated area of the participants and the non-participants shows that the former were predominantly wheat growers with more than 50 per cent of the total irrigated area covered by either Mexican or local wheat and the latter were mainly jowar growers with 58 per cent of the irrigated cropped area under jowar. In the case of the participants, Mexican wheat appears to have replaced jowar on the irrigated land.

On the non-irrigated land, jowar, local wheat and cotton were the most important crops grown during the Rabi season. They combinedly represented 90 per cent of the dry cropped area for the participants and 92 per cent for the non-participants. In fact, jowar as a single crop occupied the most predominant position in the cropping pattern of both the participants and the non-participants. It constituted 73 per cent of the total dry cropped area for the former and 68 per cent for the latter.

CHAPTER IV

CASH EXPENDITURE, CREDIT AVAILABILITY AND DIFFERENTIAL YIELD RATE FOR MEXICAN WHEAT

4.1 Cash Expenditure for Production of Mexican Wheat and Other Local Varieties

A comparison of the cash expenditure pattern of production of Mexican wheat and that of the other local varieties shows an increase in the extent of cash requirement by the farmers for replacing the local varieties by the Mexican variety. The Mexican wheat was grown on irrigated land only except for three farmers who experimented it on small pieces of dry cultivated land. In the case of the latter, it was completely proved to be unsuccessful as in one case, the seeds did not sprout at all and in the other two cases, the yield was less than half of that of the local varieties under the dry condition. We have therefore ignored the area under Mexican wheat under non-irrigated condition for the purpose of comparison. In Tables 4.1, 4.2 and 4.3, we present the data in respect of the current farm expenditure in cash for the Mexican wheat (irrigated), local wheat (irrigated) and local wheat (non-irrigated) respectively. A comparison of the cash expenditure pattern of the first two, namely, the Mexican wheat (irrigated) and the local wheat (irrigated) shows that there is remarkable increase in some of the items of costs. These tables give the cash expenditure per acre for the items like seed, organic manures, chemical fertilizers, land revenue, human labour and bullock labour for the Mexican and the local varieties. As the rent paid to the landlord was in kind, it is not accounted here. The data are given according to the size of cultivated holding groups and are presented separately for the participants and the non-participants. The item-wise comparison of the per acre cash expenditure incurred on the production of the Mexican variety and the local variety (irrigated) is presented below:

(a) Seed:

The cash expenditure on seed was Rs.53.61 per acre in the case of the Mexican variety whereas in the case of the local variety (irrigated), it was only Rs.8.95 and Rs.7.85 for the participants and the non-participants respectively. It is quite natural because the majority of the farmers bought the Mexican seed and very few reported self-production, whereas the seed of the local variety was mainly produced by the farmers themselves. When the Mexican variety will be established in the economy of the farmers, it is quite reasonable to expect that they produce themselves the seed required and the cash expenditure on seed item will be reduced. The variation in expenditure on seed for different size of holding groups was significant for both the varieties and for the participants and the non-participants as well. Farmers cultivating more than 50 acres generally produced themselves the whole of their seed requirement for the local varieties and a major part of the requirement for the Mexican variety.

Table 4.1 : Current Farm Expenditure in Cash for Mexican Wheat

	Size of holding group (Acres)		Area (Acres)	Cash expenditure per acre (in rupees)						
				Seed	Organic manures	Chemical fertilizers	Land revenue	Human labour	Bullock labour	Total expenditure
VI	Upto 10	A	3.62	80.87	34.25	129.20	12.00	106.42	36.74	399.48
		B	-	-	-	-	-	-	-	-
V	10.1-20	A	22.92	61.77	17.23	162.11	12.00	169.38	20.11	462.60
		B	-	-	-	-	-	-	-	-
IV	20.1-30	A	10.00	79.94	116.00	161.16	12.00	151.32	36.10	556.52
		B	-	-	-	-	-	-	-	-
III	30.1-50	A	11.70	81.26	68.60	152.35	12.00	146.41	-	460.82
		B	-	-	-	-	-	-	-	-
II	50.1-75	A	17.63	25.44	70.90	137.96	12.00	101.86	1.13	347.29
		B	-	-	-	-	-	-	-	-
I	75.1 & above	A	9.75	15.04	41.03	108.33	12.00	75.54	-	261.69
		B	-	-	-	-	-	-	-	-
	Total	A	75.62	53.61	54.67	146.34	12.00	132.58	12.89	412.09
		B	-	-	-	-	-	-	-	-

A = Participants B = Non-participants

Table 4.2 : Current Farm Expenditure in Cash for Local Wheat (Irrigated)

	Size of holding group (Acres)		Area (Acres)	Cash expenditure per acre (in rupees)						
				Seed	Organic manures	Chemical fertilizers	Land revenue	Human labour	Bullock labour	Total expenditure
VI	Upto 10	A	1.90	13.37	30.53	82.57	12.00	87.10	51.58	277.15
		B	-	-	-	-	-	-	-	-
V	10.1-20	A	6.42	21.18	27.26	67.06	12.00	154.40	-	281.90
		B	0.40	47.50	-	6.75	12.00	67.50	-	133.75
IV	20.1-30	A	8.17	12.33	17.14	35.21	12.00	30.48	13.22	120.38
		B	3.65	8.22	-	20.22	12.00	24.38	2.74	67.56
III	30.1-50	A	4.80	6.98	23.12	48.75	12.00	94.84	-	185.69
		B	1.50	10.00	53.33	40.04	12.00	97.33	-	213.30
II	50.1-75	A	13.00	4.31	-	47.59	12.00	57.96	0.46	121.86
		B	2.60	-	15.38	-	12.00	25.77	-	53.15
I	75.1 & above	A	5.00	-	30.00	8.87	12.00	97.60	-	148.47
		B	-	-	-	-	-	-	-	-
	Total	A	39.29	8.95	16.14	45.10	12.00	78.96	5.40	166.55
		B	8.15	7.85	14.72	16.87	12.00	41.56	1.43	94.43

A = Participants B = Non-participants

Table 4.3 : Current Farm Expenditure in Cash for Local Wheat (Non-irrigated)

	Size of holding group (Acres)		Area (Acres)	Cash expenditure per acre (in rupees)						
				Seed	Organic manures	Chemical fertilizers	Land revenue	Human labour	Bullock labour	Total expenditure
VI	Upto 10	A	-	-	-	-	-	-	-	-
		B	12.00	18.08	-	13.54	3.48	14.38	18.75	68.23
V	10.1-20	A	3.12	7.37	-	-	3.48	20.67	3.85	35.37
		B	9.00	6.19	-	-	3.48	15.00	6.33	31.00
IV	20.1-30	A	7.50	2.80	-	-	3.48	4.73	-	11.01
		B	18.00	21.03	-	-	3.48	9.19	4.33	38.03
III	30.1-50	A	20.65	13.10	-	-	3.48	5.76	-	22.34
		B	22.75	5.38	-	-	3.48	3.22	5.36	17.44
II	50.1-75	A	28.00	1.93	-	-	3.48	4.13	1.14	10.68
		B	28.50	-	-	-	3.48	2.05	-	5.53
I	75.1 & above	A	27.00	10.74	-	0.61	3.48	1.13	1.46	17.42
		B	62.00	2.74	-	-	3.48	0.59	-	6.81
	Total	A	86.27	7.63	-	0.19	3.48	4.23	0.97	16.50
		B	152.25	6.20	-	1.07	3.48	4.21	3.17	18.13

A = Participants B = Non-participants

(b) Organic Manures:

Organic manure used in the selected villages was mainly in the form of farmyard manure consisting of cattle dung and vegetable waste. It was self-produced by the farmers who owned cattle and there were many instances of even such farmers buying the extra quantity required from the farmers within the village or from the neighbouring village. The average cash expenditure thus incurred on farmyard manure by the participants was Rs.54.67 per acre for growing Mexican wheat. The corresponding figure for local variety (irrigated) was Rs.16.14 for the participants and Rs.14.72 for the non-participants. It is difficult to explain the variation in per acre expenditure on organic manure for different size-groups. In the case of Mexican wheat, it was as high as Rs.116 for Group IV and only Rs.17.23 for Group V. In the case of local wheat (irrigated), a large majority of the non-participant farmers did not incur any expenditure on organic manure. In size group III, the expenditure incurred was, however, as large as Rs.53.33 which alone influenced the average expenditure by all the non-participants.

(c) Chemical Fertilizers:

For the Mexican variety, the per acre cash expenditure on chemical fertilizers was Rs.45.10 for the participants and Rs.16.87 for the non-participants. Variation in this expenditure due to different size of holding groups was not significant for the Mexican variety. In the case of the local variety (irrigated) the variation for different size groups was quite marked for both the participants and the non-participants. In the case of the participants, the middle and the lower size groups incurred more expenditure on fertilizers as compared to the higher size groups. In the case of the non-participants, it is not possible to establish any relationship between the size groups and the expenditure on chemical fertilizers.

(d) Land Revenue:

The rate of land revenue varied from village to village and from plot to plot depending upon the fertility of the soil and the type of irrigation available. In our enquiry, we had asked the farmers to report about the land revenue and the cess paid by them for the different plots on which different crops were grown. The farmers, however, could not respond to the question as many of them did not know the amount of land revenue and the cess they paid for the different plots. We therefore collected the total land revenue and the cess paid by the farmers which was easier for them to report. These figures, however, were not useful for our purpose as they represented the averages for both the irrigated and the dry lands. On the basis of the village records, we therefore worked out the average rates of Rs.12.00 and Rs.3.48 per acre for irrigated and dry land respectively. These rates included the land revenue as well as the cess charged by the State Government during the year of enquiry. We have adopted these rates uniformly for all the size-groups.

Table 4.4 : Operationwise Cash Expenditure on Human Labour for Wheat by Participants

Operation	Expenditure per acre (in rupees)								
	Mexican wheat irrigated			Local variety wheat irrigated			Local variety wheat non-irrigated		
	Cash	Kind	Total	Cash	Kind	Total	Cash	Kind	Total
Ploughing	13.75	-	13.75	6.94	-	6.94	0.08	-	0.08
Manuring	10.71	-	10.71	3.32	-	3.32	0.02	-	0.02
Harrowing & Levelling	13.73	-	13.73	13.60	-	13.60	-	-	-
Irrigation	7.48	-	7.48	1.22	-	1.22	-	-	-
Sowing	12.90	-	12.90	11.53	-	11.53	0.43	-	0.43
Weeding	39.20	-	39.20	28.62	-	28.62	0.96	-	0.96
Harvesting	20.08	15.32	35.40	7.69	10.17	17.86	1.57	7.50	9.07
Threshing & Winnowing	14.73	5.90	20.63	6.04	7.16	13.20	1.17	2.72	3.89
Total	132.58	21.22	153.80	78.96	17.33	96.29	4.23	10.22	14.45

(e) Human Labour:

Per acre cash expenditure on human labour was Rs.132.58 for the Mexican variety and in the case of the local variety (irrigated), it is Rs.78.96 for the participants and 41.56 for the non-participants. For Mexican variety, the middle Groups III to V spent from Rs.146 to Rs.169 as against the corresponding figures of Rs.75 for Group I to Rs.106 for Group VI which are the top and the bottom groups respectively. In the case of the local variety (irrigated), the variation in expenditure on human labour was from Rs.30 for Group IV to Rs.154 for Group V for the participants and no relationship between the size-group and the expenditure on human labour could be established. For Size Group V, the expenditure on human labour was extraordinarily high because two farmers belonging to that Group in the village Babaleshwar ploughed back the crop once sown as it did not germinate properly and resowed their fields. For the non-participants, the expenditure on human labour varied from Rs.24 to Rs.27 for Groups IV and III respectively, and in this case also, the relationship between the size group and the expenditure could not be established.

It is clear from Tables 4.1 and 4.2 that the per acre expenditure on human labour for the Mexican variety was nearly double to three times the expenditure incurred by the participants and the non-participants respectively on the local variety (irrigated). Which are the operations where the expenditure on human labour varies widely for the Mexican variety as compared to the local variety (irrigated), is a pertinent question seeking the pattern of differential human labour costs for the two varieties. Tables 4.4 and 4.5, which give operation-wise cash expenditure on human labour for the Mexican and local varieties by the participants and the local varieties by the non-participants respectively answer this question satisfactorily. Except for harrowing and levelling and sowing operations, for all the other operations, the expenditure on human labour for the Mexican variety was nearly one and a half times to three times more than the expenditure incurred on the local variety (irrigated).

Table 4.5 : Operationwise Cash Expenditure on Human Labour for Wheat by Non-participants

(Per acre in Rs.)

Operation	Local variety irrigated			Local variety non-irrigated		
	Cash	Kind	Total	Cash	Kind	Total
Ploughing	-	-	-	0.49	-	0.49
Manuring	1.48	-	1.48	-	-	-
Harrowing & Levelling	7.37	-	7.37	-	-	-
Irrigation	1.19	-	1.19	-	-	-
Sowing	3.26	-	3.26	0.42	-	0.42
Interculturing	-	-	-	0.23	-	0.23
Weeding	24.56	-	24.56	-	-	-
Harvesting	1.48	15.21	16.69	1.24	7.17	8.41
Threshing & Winnowing	2.22	14.48	16.70	1.83	2.08	3.91
Total	41.56	29.89	71.25	4.21	9.25	13.46

Table 4.6 : Operationwise Cash Expenditure on Bullock Labour for Wheat by Participants

Operation	Expenditure per acre (in rupees)								
	Mexican wheat irrigated			Local variety wheat irrigated			Local variety wheat non-irrigated		
	Cash	Kind	Total	Cash	Kind	Total	Cash	Kind	Total
Ploughing	10.31	-	10.31	4.18	-	4.18	0.48	-	0.48
Manuring	0.96	-	0.96	-	-	-	-	-	-
Harrowing & Levelling	0.13	-	0.13	-	-	-	-	-	-
Irrigation	0.56	-	0.56	1.07	-	1.07	-	-	-
Sowing	0.93	-	0.93	0.15	-	0.15	0.49	-	0.49
Weeding	-	-	-	-	-	-	-	-	-
Harvesting	-	-	-	-	-	-	-	-	-
Threshing & Winnowing	-	-	-	-	-	-	-	-	-
Total	12.89	-	12.89	5.40	-	5.40	0.97	-	0.97

(f) Bullock Labour:

Cash expenditure on bullock labour was reported by only the small and the lower medium farmers in the case of the Mexican variety and mainly by the small farmers in the case of the local variety (irrigated). Average expenditure per acre for bullock labour was Rs.12.89 for the Mexican variety as against Rs.5.40 and Rs.1.43 in the case of the participants and the non-participants respectively for the local variety (irrigated). Tables 4.6 and 4.7 give the operationwise cash expenditure incurred by the participants and the non-participants respectively for different varieties. It is seen there that the expenditure incurred on ploughing operation for the Mexican variety was significantly higher as compared to the local variety.

Table 4.7 : Operationwise Cash Expenditure on Bullock Labour for Wheat by Non-participants

(Per acre in Rs.)

Operation	Local variety irrigated			Local variety non-irrigated		
	Cash	Kind	Total	Cash	Kind	Total
Ploughing	-	-	-	1.79	-	1.79
Manuring	-	-	-	-	-	-
Harrowing & Levelling	-	-	-	-	-	-
Irrigation	0.20	-	0.20	-	-	-
Sowing	1.23	-	1.23	1.13	-	1.13
Interculturing	-	-	-	0.14	-	0.14
Weeding	-	-	-	-	-	-
Harvesting	-	-	-	-	-	-
Threshing & Winnowing	-	-	-	0.11	-	0.11
Total	1.43	-	1.43	3.17	-	3.17

(g) Total Expenditure:

Per acre total cash expenditure for the Mexican variety was Rs.412 as against Rs.166 and Rs.93 for the participants and the non-participants respectively in the case of the local variety (irrigated). The total expenditure varied from Rs.262 for Group I to Rs.557 for Group IV in the case of the Mexican variety. As regards the local variety (irrigated), the variation was from Rs.120 for Group IV to Rs.277 for Group VI in the case of the participants and from Rs.53 for Group II to Rs.213 for Group III for the non-participants. Any relationship between the size of holding groups and the total expenditure per acre could not be established.

4.2 Credit Availability for Crop Production

Farmers required credit for meeting the cash expenses needed for carrying on different agricultural operations. The cooperative societies, the private money lenders (including the friends and the relatives) and a local branch office of a commercial bank were the three sources from which the farmers get the required credit.

Table 4.8 presents the figures in respect of the number of farmers borrowing from different sources, during Kharif and Rabi seasons. Out of 62 participants, 31 borrowed credit during the Kharif season and the corresponding number for the Rabi season was 35. On the other hand, out of 39 non-participants, 18 borrowed during the Kharif season and only 10 borrowed during the Rabi season. There were a few farmers who borrowed from more than one source. Cooperatives were the major source of credit for both the participants and the non-participants during the Kharif season whereas during the Rabi season, the private money-lenders and to a lesser extent the cooperatives accommodated the participants. The non-participants were mainly accommodated by the private money-lenders. The role of the commercial bank as a source of credit supply was a very minor one both in the Kharif and the Rabi seasons.

In Table 4.9 figures regarding the per acre borrowings from the different sources for the Kharif and the Rabi seasons are presented. In the case of the participants, the per acre borrowings from all the sources amounted to Rs.90 for the Kharif season and Rs.31 for the Rabi season. The corresponding figures for the non-participants were Rs.71 and Rs.9 respectively. The size of the cooperative credit was remarkably high during the Kharif season for both the participants and the non-participants. In the Rabi season, on the other hand, the size of the money-lenders' credit was significantly high. Analysis of the data according to size of holding groups showed that the per acre borrowing of the smaller and the lower middle farmers was significantly higher as compared to the bigger farmers. This shows that most of the bigger farmers depended upon their own sources to finance the current farm expenditure whereas the smaller and the lower middle farmers mainly depended upon the outside credit, mainly from the money-lenders' source.

4.3 Differential Yield Rate and the Market Value of the Mexican Variety and the Local Varieties

As we have seen in Table 1.5, the average per acre yield of wheat in Bijapur in 1963-64 was only 138 kgs. as against the standard yield of 230 kgs. This represented the average yield of wheat for both the irrigated and the non-irrigated areas. As figures presented in Table 4.10 reveal, the average yield per acre of the Mexican variety for the selected farmers was 754 kgs. as against 664 kgs. and 554 kgs. for the participants and the non-participants respectively for the local variety (irrigated). The corresponding figures for the local variety (non-irrigated) were as low as 91 kgs. and 70 kgs. for the participants and the non-participants respectively.

The yield rate of the Mexican variety as compared to that of the local variety (irrigated) is not remarkably superior. However, as the irrigated local variety was of inferior quality (useful only for preparing Rava), the market price differential in respect of these two varieties is significantly high. The per quintal prices of different varieties prevailing in the Bijapur market immediately after the wheat harvest are given below:

Table 4.8 : Number of Farmers Borrowing from Different Sources .

	Size of holding (Acres)		Total No.of farmers	Farmers borrowing for Kharif crops				Farmers borrowing for Rabi crops			
				Coope-ratives	Money-lender	Bank	Total	Coope-ratives	Money-lender	Bank	Total
VI	Upto 10	A	6	2	1	1	3	-	3	-	3
		B	6	-	-	-	-	-	1	-	1
V	10.1-20	A	18	5	2	-	7	3	4	1	7
		B	6	2	1	-	3	-	2	-	2
IV	20.1-30	A	13	6	2	1	7	4	5	-	9
		B	9	7	1	-	7	2	1	-	2
III	30.1-50	A	9	4	-	1	4	2	3	-	5
		B	7	4	-	-	4	-	1	-	1
II	50.1-75	A	9	5	1	-	6	3	4	1	8
		B	6	2	-	-	2	-	1	-	1
I	75.1 & above	A	7	3	1	-	4	3	2	-	3
		B	5	2	-	-	2	-	3	1	3
	Total	A	62	25	7	3	31	15	21	2	35
		B	39	17	2	-	18	2	9	1	10

A = Participants B = Non-participants

Table 4.9 : Per Acre Borrowing from Different Sources for Kharif and Rabi Crops

	Size of holding (Acres)		Per acre borrowing for Kharif crops(in Rs.)				Per acre borrowing for Rabi Crops(in Rs.)			
			Coope-ratives	Money-lender	Bank	Total	Coope-ratives	Money-lender	Bank	Total
VI	Upto 10	A	46.08	104.73	48.18	198.99	-	185.05	-	185.05
		B	-	-	-	-	-	4.02	-	4.02
V	10.1-20	A	17.90	30.32	-	68.22	19.93	22.38	5.33	47.64
		B	142.86	142.86	-	285.72	-	13.40	-	13.40
IV	20.1-30	A	55.10	55.10	7.60	117.80	10.71	32.78	-	43.49
		B	114.37	5.67	-	120.04	2.36	10.72	-	13.08
III	30.1-50	A	69.48	-	7.28	76.76	1.02	21.83	-	22.85
		B	54.75	-	-	54.75	-	1.29	-	1.29
II	50.1-75	A	52.91	12.83	-	65.74	5.79	24.30	4.02	34.11
		B	39.37	-	-	39.37	-	3.53	-	3.53
I	75.1 & above	A	66.08	35.24	-	101.32	9.59	5.80	-	15.39
		B	-	-	-	57.83	-	13.85	2.57	16.42
	Total	A	55.95	29.75	4.58	90.28	8.35	21.05	1.55	30.95
		B	67.11	3.45	-	70.56	0.37	8.05	0.83	9.25

A = Participants B = Non-participants

Table 4.10 : Per Acre Yield of Mexican Wheat and Local Variety Wheat (Irrigated & Non-irrigated)

	Size of holding (acres)		Per acre yield of Mexican wheat				Per acre yield of irrigated and non-irrigated local wheat							
			Mexican wheat		Straw		Irrigated wheat		Straw		Non-irrigated wheat		Straw	
			Qty.in qntl.	Value in Rs.	Qty.in qntl.	Value in Rs.	Qty.in qntl.	Value in Rs.	Qty.in qntl.	Value in Rs.	Qty.in qntl.	Value in Rs.	Qty.in qntl.	Value in Rs.
VI	Upto 10	A	9.31	1024.03	2.07	75.41	9.37	608.95	1.05	36.32	-	-	-	-
		B	-	-	-	-	-	-	-	-	1.27	152.80	0.46	16.25
V	10.1-20	A	7.10	781.33	0.89	32.07	6.74	438.40	0.70	25.23	2.48	298.08	0.40	14.42
		B	-	-	-	-	10.00	650.00	2.50	90.00	0.65	77.60	0.40	14.67
IV	20.1-30	A	10.05	1105.61	2.88	103.80	4.80	311.95	1.19	43.33	0.17	20.16	0.17	6.40
		B	-	-	-	-	2.87	186.99	0.14	4.10	1.05	125.80	0.33	11.67
III	30.1-50	A	7.50	825.47	1.22	44.10	6.25	406.25	0.57	20.62	1.81	96.93	0.37	13.37
		B	-	-	-	-	5.47	355.33	0.17	6.00	0.56	67.67	0.28	10.42
II	50.1-75	A	6.70	736.68	1.02	36.93	5.98	388.50	0.37	13.15	1.34	160.58	0.28	10.18
		B	-	-	-	-	8.46	550.00	-	-	0.71	85.68	0.13	4.63
I	75.1 & above	A	6.91	760.41	1.05	37.54	10.60	689.00	0.20	7.20	0.55	66.67	0.12	4.22
		B	-	-	-	-	-	-	-	-	0.55	65.42	0.18	6.39
	Total	A	7.54	829.55	1.31	47.33	6.64	431.80	0.63	22.68	0.91	108.72	0.25	8.90
		B	-	-	-	-	5.48	536.50	0.21	7.36	0.70	84.30	0.24	8.55

A = Participants B = Non-participants

Variety	Price per quintal
Mexican wheat	Rs. 110
Local wheat (irrigated)	Rs. 65
Local wheat (non-irrigated)	Rs. 120

These price differentials are suggestive of the differences in quality of the different varieties. The Mexican variety, with high yields which were competitive with those of the irrigated local variety, had the additional advantage over the latter in respect of the market value. In terms of value, per acre yield of the Mexican variety was as high as Rs.830 as against Rs.432 and Rs.357 for the participants and the non-participants respectively for the irrigated local variety. Even with the increased per acre cash expenditure for the production of the Mexican variety, the farmers found it more profitable to grow the new variety as compared to irrigated local variety. It is therefore quite feasible to expect that during the coming years, the area under the irrigated local variety would be mainly replaced by the Mexican variety. Though little improvement would be expected in the yield rate, the farmers would be highly benefited by the price-rise due to improvement in the quality of the product.

It could be seen from the figures presented in Table 4.10 that 'yield performance' was better in the case of the small and the medium farmers in comparison with that of the big farmers, particularly in respect of the Mexican variety. The per acre yield of the Mexican wheat was 6.91, 6.70 and 7.50 quintals for the size groups I, II and III respectively as against 10.05, 7.10 and 9.31 quintals for the size groups IV, V and VI respectively. This could be due to the higher level of acceptance of the recommended practices by the small and medium size groups. The Mexican wheat growing being labour intensive, it appears that the small and medium size groups with their surplus labour could accept certain labour intensive practices more intensively and improve their yield rates. In the following chapter, we shall see the relationship between the rate of acceptance of the recommended practices and the yield rate.

CHAPTER V

ACCEPTANCE OF THE RECOMMENDED CULTIVATION PRACTICES AND THEIR RELATIONSHIP WITH THE YIELD RATE

5.1 Yield Performance Groups

At the end of Section 1.4, we nave presented a brief account of the standard cultivation practices for growing Mexican wheat as recommended by the extension authorities. In this chapter, we will look into the rate of acceptance of those recommendations by the selected farmers and also their relationship with the yield rate.

To start with, the farmers were grouped into 6 classes according to their 'yield performance' as shown in Table 5.1. Out of 62 Mexican wheat growers, 5 reported very high yields of 15.01 quintals to 20 quintals per acre. We think that the yield performance of these 5 farmers is 'excellent'. There were 12 farmers whose yield rate ranged from 10.01 quintals to 15 quintals and we think that their yield performance is 'very good'. Similarly, there were 10 farmers with their yield rates varying from 7.01 quintals to 10 quintals, 15 farmers with an yield rate range from 4.01 quintals to 7 quintals and we consider that their yield performances are 'good' and 'moderate' respectively. At the bottom, we have two classes of the farmers who reported low yields per acre. There were 9 farmers whose yield rates varied from 2.01 quintals to 4 quintals and 11 farmers whose yield rate did not go beyond 2 quintals. We consider that their yield performances are 'bad' and 'very bad' respectively. In the following paragraphs we shall relate the rate of acceptance of the recommended practices to the yield performance groups as listed above. This relationship will be considered in respect of (a) the presowing tillage practices, (b) inputs of farmyard manure and chemical fertilizers, (c) the sowing practices, and (d) the watering practice.

Table 5.1 : Classification of the Mexican Wheat Growers According to Per Acre Yield

Per acre yield (Quintals)	Yield performance	No. of farmers
15.01 to 20.00	Excellent	5
10.01 to 15.00	Very good	12
7.01 to 10.00	Good	10
4.01 to 7.00	Moderate	15
2.01 to 4.00	Bad	9
Upto 2.00	Very bad	11
Total		62

5.2 The Presowing Tillage Practices

According to the recommended practices, the farmers were advised to bring the soil to a fine tilth by ploughing deep. It was recommended to plough by an iron plough for two times and harrow for 4-5 times to bring the soil to a fine tilth. As none of the farmers did ploughing for more than one time, the variation in yield due to number of ploughings could not be considered. We could consider the variations in types of plough, depth of ploughing and number of harrowings. Table 5.2 gives the frequency distribution of the Mexican wheat growers regarding adoption of presowing tillage practices.

Out of 62 farmers, 58 reported ploughing and only 4 did not plough. The type of the plough used was iron plough in the case of 43 farmers and wooden plough in the case of 12 farmers. Tractor ploughing was reported by 3 farmers. Type of plough did not have much influence over the yield rate except that wooden ploughs were wholly used by the low yield rate groups.

In the questionnaire canvassed to the selected farmers, the respondents were asked to report about the depth of ploughing. Twentythree farmers reported that the ploughing was done at the depth of 6". Similarly, the number of farmers reporting 7" depth was 9, 8" depth was 15, 9" depth was 10 and 10" depth was 1. It was difficult to establish any correlationship between the variation in depth of ploughing and the yield performance.

Number of harrowing was reported from 1 to 6 times by different farmers. The practice of cross harrowings was quite prevalent and whenever one cross harrowing was reported, we have considered it as two straight harrowings. A large number of farmers reported 2 or 4 harrowings. Most of these farmers cross-harrowed their fields once or twice. In the case of the number of harrowings too, we could not establish any correlationship with the yield rate.

5.3 Inputs of Farmyard Manure and Chemical Fertilizers

The recommended dose of the farmyard manure was 8-10 carloads, and the N P K requirement in the form of different fertilizers was 40 kg. of N, 20 kg. of P, and 15 kg. of K. The selected farmers used the following types of chemical fertilizers with the percentage content of N, P and K.

	N	P	K
Ammonium Sulphate	20	-	-
Urea	46	-	-
Superphosphate (Single)	-	16	-
Muriate of Potash	-	-	50
Di-Ammonium Phosphate	21	53	-
Nitrophosphate	12.9	12.9	-
Mixture 15-5-5	15	5	5

In Table 5.3, we have presented the average per acre inputs of farmyard manure in cartloads and N, P, K units of different yield performance groups. On an average, the Mexican wheat growers used 13 cartloads of farmyard manure,

Table 5.2 : Adoption of Presowing Tillage Practices According to 'Yield Performance' Groups

Yield performance	Total No.of cases	Type of plough				Depth of ploughing					No. of harrowings					
		Wooden	Iron	Tractor	No Ploughing	6"	7"	8"	9"	10"	1	2	3	4	5	6
Excellent	5	-	5	-	-	3	-	2	-	-	-	2	1	2	-	-
Very good	12	-	11	1	-	6	4	-	2	-	2	6	-	3	-	1
Good	10	-	8	-	2	4	1	3	-	-	3	3	-	3	-	1
Moderate	15	4	9	1	1	5	-	3	6	-	1	4	-	8	-	2
Bad	9	3	6	-	-	-	4	2	2	-	-	4	2	3	-	-
Very bad	11	5	4	1	1	5	-	4	-	1	-	3	-	8	-	-
Total	62	12	43	3	4	23	9	15	10	1	6	22	3	27	-	4

54 kg. of N, 23 kg. of P, and 5 kg. of K. It can be seen from the table that the input of farmyard manure which varied from 5 cartloads for the 'excellent' performance group to 18 cartloads for the 'very good' performance group was not a very useful factor determining the yield. Even the 'bad' and the 'very bad' performance groups which reported 16 cartloads and 11 cartloads respectively - which are certainly more than the recommended doses - found these inputs not useful for increasing the yield rate. Similarly, input of nitrogen was far above the recommended dose in respect of many of the yield performance groups and it cannot be said conclusively that increase in the nitrogen inputs resulted in better yields. On the other hand, the inputs of phosphorous and potassium appear to be highly correlated with the yield rates. This relationship is markedly seen in the case of potassium. In the case of phosphorous, inputs were below the recommended dose for 'moderate', 'bad' and 'very bad' performance groups, whereas they were slightly more than the recommended dose for 'good' performance group and double the recommended dose in the case of the 'very good' and 'excellent' groups. Input of potassium was below the recommended dose for all the groups except the 'excellent' performance group. This leads one to conclude that phosphorous and potassium are the most significant factors determining the yield and one can also raise a suspicion as to the present recommended doses of phosphorous and potassium being too small to be effective.

Table 5.3 : Per Acre Input of Farmyard Manure and Chemical Fertilizers Converted Into N.P.K. Units for Different 'Yield Performance' Groups

Yield performance	Farmyard manure (Cartloads)	Chemical fertilizers (kg.)		
		N	P	K
Excellent	5	59	39	14
Very good	18	73	50	7
Good	9	53	23	5
Moderate	14	56	15	3
Bad	16	52	15	2
Very bad	11	34	6	1
Total	13	54	23	5

5.4 Adoption of Sowing Practices

According to the recommendation, sowing should be done between 25th September and 15th October. It was recommended to drill the seed shallow, not more than 2 inches deep, in rows 6 inches to 9 inches apart, at the rate of 40 kg. per acre when there is enough moisture in the soil. Either S-64 or Lerm Roza varieties of seed were recommended as suitable to the tract. In Table 5.4, we give the data regarding the adoption of the sowing practices by the

Table 5.4 : Adoption of Sowing Practices According to 'Yield Performance' Groups

Yield performance	Total No.of cases	Seed variety		Average seed rate (kg.)	Spacing				Depth sowing			Month and week of sowing															
												October				November				December				Jan			
		S. 64	L. R.		12" cross	12" line	9" cross	9" line	1"	2"	3"	I	II	III	IV	I	II	III	IV	I	II	III	IV	I			
Excellent	5	-	5	63	-	-	5	-	5	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-		
Very good	12	-	12	51	1	-	11	-	12	-	-	-	-	-	6	3	-	-	2	1	-	-	-	-	-		
Good	10	2	8	45	2	-	8	-	9	1	-	-	1	-	1	2	-	-	1	1	-	3	-	1			
Moderate	15	11	4	38	11	2	-	2	-	-	15	-	5	1	2	2	-	-	2	-	-	-	1	2			
Bad	9	9	-	29	8	1	-	-	-	1	8	-	1	1	1	1	-	2	-	1	-	-	2	-			
Very bad	11	11	-	26	9	1	-	1	-	-	11	2	3	1	-	-	1	1	-	2	1	-	-	-			
Total	62	33	29	40	31	4	24	3	26	2	34	2	10	3	10	13	1	3	5	5	1	3	3	3			

selected farmers. Out of 62 farmers, 33 used S-64 variety whereas 29 used Lerm Roza which is closely associated with high yield rates. As the two varieties of Mexican seeds available for sowing were in scarcity and their special characteristics were not known to the farmers, they really did not sow a certain variety at their own choice. Either of the two varieties which was made available to the individual farmers at the time of sowing was accepted by them. As far as the seed rate was concerned, though the average seed rate for the total farmers was exactly equal to the recommended seed rate, there were wide variations in the seed rates practised by the different yield performance groups. On an average, the 'very bad' performance group used only 26 kg. of seed as against 63 kg. by the 'excellent' group. Higher yields were very closely associated with higher seed rate which was definitely more than the recommended seed rate. Similarly, cross sowing with 9" spacing was highly correlated with higher yields as against cross sowing with 12" spacing or line sowing with 9" or 12" spacing. Sowing with 1" depth influenced the increase in yields as against sowing with 3" depth which was the local practice. As regards the date of sowing, no correlationship between the date of sowing and the yield rate could be established.

5.5 Watering Practice and Yield Rate

According to the recommended practices, farmers were advised to give five waterings at intervals of 12 days e each. But the experience of the Bijapur farmers in raising irrigated wheat was that 12 to 16 waterings were essential for getting better yields. From our sample, 26 farmers gave upto 4 waterings, 12, from 5 to 8 waterings, 14, from 9 to 12 waterings and 8, from 13 to 16 waterings. Two farmers raised the crop under dry conditions. From Table 5.5, it can be seen that there is a high correlation between the number of waterings and the yield rate.

Table 5.5 : Relationship Between Watering Practice and Yield Rate

Yield performance group	Total No.of cases	No. of waterings given				Dry cultivated
		Upto 4	5 to 8	9 to 12	12 to 16	
Excellent	5	-	-	1	4	-
Very good	12	-	2	6	4	-
Good	10	2	3	5	-	-
Moderate	15	9	4	2	-	-
Bad	9	7	2	-	-	-
Very bad	11	8	1	-	-	2
Total	62	26	12	14	8	2

To conclude, (a) There was not any correlationship between the rate of acceptance of presowing tillage practices and the yield rate. (b) Increase in the rate of input of organic manure did not influence the yield rate significantly. (c) In respect of chemical fertilizers, it could not be said conclusively that increase in the nitrogen inputs resulted in better yields. On the other hand, the inputs of phosphorous and potassium appeared to be highly correlated with the yield rate. (d) As regards the sowing practices, seed variety, depth of sowing, spacing and seed rate were highly correlated with the yield rate. Time of sowing, on the other hand, was not an important factor influencing yield. And lastly, (e) there was a high correlationship between the number of waterings and the yield rate.

CHAPTER VI

CONCLUSION

Most of the high yielding varieties of crops are grown on irrigated lands and they also require high rate of fertilizer inputs. The cultivation practices recommended for growing these crops are also labour intensive. Hence the new varieties could be grown profitably on irrigated lands using more capital and labour. As labour also is to be bought by spending additional money, additional capital expenditure on a large scale is necessary for growing the new varieties of crops. In short, water and capital are the two essential factors necessary for the success of the 'Green Revolution'.

In the Bijapur district, water is scarce. Only 2.95 per cent of the total cropped area was irrigated in 1963-64. In absolute term, the gross area irrigated was 107,113 acres only. Though the agricultural extension officials claim that some of the high yielding varieties of crops (including the Mexican wheat varieties) could be grown under the rain-fed conditions, it is doubtful to believe the success of such crops when the rainfall in the district is so scanty. The success of the high yielding varieties programme in the district is limited by the availability of the irrigated land which is very scarce.

Some of the high yielding varieties of crops like hybrid jowar and hybrid bajra could not compete with their corresponding local varieties even on the irrigated land as the former were highly susceptible to pests and diseases. In 1963-64, the total area under irrigated jowar was 45,436 acres. The achievement of the area under hybrid jowar in 1966-67 and 1967-68 was 3,543 acres and 1,203 acres respectively. Traditionally, bajra was not an irrigated crop in the Bijapur district. In 1963-64, bajra was grown as an irrigated crop on 310 acres only. The achievement of the area under hybrid bajra was 217 acres in 1966-67 and 171 acres in 1967-68. On the other hand, hybrid maize could prove a success because of its high yield and less susceptibility to pests and diseases. The area under irrigated maize in 1963-64 was only 5,412 acres. The area under hybrid maize in 1966-67 and 1967-68 was 16,761 acres and 17,500 acres respectively. Hybrid maize might have been substituted for some other irrigated crop. Mexican wheat, which was introduced in 1967-68 at the farmers' level, showed the potentialities of success by achieving an area of 4,050 acres. The results of our study show that it was competing with irrigated local varieties of jowar and wheat, and also with hybrid maize for its expansion. The expansion of the area under Mexican wheat therefore depends upon the relative profitability of that crop as compared with those of the other competing crops.

Under these circumstances, it was observed that setting of high targets for certain high yielding varieties of crops was unnatural and against the reality of the situation. For instance, the target area for hybrid jowar was 20,500 acres in 1966-67 and 36,000 acres

in 1967-68 as against the achievement of 3,543 acres and 1,203 acres for the respective years. Similarly, the target-area for hybrid bajra was 10,000 acres in both 1966-67 and 1967-68 whereas the achievement was only 217 acres and 171 acres for the respective years. When such large gaps occur between the targets and the achievements, efforts made by the administration in mobilising the scarce resources like fertilizers and pesticides go waste. It is left to anybody to guess that the resources so mobilised could have been used profitably for growing other successful crops. This problem could have been avoided by setting the targets right at the village level instead of at the district and the state levels.

As already stated, the high yielding varieties require more fertilizer, insecticides and labour inputs as compared to the local varieties and hence the farmers growing them need capital to buy those resources. As far as the supply of fertilizers and insecticides were concerned, there was no shortage as the achievement of the area under many high yielding crops was far below the targets fixed. Under the condition of surplus labour availability in the rural areas, labour was also available in abundance. The problem before the farmers who participated in the high yielding varieties programme was not the non-availability of the necessary resources but the non-availability of credit to buy those resources. As we could see the per acre cash expenditure for growing the Mexican variety of wheat was Rs.412 as against Rs.166 for the irrigated wheat of the local variety. Average credit availability per acre for the participants during the Rabi season when the Mexican wheat was grown was only Rs.31. On an average, each participant kept aside Rs.381 from his own source for financing the resources used per acre of Mexican wheat and Rs.135 for the irrigated wheat of the local variety. Scarcity of credit could have forced some of the farmers to grow local variety of wheat or other traditional crops, though irrigated land was available. The credit was mainly supplied by the cooperatives and the money-lenders. The District Central Co-operative Bank did not provide for any special rate of credit for the participants in the High Yield Varieties Programme. The normal rate of credit advanced to the farmers was Rs.25 per acre only. The gap between the cash required for growing the high yielding varieties and the credit available being so wide, many farmers might have felt it impossible to grow the high yielding varieties.

Mexican wheat was grown as an irrigated crop by 60 out of 62 farmers in our sample. The economics of Mexican wheat should therefore be compared with that of the irrigated wheat of the local variety. A simple method of understanding the economics of a given crop production is to establish the relationship between the total inputs and the total outputs. We do not know the total inputs either for the Mexican variety or for the local variety. For collecting the total input figures one needs to undertake a detailed farm business study which we have not attempted. We have however the data in respect of the total cash expenditure incurred by the farmers on each of those crops. We have also the data in respect of the value of the total yield for each of those crops. The data are summarised below:

	Total cash expenditure per acre (Rs.)	Total yield per acre (Rs.)
Local wheat irrigated:		
Participants	166.55	454.48
Non-participants	94.43	543.86
Average	130.49	499.17
Mexican wheat	412.09	876.88

It is obvious from the above figures that the cash expenditure levels of participant and non-participant farmers for growing irrigated local wheat are quite diff different. A participant farmer,on an average, spends Rs.166.55 per acre for growing irrigated local wheat and the corresponding expenditure done by a non-participant farmer is Rs.94.33 only. On the other hand, the value of per acre yield was Rs.454.48 for participant farmer and Rs.543.86 for non-participant farmer, suggesting a high cash-capital efficiency for non-participant farmer. It appears that the participant farmers and the non-participant farmers make two distinct groups of producers, the former using the higher level of purchased inputs while the latter depending mainly upon owned inputs. It is therefore not appropriate to compare the cash-capital efficiencies of these two groups.

We can however compare the cash-capital efficiencies of the irrigated local wheat grown by participant farmers & of the Mexican wheat because the producers belong to the same group. Cash-capital efficiency, i.e. output - cash expenditure coefficient is 2.73 for irrigated local wheat and Rs.2.13 for the Mexican wheat. The efficiency of the extra cash spent on the Mexican wheat over that of the local wheat is 1.72. These output - cash-expenditure coefficients suggest that it is economic for the producers to spend extra cash on the Mexican wheat provided the cash-capital is available at a rate of interest less than 72 per cent. The difference between the output - cash-expenditure ratio and the rate of interest would be the net capital efficiency. This is true only when we assume that the use of owned inputs for irrigated local wheat and the Mexican wheat remains constant.

Mexican wheat may replace irrigated local wheat in a short time provided the major constraint of extra-cash availability is effectively nullified. This requires a progressive change in the attitude of the District Central Co-operative Bank in supplying credit to the Mexican wheat growers. Within a short period, Mexican wheat has occupied an important place in the irrigated agriculture of the district. It should however be reminded that as the irrigated area makes a very small proportion of the total cultivated area in the district,the crop, though successful, has no special importance in the total agricultural economy of the district.

APPENDIX

SCHEDULES USED IN THE FIELD INVESTIGATION

I. Listing Schedule

1. Village

2. Taluka/Block

3. District

Name of the head of the family	Area under wheat	Area under the other crops	Area under the HYVP	Whether member of the Credit Society Yes/No	Remarks

II. Schedule for the participating and the non-participating families

I. 1. Village
2. Taluka/Block
3. District
4. Name of the Cultivator
5. Caste
6. Date
7. Serial No.
8. Whether the cultivator had participated in the HYVP?
9. Whether the cultivator is a member of the Credit Society?
10. Occupations:
    Principal :
    Subsidiary :
11. Size of the household:
    Earning persons :
    Non-earning persons :

II. Land owned and cultivated (in acres):

1. Total owned land
2. Land leased out on cash rent
3. Land leased out on share rent
4. Owned and cultivated land
5. Land leased in on cash rent
6. Land leased in on share rent
7. Total cultivated land
8. Land Utilization (in acres)

Irrigated _____ Unirrigated _____ Current fallow ___

Permanent fallow _____ Total _____

III. Cropping Pattern 1966-67 (in acres)

Kharif			Rabi			
				Irrigated		Unirrigated	
Name of the crop	Irrigated	Unirrigated	Name of the crop	Total area	Double cropped area	Total area	Double cropped area

Area under the perennial crops

Name of the crop :

Area :

IV. Expenditure during 1966-67 over seeds, fertilizers, etc. and the sources of finance

Name of the crop	Area	Item			Home produced		Purchased		Remarks
			Quantity	Value	Quantity	Value	Quantity	Value	

(Information on the following six items will be collected for each crop)

1. Seeds
2. Farm Yard Manure
3. Fertilizers
4. Pesticides
5. Land Revenue
6. Rent

V. Expenditure over human labour and bullock labour

Name of the crop:

(Separate sheet to be used to note expenditure on each crop)

Operation	Number of times performed	Month	Wages paid to human labour			Wages paid to bullock labour		
			Cash	Kind		Cash	Kind	
				Type	Quantity Value		Type	Quantity Value

1. Pre-sowing tillage
2. Transporting and spreading F.Y.M.
3. Preparation of seedlings
4. Transplantation
5. Watering
6. Weeding
7. Spreading fertilizers
8. Harvesting
9. Threshing
10. Winnowing
11. Guarding from birds

VI. Other farm expenses

Item	Expenditure			Total
	Cash	Kind		
		Type	Quantity	Value
1. Fodder				
2. Feeds				
3. Hired bullock labour if any for other than crop production				
4. Wages paid to the permanent farm worker				
5. Others				

VII. Total expenditure (to be compiled from IV and V)

Item	Total expenditure in		
	Kind	Cash	Total
1. Seed			
2. Farm yard manure			
3. Fertilizers			
4. Pesticides			
5. Land revenue			
6. Rent			
7. Labour			
8. Other expenditure			
9. Total			

VIII. Current finance borrowed during the year:

1. Borrowed from whom
2. Purpose of borrowing (crops and items)
3. Date of borrowing

4. Amount borrowed.

   (a) in cash

   (b) in kind

5. Amount actually received

   (a) in cash

   (b) in kind

6. Rate of interest

7. Utilization of the amount

   (a) For the payment of the previous crop loan (amount)

   (b) Other items and amounts

8. Repayments :

   Principal

   Interest

   Total

9. Loan outstanding :

   Principal

   Interest

   Total

IX. Production and disposal

Name of the crop	Area	Production	Sales			Remarks
			Quantity	Value	To whom 1.Society 2.Government 3.Other agency 4.Private sales	
1	2	3	4	5	6	7

X.

1. Reasons for non-participation

2. If participated, experiences about the variety (such as whether the crop had to be abandoned or the use of fertilizers had to be stopped or the crop was a great success etc.)

3. Notes

XI. Adoption of cultivation practices:

1. Type of plough used
2. Number of ploughings
3. Depth of ploughing
4. Number of harrowings
5. Farm-yard manure used (cartloads)
6. Chemical fertilizers used (quantity in kilograms)
   a. Ammonium Sulphate
   b. Urea
   c. Superphosphate (single)
   d. Superphosphate (double)
   e. Muriate of Potash
   f. Di-Ammonium Phosphate
   g. Nitrophosphate
   h. Mixture 15-5-5
7. Variety of seed used
8. Quantity of seed (kilograms)
9. Treatment of seed
10. Depth of sowing
11. Spacing between lines
12. Date of sowing
13. Number of waterings
14. Pesticides used
    a. Type
    b. Quantity