Ad-hoc Study No.39

EVALUATION OF INTENSIVE DEVELOPMENT PROGRAMME FOR PULSES IN NARSINGHPUR DISTRICT, MADHYA PRADESH

AGRO-ECONOMIC RESEARCH CENTRE
For Madhya Pradesh
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C O N T E N T S

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CHAPTER-I

INTRODUCTION

Pulses are an important source of protein in the diet of the Indian people. Since the protein content of pulses is double that of wheat and triple that of potato or rice, pulses are particularly important to low-cost diets. The effectiveness of pulses in overcoming protein deficiency is well known. In addition, the pulses are rich in iron as well as some vitamins. It is estimated that the country would need 160,000 thousand tonnes of pulses by 1978-79 to meet the nutritional requirements of the countrymen. Therefore, due importance was accorded to pulses production in the five year plans.

1.1 Pulse Production Programme in IV Plan

Pulse Production Programme was initiated towards the end of the Fourth Five Year Plan. The approach was two fold (i) increasing the productivity through package of practices and (ii) expansion of area under short duration varieties. An area of 3000 thousand hectares and 300 thousand hectares was targetted to be covered under the package approach and additional area approach respectively to achieve an overall production target of 11,500 thousand tonnes by the end of the IV plan.

In support of this programme, a centrally sponsored scheme was launched in 1972-73. Under this scheme financial assistance was provided to the state Governments as subsidy for larying out extension demonstrations (based on input kit), seed multiplication, plant protection, rhizobium culture and seed supply.

Microbiological laboratories of the State Governments/ Agricultural Universities were also equipped for large scale production of rhizobium culture.

The scheme was widely appreciated by the State Governments and was considered as an important step for increasing the production of pulses in the country. It was decided that while the production programme would be initiated throughout the pulse growing areas of the country special efforts would be put in the selected districts which have potential for pulse production. Accordingly 30 districts were selected for Intensive Pulses Development Programme for 1973-74 (Table 1.1).

1.2 Programme in V Plan

The above programme was continued and intensified in the fifth plan. The pulse production target for the fifth plan was fixed at 14,000 thousand tonnes. This was envisaged through the expansion of the area under pulses from 22,7000 thousand hectares in 1974-75 to 24,000 thousand hectares in 1978-79 (Table 1.2).

Table 1.1 : List of Districts for Intensive Pulses Development Programme under the Centrally Sponsored Scheme

States	No. of Operational Units	Districts of Operation (Selected during 1973-74)	Additional Districts during 1974-75
Andhra Pradesh	2	1. Krishna (Guntur) 2. Warangal (Karimnagar)	
Bihar	2	1. Muzaffarpur 2. Bhagalpur	Purnea
Gujarat	1	Banaskantha	
Haryana	1	Hissar	Bhiwani
Madhya Pradesh	6	1. Narsinghpur 2. Bhind 3. Morena 4. Raisen (Vidisha) 5. Chhindwara 6. Khargone	1. Hoshangabad 2. Jabalpur
Maharashtra	2	1. Aurangabad (Parbhani) 2. Osmanalad (Bhir)	1. Nagpur 2. Poona (Ahmednagar)
Karnataka	1	Gulbarga (Bidar)	Raichur
Orissa	2	1. Ganjam (Koraput) 2. Cuttack (Puri-Balasore)	
Punjab	1	Bhatinda (Ferozepur)	
Rajasthan	3	1. Ganganagar 2. Bharatpur 3. Jaipur	1. Churu (Nagasur) 2. Kota (Bundi)
Tamil Nadu	2	1. Tanjavur (Tiruchirapalli) 2. Ramanathapuram (Tirunelvelli)	
Uttar Pradesh	6	1. Jhansi (Jalaun) 2. Banda (Hamirpur) 3. Allahabad (Kanpur) 4. Lucknow (Rai Bareily) 5. Varanasi (Mirzapur) 6. Faizabad	Meerut (Bulandshahar)
West Bangal	1	Murshidabad (Nadia)	
Total	30		10

Table 1.2: Targets for the Pulses Development Programme during the fifth Plan

Year	Target Area ('000 hectares)	Target Production ('000 Tonnes)
1974-75	22,700	12,000
1975-76	23,000	12,500
1976-77	23,300	13,025
1977-78	23,600	13,550
1978-79	24,000	14,000

For the Intensive Pulses Development Programme 10 more districts were selected so that the Programme was in operation in a total number of 40 districts (Table 1.1)

1.3 The Programme in Madhya Pradesh

Of the 30 districts selected for 1973-74, six were from M.P. The districts were Narsinghpur, Bhind, Morena, Raisen, Chhindwara and Khargone. During the fifth five year plan two more districts of Hoshangabad and Jabalpur were included in the programme. Thus the programme is in operation in 8 districts of the State.

1.4 The Present Study

The Crops Division in the Ministry of Agriculture and Irrigation, Government of India desired that the Agro-Economic Research Centre, Jabalpur should conduct a study on ' Evaluation of Intensive Development Programme for pulses in M.P. The Crops Division also suggested that Narsinghpur district be selected for the study.

1.5 The Objectives

The objectives of the study were

i) To assess the impact of the programme for pulses on raising the yield per hectare vis-a-vis yields in other areas;

ii) To isolate the factors responsible for increased production and to study the adequacy of the quantum of water made available to the farmers, timing of supply of water and plant protection practices and their impact on yield;

iii) To assess whether the benefits of the Scheme have percolated down to the farm level to the desired extent;

(iv) To suggest further improvements in the scheme to achieve the objective (i);

(v) To study whether the Programme has demonstration effect on other areas;

vi) To assess the reaction of the farmers to the Scheme;

vii) To identify the constraints, if any, in increasing the popularity of the programme and analyse them;

1.6 Sample Design

A sample of 30 farmers was selected for the study.

1.7 Reference year

The year 1977-78 was the reference year of the study.

CHAPTER II

PULSE PRODUCTION PROGRAMME IN THE FIFTH PLAN

The programme under Centrally Sponsored Scheme included field demonstrations, seed multiplication, rhizobium inoculation, plant protection and financial assistance for developing pulse technology.

In the following paragraphs the details of these aspects are examined.

2.1. Extension Demonstrations

It was planned to lay-out extension demonstrations on an area of 12.000 hectares in the first year (1974-75). The area was to be increased by 2,000 hectares every year so that in the last year 20,000 hectares would be covered. Thus the total area under the demonstrations during the five years of the programme was to be 80,000 hectares.

Input Kit. consisted of seed. phosphatic fertilizers. rhizobiun culture and pesticide. Inputs were provided free ofcost. The cost of a demonstration per hectare was Rs. 275. This included seed costing Rs. 75. fertilizers Rs. 100 and pesticides Rs. 100. Thus the total outlay on demonstrations during the V Plan Period would be Rs. 220 lakhs (Table 2.1)

Table 2.1 Area and cost of extension demonstrations

Year	Area under demonstrations ('000-hectares)	Cost (Rs.-lakhs) (e Rs. 275 per hectare)
1974-75	12	33.0
1975-76	14	38.5
1976-77	16	44.0
1977-78	18	49.5
1978-79	20	55.0
Total :-	80	220.0

The state governments were free to lay out demonstration with improved/short duration varieties recommended for their zones.

The demonstrations were laid out in selected villages of the specified districts which had potential for pulse production. The demonstrations were laid out as half plot demonstrations. So as to create a better impact on the farmers. The intention was to have participation of maximum number of farmers in each of the selected districts and new farmers were selected each year. Under the programme the extension staff was provided quality seed of improved varieies, phosphatic fertilizors and pesticides for making them avallable to the farmers in time. The unit for input-Kit for the demonstration was 0.4 hectare or less as convenient.

2.2. Seed Multiplication Frogramme

It was proposed to multiply seed under 3 stages (a) breeder's seed (b) foundation seed and (c) certified seed.

2.2.1 Breeder's Seed

The breeders seed or nucleus seed of the improved varietles was multiplied under the supervision of the breeder. A sum of Rs. 350 per hectare was provided as subsidy as part of expenditure on major inputs. This included Rs. 100 for rhizobium culture and fertilizers. Rs. 100 for plant protection and Rs. 150 for roguing. selfing, processing etc. The land and other facilities of various Agricultural Universites or Research Farms were untilised. It was planned to undertake this programme in an area of 1000 hectares

in the first year. In the subsequent years the area was increased by 250 hectares per years. Thus the total area during the 5 years would be 7.500 hectares .The breeder's seed multiplication would cost Rs. 26.25 lakhs (Table 2.2)

Table 2.2 Details of nucleus seed multiplication programme

Year	Area (Hectares)	Exependiture (@ Rs. 350 per hectare)
1974-75	1,000	3,50,000
1975-79	1,250	4,37,500
1976-77	1,500	5,25,000
1977-78	1,750	6,12,500
1978-79	2,000	7,00,000
Total	7,500	26,25,000

Agricultural Universities/Agricultural Research Stations undertaking nucleus seed multiplication programme were obliged to hand over the entire produce of the nucleus/breeder's seed to the Director of Agriculture of the state concerned at a price mutually agreed between the Agricultural Universities and the respective State departments of agriculture.

2.2.2 Foundation Seed

The foundation seed multiplication programme was implemented by the respective State Governments on their seed multiplication farms and supervised by the Senior Officers of the Department of Agriculture. For the foundation seed multiplication. the cost of tillage. irrigation. interculture. harvesting and threshing etc. was borne by the State Government. However. a sum of Rs. 150 per hectare was provided as subsidy to meet the 50% cost of major inputs and roguging etc.

It was planned to cover 20.000 hectares in the first year of the programme. In the subsequent years the area was planned to be increased at the rate of 5.000 hectares per year. Thus the total area under this programme during the five year period would be 1,50,000 hectares. The total expenditure for foundation seed multiplication during the 5th plan would be Rs. 225 lakhs as per details given in Table 2.3

Table 2.3 Details of foundation seed multiplication programme

Year	Area (Hectares)	Expenditure on subsidy @Rs. 150 per hectare
1974-75	20,000	30,00,000
1975-76	25,000	37,50,000
1976-77	30,000	45,00,000
1977-78	35,000	52,50,000
1978-79	40,000	60,00,000
Total :-	1,50,000	2,25,00,000

2.2.3 Certified Seed

As regards certified seed the major responsibility was taken up by seed producing agencies like N.S.C, S.F.C, T.D.C. and other State seed producing organisations. To reduce the cost of procurement for supply of certified seed to the farmers a subsidy of Re. 1 per kg was provided. The expenditure on subsidy for supply of certified seed of short-duration improved varieties during the 5th plan would be Rs. ~~130~~ 130 lakhs.

The requirement of quality seed for the areas under the Intensive Pulses District Programme (IPDP) was met out of the produce from the area under

foundation seed multiplication. So far as the seed requirement of other areas was connerned, it was met from the produce from I.P.D.P. areas through natural spread.

2.3 Rhizobium Inoculation

Rhizobium inoculation was another component which was considered during the Fourth Plan. Research scientists had isolated efficient rhizobium culture for major pulse crops like gram, arhar and lentil. They hoped that cultures for other crops like moong, urd, peas etc. would be made available. With a view to produce the rhizovium culture on mass scale for distribution to the farmers either free or at low cost. Govt. of India provided grants during 1973-74 for equipping the microbiological laboratories for mass scale production of cultures. These laboratories were to start functioning during the 1st year of the V Plan. A sum of Rs. 5 lakhs was provided as contingencies during 5th Plan.

2.4. Plant Protection

After the working of the scheme for a period of 1½ years, there were differences of opinion regarding use and subsidy on plant protection chemicals. Some of the states, like Punjab, Haryana, Rajasthan and Uttar Pradesh felt that insect pests did not pose serious problem to pulse crops; as such there was no need of availing subsidy on plant protection chemicals. However, as and when the incidence of insect pests would occur the State Govt. would approach Government of India for assistance.

small farmers. They did not have proper equipment for undertaking dusting. Spraying opertions for taking up plant protection measures. In the second meeting of the Indian Pulses Development Council held at Pachmarhi (M.P.) the State Government representatives stressed that Government of India might provide 50% subsidy on the cost of plant protection equipments. It was proposed that a sum of Rs. 10 lakhs be provided as lump sum subsidy for plant protection equipments to the State Government during the V plan period.

These programmes on plant protection would involve an expenditure of Rs. 450 lakhs as per details in Table 2.4.

Table 2.4 Expenditure on plant protection

Year	Expenditure (in lakhs)
1974-75	76.00
1975-76	85.00
1976-77	92.00
1977-78	97.00
1978-79	100.00
Total :-	450.00

2.5. New Technology

The All India Coordinated Pulse Project is engaged in pulse crop research. During the Fifth Plan, the project proposed to intensify the efforts in developing high yielding, disease resistant varieties and pulse production and plant protection technology.

It was expected that the new pulse technology for stabilising the higher production levels, as and when made available would be implemented under the field programme. During the Fifth Plan, advantage would also be taken of the technology of dry land farming to increase the production of pulses. For implementation of such new programmes a sum of Rs. 150 lakhs was earmarked during the Fifth Plan.

2.6. Staff for the Scheme

During the Fourth Plan under Centrally Sponsored Scheme one Joint Director (Pulses), one Stenographer and one peon at State level and one Pulses Development Officer & one Technical Assistant at Operational Unit/District level in the selected districts was provided. Expenditure on the staff including transport facilities and contingencies would be Rs. 93.75 lakhs and this would be met from the sanctioned grant of the scheme (Table 2.5)

Table 2.5 Expenditure on staff, Jeep and contingencies during the fifth plan

(Rs. Lakhs)

Year	Expenditure on state levels staff	Expenditure on district level staff	Cost of 15 Jeeps	Total expenditure
1974-75	6.00	20.00	3.75	29.75
1975-76	6.00	10.00	-	16.00
1976-77	6.00	10.00	-	16.00
1977-78	6.00	10.00	-	16.00
1978-79	6.00	10.00	-	16.00
Total :-	30.00	60.00	3.75	93.75

2.7. Total Expenditure on the Scheme

The total cost of the production programme for pulses under the Centrally Sponsored Scheme during the 5th plan would be Rs. 1,300 lakhs or Rs. 13.00 crores. Plant protection and chemicals was the single major item of expenditure with an outlay of Rs. 450 lakhs or 34.61 per cent of the total out lay. The estimated expenditure on foundation seed was Rs. 225 lakhs or 17.30 per cent. Demonstrations would cost an expenditure of Rs. 220 lakhs or 17.00 per cent. New technology (11.50 per cent) and subsidy on seed supply (10.00 percent) were other important items.

Table 2.6 Details of expenditure for the Centrally Sponsored Scheme

Sr. No.	Particulars	Expenditure (Rs. lakhs)	Percentage
1.	Demonstrations	220.00	17.00
2.	Seed multiphication		
a.	Breeder's seed	26.25	2.00
b.	Foundation seed	225.00	17.30
3.	Seed supply at subsidised rate	130.00	10.00
4.	Plant Protection & Chemicals	450.00	34.61
5.	Supply of rhizobium culture	5.00	0.38
6.	Staff, jeep and Contingencies	93.75	7.21
7.	New Technology	150.00	11.50
	Total	1,300.00	100.00

In case the funds provided for demonstrations and seed multiplication were not utilised for want of seed or some other inputs or due to some unknown reasons or those under plant protection are not utilised due to non-occurrence of the pests and diseases. The State Governments could utilise the unspent funds for some other items of work envisaged under the scheme where it was hoped that this expenditure would help promotion of pulses production programme.

2.8 The Programme in Madhya Pradesh

It was planned to lay-out extension demonstrations on an area of 12,200 hectares in the state. The area to be covered under the nucleus seed multiplication programme was targeted to be 1,625 hectares. Similarly an area of 32,500 hectares was to be covered under foundation seed multiplication programme.

Table 2.7 Pulse Production Programme in Madhya Pradesh

(Area-Hectares)

Year	Area under Extension Demonstrations	Area under nucleus seed multiplication programme	Area under Foundation Seed Programme
1974-75	2,000	225	4,500
1975-76	2,200	275	5,500
1976-77	2,400	325	6,500
1977-78	2,700	375	7,500
1978-79	2,900	425	8,500
Total	12,200	1,625	32,500

2.8.1 Outlay on the Scheme

An estimated amount of Rs. 1,02,23,750 would be spent on the scheme during the five years of the plan. Besides this amount expenditure would also be incurred on items such as seed supply at subsidised rates, plant protection, rhizobium culture and new technology for which the details of outlay are not available.

It was noted that the bulk of the expenditure was planned to be incurred on foundation seed (47.68 per cent) and extension demonstration (32.82 per cent)(Table 2.8)

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Table 2.8 Expenditure on Pulse Production Programme in Madhya Pradesh during the V Plan

Year	Extension Demonstration @Rs.275/- per hect.	Breeder's seed @ Rs.350/- per hect.	Foundation seed @ Rs. 150/- per hect.	State level Staff	District level Staff	Seed supply at subsidised rates	Plant Protection, rhizobium culture and new technology	Total
1974-75	5,50,000	78,750	6,75,000	65,000	4,00,000	Details not available	Details not available	17,68,750 *
1975-76	6,05,000	96,250	8,25,000	40,000	2,00,000			17,66,250
1976-77	6,60,000	1,13,750	9,75,000	40,000	2,00,000			19,88,750
1977-78	7,42,500	1,31,250	11,25,000	40,000	2,00,000			22,38,750
1978-79	7,97,500	1,48,750	12,75,000	40,000	2,00,000			24,61,250
Total	33,55,000	5,68,750	48,75,000	2,25,000	12,00,000			1,02,23,750
Percentage to total	32,82	5,56	47,68	2,20	11,74			100,00

* Including cost of Jeep in the first year.

CHAPTER III

PULSE DEVELOPMENT IN MADHYA PRADESH

Madhya Pradesh shares the largest proportion of area under pulses among all the states. In 1976-77 out of the total area of 22,845.7 thousand hectares in the country M.P. had 4,762.7 thousand hectares or 20.85 per cent (Table 3.1)

Table 3.1 Area under Pulses 1976-77

(Unit : thousand hectares)

S. No.	State/Union Territory	Area	Percentage of All India
1	2	3	4
1.	Andhra Pradesh	1,286.11,	5.63
2.	Assam	93.6	0.41
3.	Bihar	1,420.1	6.22
4.	Gujrat	148.1	1.96
5.	Haryana	1,115.5	4.88
6.	Himachal Pradesh	72.8	0.32
7.	Jammu & Kashmir	46.3	0.20
8.	Karnataka	955.6	4.18
9.	Kerala	38.4	0.17
10.	Madhya Pradesh	4,762.7*	20.85
11.	Maharashtra	2,805.3	12.28
12.	Manipur	5.7	0.02
13.	Meghalaya	1.5	0.06
14.	Nagaland	4.6	0.02

* Fully Revised estimates

S.No.	State/Union Territories	Area	Percentage of All India
1.	2.	3.	4.
15.	Orissa	973.4	4.26
16.	Punjab	336.8	1.47
17.	Rajesthan	4228.4	18.51
18.	Tamil Nadu	544.7	2.38
19.	Tripura	4.5	0.02
20.	Uttar Pradesh	3042.5	13.32
21.	West Bengal	738.1	3.23
22.	Union Territories	18.3	0.08
	All India	22845.7	100.00

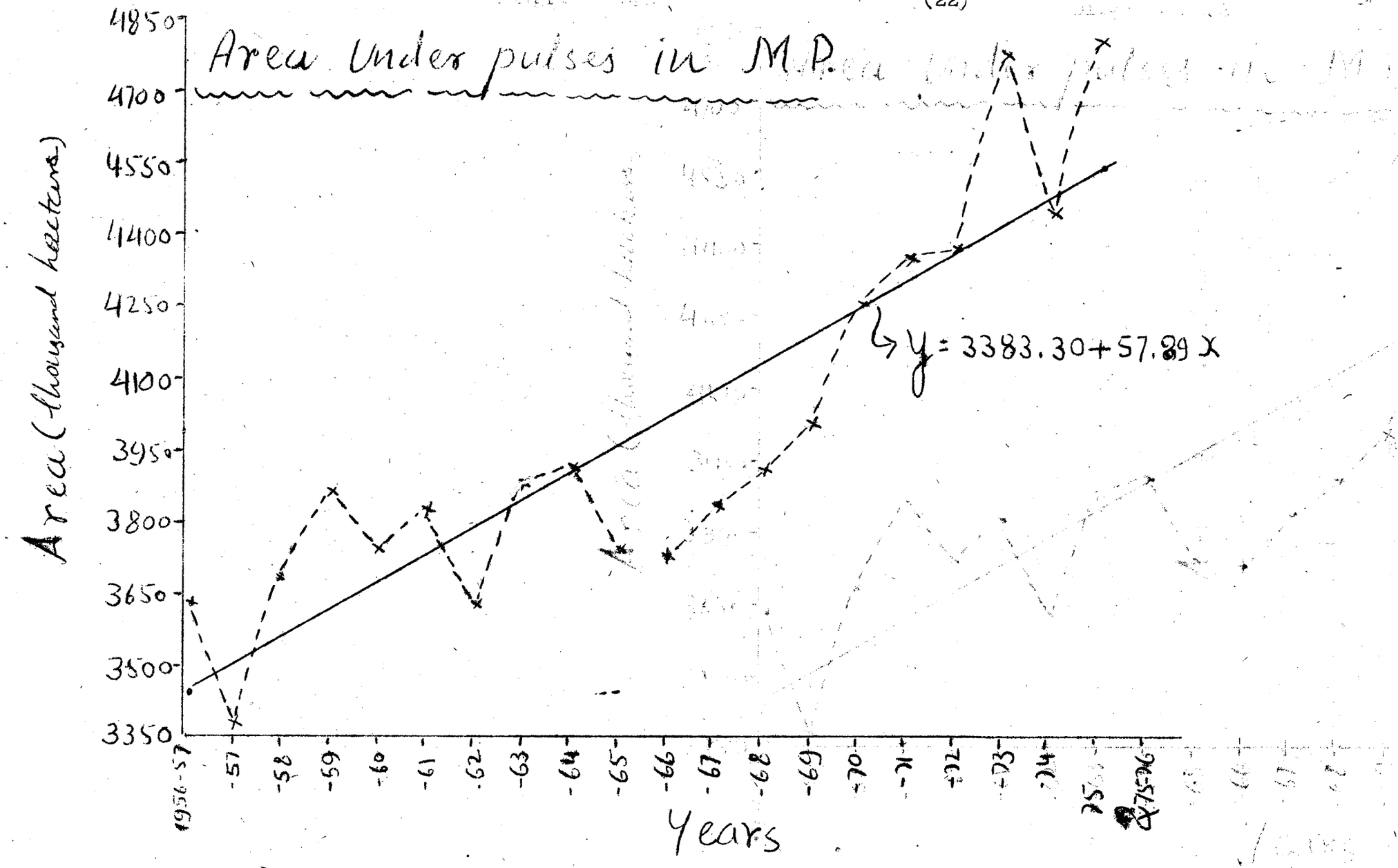
The important pulse caltivating states in India are Uttar Pradesh. Rajasthan and Madhya Pradesh. which jointly claimed 52.68 per cent of the area under the crop and 57.91 per cent of the production in 1976-77. Madhya Pradesh ranked third claiming 17.04 per cent of the pulse production in the country while the total area devoted to pulse crop was 20.85 per cent in 1976-77 as stated earlier. **(Table 3.2).**

Table 3.2 Production of pulses 1976-77

(Unit : Thousand Tonnes)

S.No.	State/Union Territory	Production of total pulses 1976-77	Percentage of All India
1	2	3	4
1.	Andhra Pradesh	362.4	3.23
2.	Assam	37.2	0.33
3.	Gujarat	186.8	1.67
4.	Bihar	697.1	6.22
5.	Haryana	874.3	7.80
6.	Himachal Pradesh	36.8	0.33
7.	Jammu & Kashmir	21.6	0.19
8.	Karnatka	286.2	2.55
9.	Kerala	14.8	0.13
10.	Madhya Pradesh	1909.9 *	17.04
11.	Maharashtra	977.1	8.72
12.	Manipur	2.3	0.02
13.	Meghalaya	0.9	0.01
14.	Nagaland	2.8	0.02
15.	Orissa	349.2	3.12
16.	Punjab	332.9	2.97
17.	Rajasthan	1999.1	17.84
18.	Tamil Nadu	156.0	1.39
19.	Tripura	1.7	0.01
20.	Uttar Pradesh	2581.4	23.03
21.	West Bengal	417.5	3.72
	Union Territories	11.2	0.10
All India		11208.1	100.00

* Fully Revised estimates


Area Under pulses in M.P.
Area (thousand hectares)
4850
4700
4550
4400
4250
4100
3950
3800
3650
3500
3350
y = 3383.30 + 57.89 X
1956-57
-57
-58
-59
-60
-61
-62
-63
-64
-65
-66
-67
-68
-69
-70
-71
-72
-73
-74
75
Years

The regression equation Y=a+bx was fitted to the data of area where Y stood for the expected value of area in a given year X. The equation obtained for the eata was y=3383.30 + 57.89 x indicating that the average rate of growth of area under pulses was 58 thousand hectares per year. (Diagram 3.3.)

3.2 Production of Puleses

The total production of pulses in 1956-57 was 1,625 thousand tonnes. Against this it stood at 2,540 thousand tonnes in 1975-76. Thus the percentage increase in production was 56.31 (Table 3.4)

Table 3.4: Index numbers of Production of Pulses in Madhya Pradesh (1956-57 to 1975-76)

Year	Production (thousand tonnes)	Index numbers (1956-57=100)
1956-57	1,625	100.00
1957-58	1,150	70.77
1958-59	1,637	100.74
1959-60	1,839	113.17
1960-61	1,802	110.89
1961-62	1,730	106.46
1962-63	1,612	99.20
1963-64	1,585	97.54

Years	Production (Thousand tonnes)	Index numbers (1956-57=100)
1964-65	1,834	112.86
1965-66	1,504	92.55
1966-67	1,079	66.40
1967-68	1,549	95.32
1968-69	1,547	95.20
1969-70	1,757	108.12
1970-71	1,991	122.52
1971-72	2,353	144.80
1972-73	2,255	138.77
1973-74	2,074	127.63
1974-75	2,233	137.41
1975-76	2,540	156.31

The regression equation y= a+bx was fitted to the data on production and the equation obtained was y=1344.96 + 41.89x indicating an average rate of growth of 42 thousand tonnes per year. **(Diagram 3.5)**

3.3 Important Pulses

Pulses are grown in both kharif and Rabi Seasons. The main pulses crops of kharif season are arhar (tur), urad and moong and those in the rabi season are gram, teora, peas and masoor (Lentil). The kharif pulses covered about 29% of the total area under pulses and accounted for 26% of the total production. Rabi pulses occupied 64% of the area under pulses and accounted for about 69% of the total production (Table 3.6)

Table 3.6 Area, production and yield of pulse crops in M.P. 1976-77.

Pulse crop	Area (000' hect.)	Perce-ntage	Product-ion (000' tonnes)	Perce-ntage	Yield kg/ Hect.
Gram	2017	42.35	1049	54.92	520
Teora	679	14.26	141	7.38	207
Urad	624	13.10	152	7.96	211
Arhar	509	10.69	281	14.72	553
Masoor	301	6.32	115	6.02	383
Moong Moth	247	5.19	69	3.61	216
Peas	97	2.03	27	1.41	283
Other Pulses	289	6.06	76	3.98	263
All pulses	4763	100.00	1910	100.00	401

Gram was the most important crop accounting for 42.35 per cent of the area and 54.92 per cent of the total pulses production. Arhar occupied second position and contributed 10.69 per cent of the total area and 14.72 per cent of the total pulse production. The third important pulse crop was urad.

3.4 Yield of Pulses

The yields in the State of two important pulses viz. gram and arhar were below the all India averages. For gram the yield per hectare of the State was 520 kg. as against the all India average of 683 kg. For arhar it was 553 kg. for the State as against 650 kg. for the country.

The yield performance of gram, tarhar and urad which were the major pulses in the State was examined with the help of index numbers. The indices of yield of these pulses are given in Table 3.7. A close examination of the indices of these three different pulses suggested the following trends:

3.4.1 Gram

In 1956-57 the yield of gram was 655 kg. per hectare. At the end of the 20 years period i.e. in 1975-76 it was 640 kg. per hectares. In other words it was less by 2.29 percentage points than what it was in the base year (1950-57). This reverse trend was observed in the case of gram only, an imporant pulse crop.

The regression equation y=a+bx was fitted to the data of yield where y stood for the expected value of yield in a given year x. The equation obtained for the data was y=535.95 + 2.91 x indicating that the average rate of growth of yield in gram was 2.91 kg. per ha. per year. (Diagram 3.4.1)

3.4.2 Arhar

The yield of arhar was 715 kg. per hectare in 1956-57. Against this it stood at 838 kg. per hectare in 1975-76. Thus the percentage increase in yield

Table 3.7 Index Number of yield per hectare of gram, Arhar and urad in Madhya Pradesh (1956-57 to 1976-77)

Base year - 1956-57 = 100
(Unit:Kilogram)

Year	Gram		Arhar		Urad	
	Yield	Index No. (1956-57=100)	Yield	Index No. (1956-57=100)	Yield	Index No. (1956-57 =100)
1956-57	655	100.00	715	100.00	188	100.00
1957-58	409	62.44	568	79.44	185	98.40
1958-59	606	92.52	853	119.30	198	105.32
1959-60	613	98.59	683	95.52	248	131.91
1960-61	576	87.94	866	121.12	254	135.11
1961-62	568	86.72	612	85.59	232	123.40
1962-63	603	92.06	585	81.82	224	119.15
1963-64	502	76.64	318	44.48	234	124.47
1964-65	576	87.94	713	99.72	250	132.98
1965-66	530	80.92	520	72.73	176	93.62
1966-67	377	57.56	264	36.92	159	84.57
1967-68	550	83.97	651	91.05	216	114.89
1968-69	486	74.20	525	73.43	226	120.21
1969-70	552	84.27	658	92.03	282	150.00
1970-71	529	80.76	821	114.83	241	128.19
1971-72	682	104.12	855	119.58	267	142.02
1972-73	683	104.27	903	126.29	212	112.76
1973-74	571	87.18	568	79.44	211	112.23
1974-75	622	94.96	817	114.26	225	119.68
1975-76	640	97.71	838	117.20	258	137.23

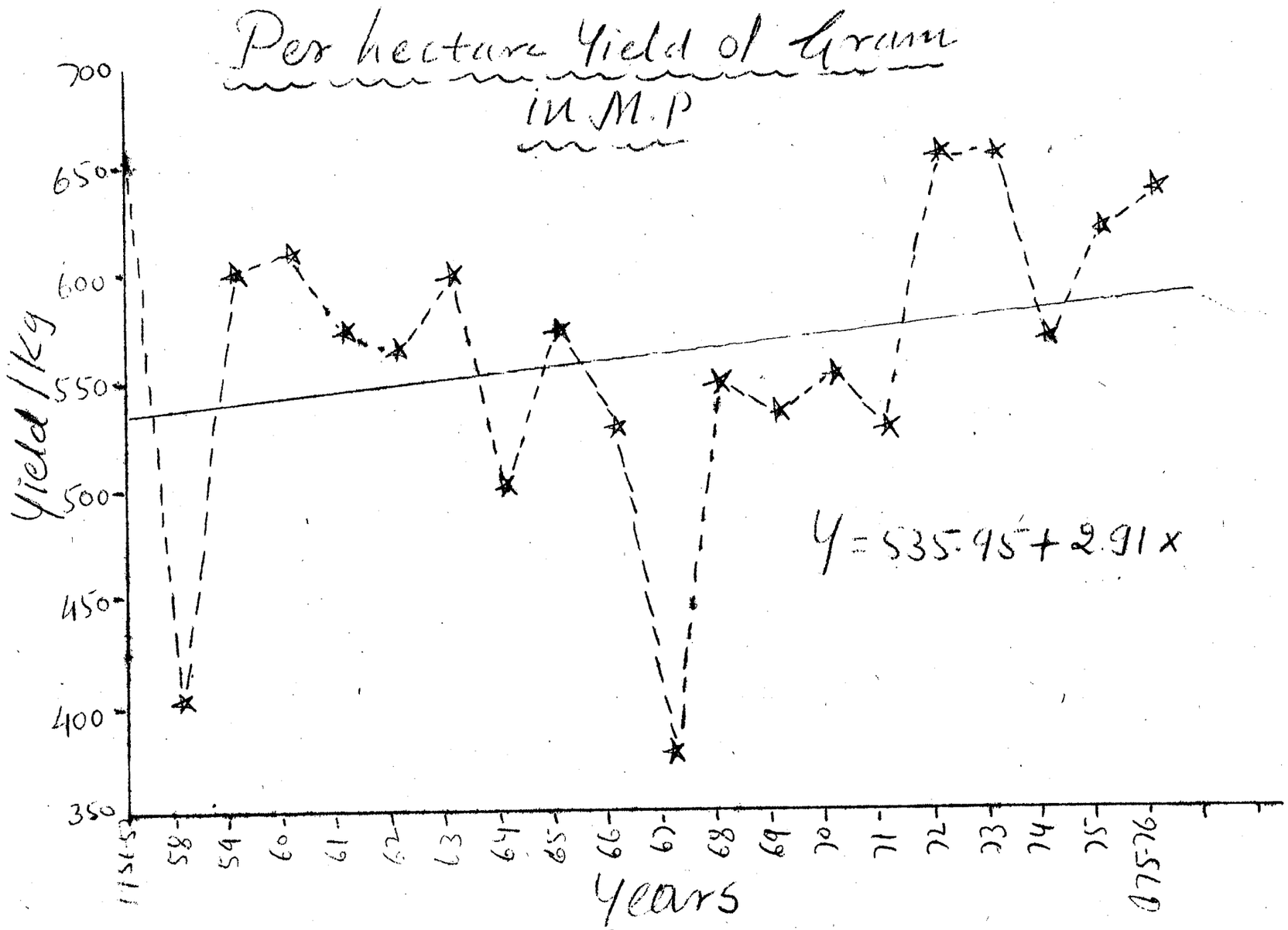
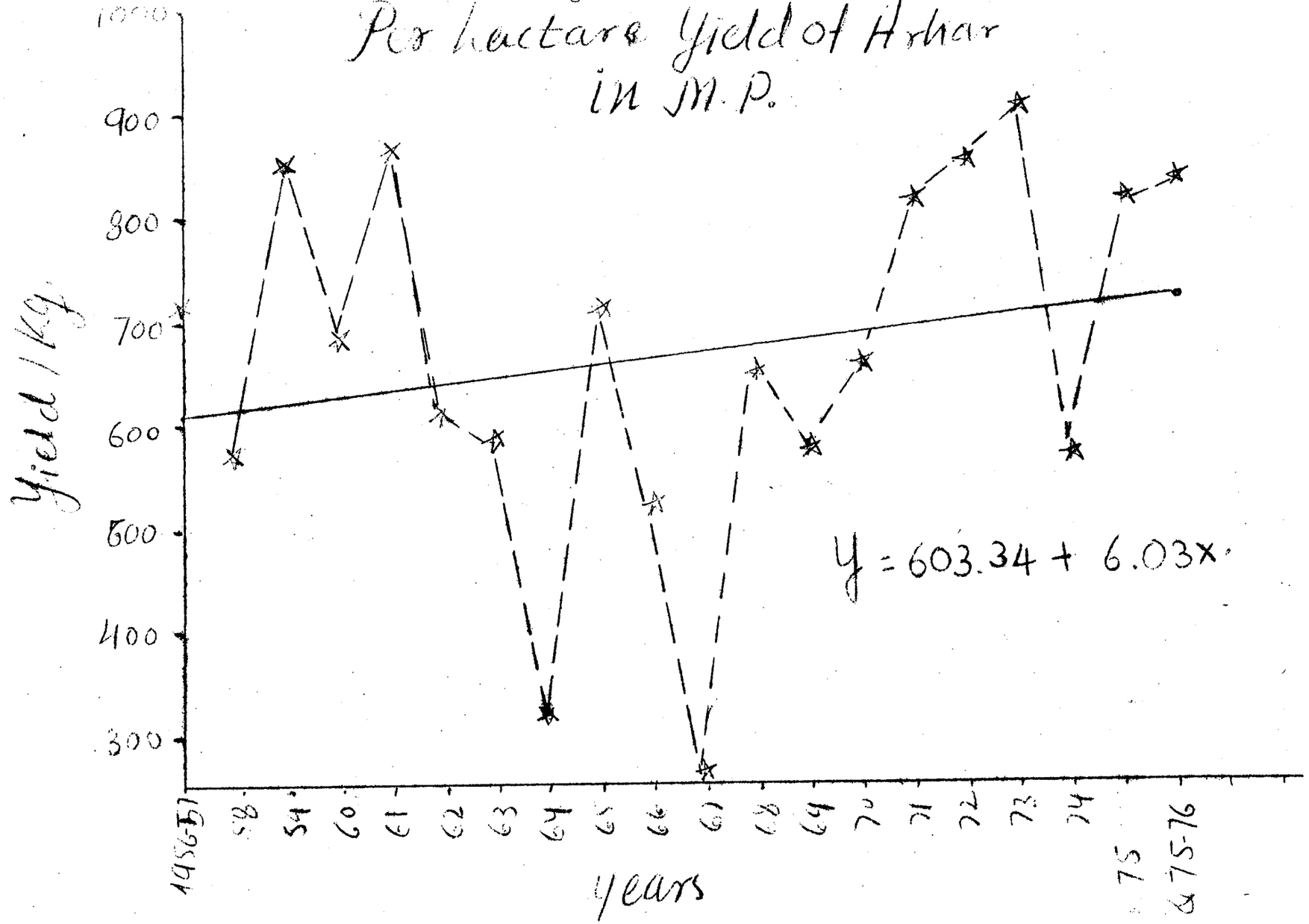
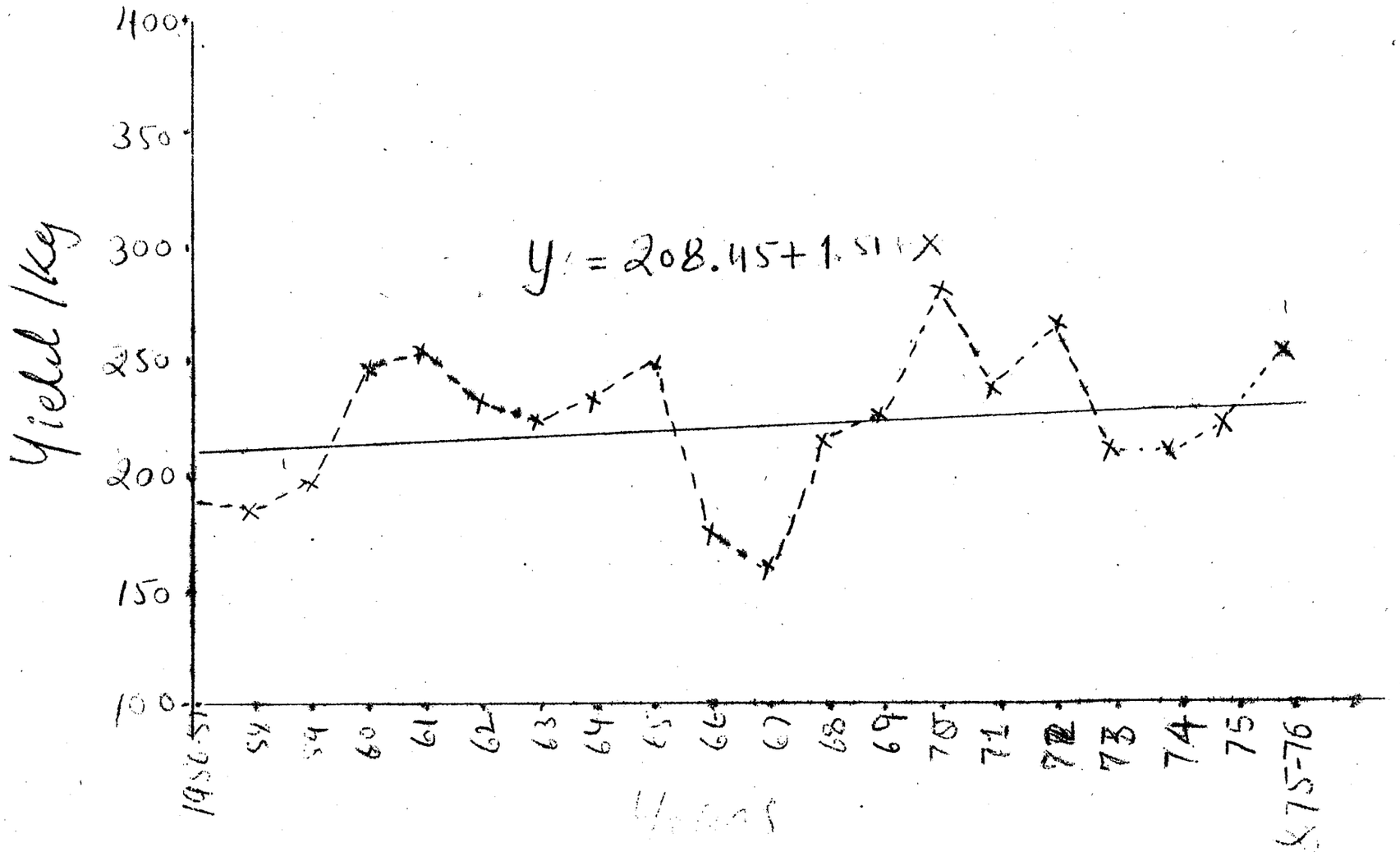

Per hectare Yield of Gram in M.P
700
650
600
550
500
450
400
350
Yield / Kg
Y = 535.95 + 2.91 x
1951-52
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
73
74
75
75-76
Years

Diagram 3.4.2

Per hectare Yield of Arhar in M.P.



Per hectare yield of Urad in M.P.



was 17.20 in 1975-76. The highest yield was obtained in 1972-73.

The regression equation y= a+ bx was fitted to the data of yield where y stood for the expected value of yield in a given year x. The equation obtained for the data was y=603.34 + 6.03 x indicating that the average rate of growth of yield in arhar was 6.03 kg per hectare per year. (Diagram 3.4.2)

3.4.3 Urad

Between 1956-57 and 1975-76 the yield of urad showed an increase of nearly 37 percentage points.

The regression equation y= a+bx was fitted to the data of yield where y stood for the expected value of yield in a given year x. The equation obtained for the data was y=208.45 +1.51x indicating that the average rate of growth of yield in Urad was 1.51 kg per hectare per year. (Diagram 3.4.3)

The regression analysis showed that the highest average rate of increase in yield was for arhar.

3.5 The Pulse Growing Districts

Area under pulses formed 22.84 per cent of the gross cropped area in the state in 1976-77.

If the districts having more than 25 per cent of the gross cropped area under pulses are taken as pulse districts the number of such districts comes to 20.

The percentage of pulse area to gross cropped area was highest (62.24) in Narsinghpur district followed by Raisen (42.74) and Datia(41.40) (Table 3.8)

Table 3.8: Pulse growing districts of Madhya Pradesh- 1976-77 (Area in thousand hectares)

S.NO.	District	Gross cropped area	Area under pulses	% of area under pulses to gross cropped area
1.	Narsinghpur	281.8	175.4	62.24
2.	Raisen	402.4	172.0	42.74
3.	Datia	131.4	54.4	41.40
4.	Indore	290.8	110.1	37.86
5.	Bhind	352.6	124.0	35.17
6.	Vidisha	507.7	156.3	30.79
7.	Ujjain	499.7	151.6	30.34
8.	Durg	711.5	214.7	30.18
9.	Dhar	539.1	157.4	29.20
10.	Chhindwara	522.5	150.9	28.88
11.	Ratlam	351.6	101.3	28.81
12.	Mandsaur	678.9	194.1	28.59
13.	Gwalior	264.9	75.1	28.35
14.	Jhabua	396.7	103.0	27.86
15.	Jabalpur	513.8	137.1	26.68
16.	Betul	443.4	116.3	26.23
17.	Morena	423.0	108.9	25.74
18.	Bhopal	152.5	38.9	25.51
19.	Dewas	372.9	94.1	25.23
20.	Hoshangabad	442.8	111.4	25.16
Total		8253.0	2547.0	30.86
Total of other districts		12603.5	2215.7	17.58
M.P. State		20856.5	4762.7	22.84

3.6 Progress of the work under the Pulse Development Programme.

The broad outline of the Programme under the fifth plan has been narrated in chapter II. The planned programme for M.P. under different heads has also been given in paragraph 2.8.

The target set forth the beginning of the fifth plan had to be altered in the course of different years according to the conditions obtained in the State. In the following pages the progress is evaluated under different aspects of the programme (Table 3.9)

3.6.1 Extension Demonstrations

The area set for extension demonstrations was 2,000 hectares in the first year with an annual increase of about 200 hectares per year. However, at the State level the target was to be modified in 1975-76 and in the later years. It was 3,000, 3,900, and 3,300 hectares. As against this target the adhievement was 109,40 per cent in 1974-75 and 109.67 per cent in 1975-76. In 1976-77, however, the achievement was only 97.61 per cent of the target. In the year of the programme the adhievement was just double that of the target (200.15 per cent). It can, therefore, be said that the demonstration aspect of the programme had been a success.

3.6.2 Nucleus Seed Multiplication

Under this programme the target originally set was 225 hectares in 1974-75. This was expected to increase at the rate of 50 hectares in the subsequent year.

However, this target area was drastically reduced by the State Government in all the years. It was 20 hectares in 1974-75, 100 hectares in 1975-76, 140 hectares in 1976-77 and 150 hectares in the last year. Evidently these targets were achieved in all the years except the last year. Of course, the achievement was far below the initial targets.

3.6.3 Foundation Seed

The target set by the Govt. of India for Madhya Pradesh under this programme was 4,500 hectares in 1974-75. The coverage was to be increased by 1,000 hectares in every subsequent year. The State Government, however, targetted a much lower coverage for the programme. Surprisingly this also could not be achieved in any of the four years. Achievement was 60.11 per cent in the first year and 71.73 per cent in the second year. In the subsequent two years the achievement was only 48 per cent of the target.

3.6.4 Certified Seed

Although no physical target for this programme was earmarked by the Govt. of India, the State Government had fixed a target of 4,500 quintals in the first two years. In the third year the target set was 5,000 quintals and that in the fourth year 3,000 quintals. It was observed that in the first and the fourth year the target was achieved to a considerable extent (100.00 and 93.93 per cent respectvely). In 1975-76, however, the achievement was only 12.11 per cent of the target and that in 1976-77 it was 63.70 per cent.

3.7. Financial Outlay

The detail financial outlay from 1974-75 to 1977-78 for the programme and administrative expenditure on it is given in Table 3.10. Since the activities were hetrogenous in nature, the total budgeted outlay and actual expenditure incurred were taken as an indicator of the expansion of the programme. The percentage of total expenditure incurred in the total budgeted outlay imcreased from 65.08 in 1974-75 to 101. 51 in 1977-78.

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Table 3.9 Targets and achievements of area under pulse development programme for Extension Demonstrations in Madhya Pradesh (1974-75 to 1977-78) (Area in hectares)

Year	Demonstration				Nucleus seed multiplication programme			
	Area targetted under centrally sponsored scheme by G.O.I. for M.P.	Area targetted by the State Govt.	Area achieved	Area achieved as % of area targetted by State Govt.	Area targetted under centrally sponsoured Scheme by G.O.I. for M.P.	Area targetted by the State Govt.	Area achieved	Area achieved as % to area targetted by State Govt.
1	2	3	4	5	6	7	8	9
1974-75	2,000	2,000	2188	109.40	225	20	20	100.00
1975-76	2,200	3,000	3,290	109.67	275	100	116	116.00
1976-77	2,400	5,900	5,169	87.61	325	140	140	100.00
1977-78	2,700	3,300	6,605	200.15	375	150	142	94.67

Year	Foundation seed multiplication programme				Certified Seed (In quintals)			
	Area targetted under centrally sponsored scheme by G.O.I. for M.P.	Area targetted by State Govt.	Area achieved	Area achieved as % to area targetted by State Govt.	Area targetted under centrally sponsored Scheme by G.O.I. for M.P.	Area targetted by State Govt.	Area achieved	Area achieved as % to area targetted by State Govt.
	10	11	12	13	14	15	16	17
1974-75	4,500	1,394	838	60.11	-	4,500	4,500	100.00
1975-76	5,500	1,500	1,076	71.73	-	4,500	545	12.11
1976-77	6,500	2,000	960	48.00	-	5,000	3,185	63.70
1977-78	7,500	2,000	961	48.05	-	3,000	2,818	93.93

Table 3.10 Financial allocation and expenditure of the Pulse Development Programme in M.P.

(In Rupees)

Year	Allocation under Centrally sponsared scheme	Budget Provision by the State Govt.	Total Expenditure incurred	Percentage of total expenditure incurred to Budget Provision by the State Govt.
1974-75	17,68,750	24,19,600	15,74,711	65.08
1975-76	17,66,250	28,60,000	22,39,138	78.29
1976-77	19,08,750	31,93,500	28,22,531	88.38
1977-78	22,38,750	43,98,000	44,64,206	101.51
Total	77,62,500	1,28,71,100	1,11,00,586	86.24

CHAPTER IV

ECONOMY OF THE SELECTED DISTRICT

This chapter gives an account of the general features of Narsinghpur district such as topography, climate, important characteristics of population and agriculture. Some of the features of the district are compared with the State, wherever necessary, to note how the district fares in comparison to the State as a whole.

The information on agricultural statistics pertain to the year 1976-77.

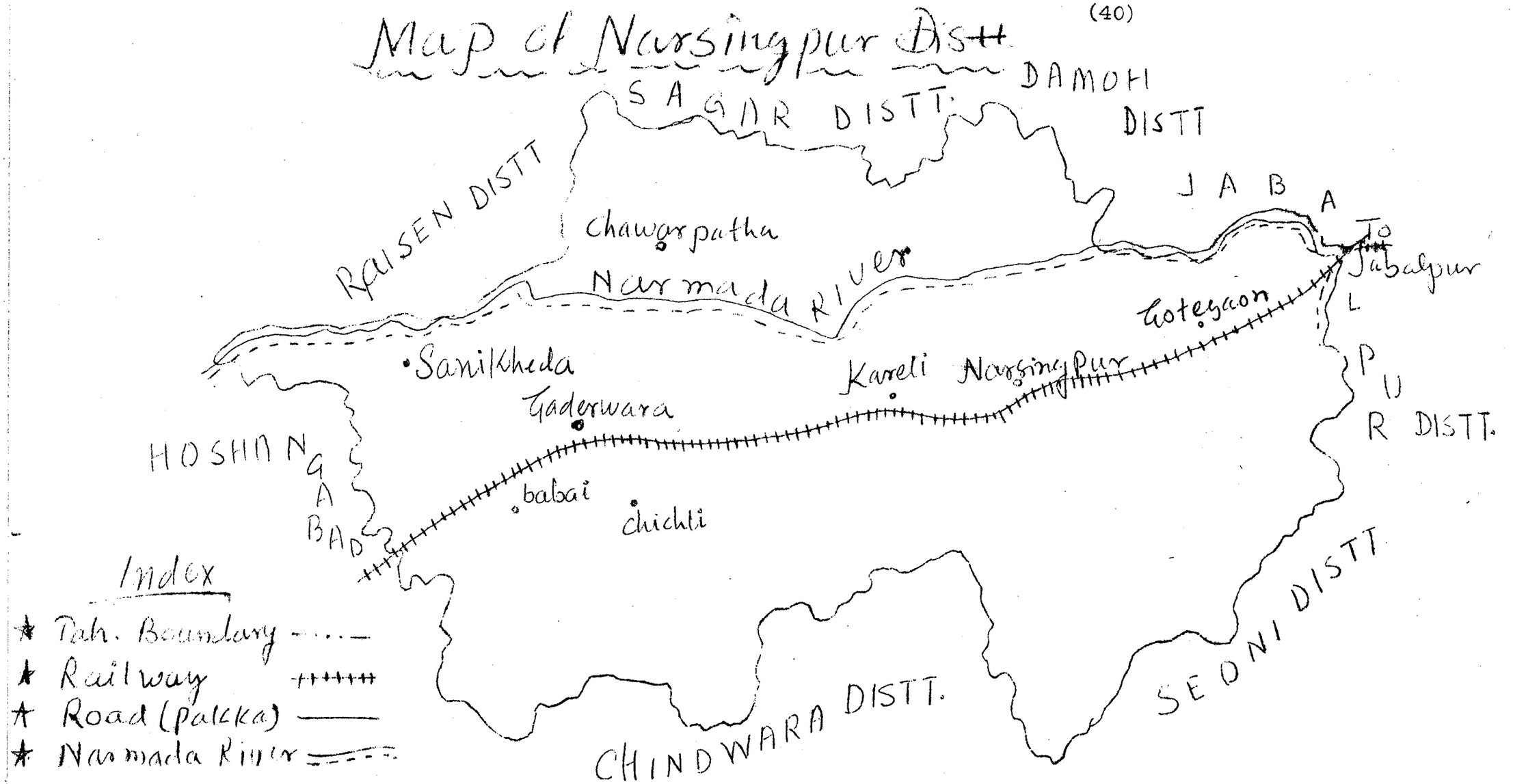
4.1 Location

The district is situated in the central part of the State. It lies between the latitudes $22^{\circ}45/N.$ and $23^{\circ}15/N$, and the longitudes $78^{\circ}38/E.$ and $79^{\circ}38/E.$ Though small in size, the district boundary runs with the boundaries of as many as seven districts. These are: Sagar in the north, Raisen in the north-west, Damoh in the north-east, Seoni in the south-east, Jabalpur in the east, Chhindwara in the south and south-west and Hoshangabad in the west.

The district headquarters, Narsinghpur, is at a distance of 253 kms. by road from the State head-quarters, Bhopal.

Till October, 1956, Narsinghpur district was a part of Hoshangabad district. The reorganisation of States effected on the 1st November, 1956 was associated with an important event in the history of the district as on that day, Narsinghpur was

Map of Narsingpur Distt



restored to its original form and status of a district considering its area, population, revenue and past history.

4.2 Topography

The district occupies a part of the eastern Narmada valley, a continuous chain of the Satpura hills bordering on the south and a section of the Vindhyan scrap on the north. The natural divisions of the district stretch into three narrow belts parallel in an east-west direction. Greater portion of the district consists of a wide alluvial basin in the upper half of the Narmada valley.

The chief river of the district is Narmada. Its tributaries are Sher, Shakkar, Dudhi, Soner, Baru rewa, Hiren and Sindhor.

4.3 Climate & Rainfall

The climate of the district is characterised by generally pleasant weather, except in the hot season. The year may be divided into four seasons. The cold season from about the middle of November to February is followed by the hot season which continues up to the middle of June. The period from middle of June to the end of September is the south-west monsoon season. October and the first half of November constitute the post- monsoon or retreating monsoon season.

The range of maximum and minimum temprature of the district is 41°c and 8°c.

The normal annual rainfall in the district is 1300.8 m.m. The rainfall during the year 1976-77 was 963.1 m.m. and there were 49 rainy days. (Table 4.1)

Table 4.1 Rainfall distribution and rainy days, Narsinghpur district, 1976-77

Month	No. of rainy days	Total rains (m.m.)
June	6	57.8
July	15	369.3
August	16	288.5
September	7	166.0
Oct. & November	4	67.4
December to March	1	9.8
Total	49	963.1

4.4 Administrative Divisions

The district occupies an area of 5,131.7 sq.km. and comprises two tehsils viz. Narsinghpur and Gadarwara. Each tehsil is further divided into 3 Development blocks. Thus the district has six Development Blocks convering a total number of 1,078 villages (Table 4.2)

Table 4.2 Tehsils and blocks of Narsinghpur district

Tehsil/Block		No. of villages covered
Gadarwara		
i	Chawarpatha	222
ii	Babai Chichli	153
iii	Sainkheda	105
	Total	480
Narsinghpur		
i	Gotegaon	250
ii	Narsinghpur	191
iii	Kareli	157
	Total	598

4.5 Population and Literacy

According to the 1971 ceusus, the district had a total population of 5,19270. The rural population was about 87.03 per cent of the district population whereas the urban population was 12.97 per cent. Thus, the district is rural in character. During the decade 1961-71 the population growth of the district was 25.91 per cent. The density of population per sq. km. was 101. The sex-ratio i.e. the number of females per 1000 males was 926. Tehsil Gadarwara had a sex-ratio lower than the district average whereas the other tehsil, Narsinghpur had a higher sex-ratio. The percentage of literacy in the district came to about 29 in 1971. In 1961,

the literacy percentage was 21.55. Thus, the district has made some progress in the sphere of literacy during the decade 1961-71.

4.6 Agriculture

In the following paragraphs various aspects of agriculture such as land utilization, cropping pattern, irrigation, production etc. have been described.

4.6.1 Land Utilization

The district has a geographical area of 513.6 thousand hectares. Of this the net sown area was 272.0 thousand hectares or 53.03 per cent. Forests covered 137.0 thousand hectares or 26.71 per cent of the total area. (Table 4.3)

Table 4.3 Land utilisation in Narsinghpur district 1976-77

S. No.	Classification	Area (thousand hectares)	Percentage
1.	Forest	137.0	26.71
2.	Land not available for cultivation	23.0	4.48
3.	Other un-cultivated land	43.0	8.38
4.	Cultivable waste land	21.0	4.09
5.	Fallow Land	17.0	3.31
6.	Net area sown	272.0	53.03
Total Geographical Area		513.0	100.00

4.6.2 Soils

The Narmada valley which accounts for a good proportion of the land in the district, consists of black cotton soil, alluvial in character. The soils are broadly classified into (i) kabar I, (ii) kabar II, (iii) mund I, (iv) mund II, (v) patarua, (vi) sehra (vii) ritua, (viii) bhalua and (ix) kachhar.

4.6.3 Cropping Pattern

The cropping pattern of the district reveals that food crops dominate the scene. The cereals and pulses together form nearly 93 per cent of the total cropped area. While cereals formed 30.33 per cent pulses accounted for as high as 62.29 per cent of the gross cropped area. Among cereals wheat was the most important occupying 13.92 per cent of the gross cropped area. Other important cereals were jowar (5.58 per cent), paddy (5.29 per cent) and kodo-kutki (4.44 per cent). Among the pulses the pride of place went to gram which accounted for 31.75 per cent of the gross cropped area. Among the non-food crops only oilseeds occupied significant proportion of the cropped area. The area under fodder, sugarcane, fruits, vegetables and spices was about 3 per cent of the total area. (Table 4.4)

Table 4.4 Area under different crops, Narsinghpur district 1976-77

Crop	Area (Thousand hectares)	Percentage
Paddy	14.9	5.29
Wheat	39.2	13.92
Jowar	15.7	5.58
Maize	0.4	0.14
Bajra	0.5	0.18
Kodon-Kutki	12.5	4.44
Sawa	2.0	0.71
Other cereals	0.2	0.07
Total cereals	85.4	30.33
Gram	89.4	31.75
Arhar	16.6	5.89
Urad	6.7	2.38
Moong & moth	6.6	2.34
Teora	16.9	6.00
Lentil	17.4	6.18
Peas	21.7	7.70
Total Pulses	175.4	62.29
Ground nut	0.9	0.34
Sesamum	6.7	2.38
Linseed	2.4	0.85
Niger	1.4	0.50
Other oilseeds	-	-
Total oilseeds	11.4	4.05
Sugar cane	2.3	0.82
Sunhemp	0.4	0.14
Fodder	4.5	1.60
Total fruits and vegetables	1.7	0.60
Total Spices	0.5	0.17
Gross Cropped Area	281.6	100.00

4.6.4 Irrigation

The net area irrigated during 1976-77 was 18.5 thousand hectares. Wells constituted the most important source of irrigation in terms of area. The land irrigated by these formed 62.70 per cent of the total irrigated area. The facilities of canal and tank irrigation were negligible. (Table 4.5)

Table 4.5 Sources of Irrigation, Narsinghpur district 1976-77

Source	Area ('000 ha)	Percentage to total
Canal	0.3	1.62
Tanks	-	-
Wells	11.6	62.70
Others	6.6	35.68
Total	18.5	100.00

4.6.5 Irrigated crops

Of the gross cropped area of 281.6 thousand hectares 18.5 thousand hectares or 6.8 per cent were irrigated. Wheat alone accounted for a little over 75 per cent of total irrigated area. Among other irrigated crops gram, fruits & vegetables and spices accounted for 4.32, 4.87 and 1.08 per cent respectively.

It was also noticed that nearly half of the area under fruits, vegetables and spices received irrigation whereas wheat was irrigated to the extent of 36.73 per cent (Table 4.6)

Table 4.6 Area of irrigated crops in Narsinghpur district 1976-77

(Area- thousand hectares)

Crop	Total Area under the crop	Irrigated area	Percentage to total irrigated area	Percentage of irrigated area to area of the crops
Wheat	39.2	14.4	77.84	36.73
Gram	89.4	0.8	4.32	0.89
Fruits and vegetables	1.7	0.9	4.87	52.94
Total spices	0.5	0.2	1.08	40.00
Others	-	2.2	11.89	-
Total	130.8	18.5	100.00	-

Kodon-kutki	1.9	1.08
Sawa	1.00	0.57

4.6.7 Yield rates

A comparison of the per hectare yields, though limited to some principal crops, reveals that the performance of the district was better as compared to the State as a whole in 1976-77. Narsinghpur obtained higher yield rates than the average for the entire State in respect of rice, wheat, jowar, gram, arhar teora, lentil and sesamum. In the case of peas, however, the yield in the district was slightly lower by 1.42 per cent than the State average. (Table 4.8)

Table 4.8 Per hectare yields of Principal crops in Narsinghpur district and the State, 1976-77

Crop	Yield per hect. (in kgs.) Narsinghpur District	Madhya Pradesh State	Absolute increase(+) or decrease(-) of in Narsinghpur over M.P. State	Increase (+) or decrease (-) in Narsinghpur as percentage to that in Madhya Pradesh
Rice	853	638	+ 215	+ 37.70
Wheat	1031	766	+ 265	+ 34.59
Jowar	833	682	+ 151	+ 22.14
Gram	702	520	+ 182	+ 35.00
Arhar	974	553	+ 421	+ 76.13
Teora	473	207	+ 266	+ 128.50
Peas	279	283	- 4	- 1.42
Masoor	466	383	+ 83	+ 21.67
Sesamum (Til)	184	142	+ 42	+ 29.58

4.6.8 Pulses Production

The pulses production in the district since 1974-75 has not been satisfactory. Though the area under pulses has increased from 171.2 thousand hectares in 1974-75 to 173.1 thousand hectares in 1975-76 and to 175.4 thousand hectares in 1976-77, the production has decreased from 118.7 thousand tonnes in 1974-75 to 117.0 thousand tonnes in 1975-76 and 107.2 thousand tonnes in 1976-77. As a result, the yield has decreased from 693 kg. per hectare in 1974-75 to 676 kg. and 611 kg. in the subsequent years respectively. (Table 4.9)

Table 4.9 Area, Production and Yield per hectare of total Pulses in Narsinghpur distict.

Year	Area under pulses (thousand hect.)	Production (thousand tonnes)	Yield (kg/hect.)
1974-75	171.2	118.7	693
1975-76	173.1	117.0	676
1976-77	175.4	107.2	611
Average	173.2	114.3	660

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CHAPTER V

Characteristics of the Selected Farmers

The present study is concerned with the assessment of the impact of the Intensive Development Programme for Pulses in Narsinghpur district of Madhya Pradesh at the farm level. But before this aspect is dealt with, a brief account of the economic characteristics of the sample farmers is considered to be of significance, in as much as it provides relevant background against which the analysis to be attempted in the ensuing chapters, may be evaluated.

5.1 Size groups of Cultivators

Size of land holding is one of the major variables which may affect agricultural production as well as input use of the cultivators. The cultivators are, therefore, grouped into three categories according to the size of land holdings.

Size group I: holding upto 5 hectares

II: holding from 5.01 hectares to 10.00 hectares

III: more than 10.00 hectares

The distribution of farmers in these categories is shown in table 5.1 which reveals that majority of the respondents had small, holding (below 5.00 hectares).

Table 5.1 Distribution of respondents according to the size of land holding

Size group	Holding in hectares	No. of households	Percentage
I	Upto 5.00	13	43
II	5.01 to 10.00	10	33
III	10.01 and above	7	24
		30	100

5.2 Size of family and number of workers

The average size of family, irrespective of age and sex, was 6.26 and the average number of workers in a family was 2.26. There was not much difference in male/female ratios. In terms of membership of the village organisations, of the total 30 farmers 26 were members of the village cooperative societies (Table 5.2).

5.3 Labour Management

Despite the use of casual agricultural labourers, selected households engaged permanent labourers too. In all 20 households engaged permanemt labourers. The per household labour engagement varied from the ratio of one permanent labour per household in size group I to 1:1.2, in group II and 1:3.3 in group III. At an aggregate level the ratio stood at 1:1;8. The average monthly wages of a permanent labourer was Rs. 79.00 and the engagement of permanent labourers was mostly on annual basis (Table 5.3).

Table 5.2 Details of population of the selected households

Size group	No of households	Total population Male	Female	Child	Total	Average	Workers Male	Female	Total	Average	Total members of Co.society	Average
(Hectares) Upto 5.00	13	21	22	29	72	5.53	16	15	31	2.38	11	0.85
5.01 to 10.00	10	25	27	27	79	7.90	15	10	25	2.50	9	0.90
10.01 and above	7	9	12	31	52	7.42	8	4	12	1.71	7	1.00
Total	30	55	61	87	203	6.76	39	29	68	2.26	26	0.87

Table 5.3 Permanent labour and wages paid by sample farmers in different size groups

Size group	No of household	No of permanent farm servants	Frequency of employmant 6 month	1 year	per month total wages paid Cash Rs.	Kind Rs.	Total Rs.	Average monthly wages paid per labour
I	7	7	1	6	528	133	661	94.00
II	7	9	3	6	706	154	860	96.00
III	6	20	2	18	877	458	1335	67.00
Total	20	36	6	30	2,111	745	2,856	79.00

5.4 Size of holding

On an average a household owned 8.20 hectares of land. The average land holding of the cultivators in a land size group I was 2.80 hectare. It was 6.99 hectares in group II and 19.95 hectares in group III. Of the total land, only 17.17 hectares consisted of irrigated land. (Table 5.4)

5.5 Irrigation

The wells were the main source of irrigation accounting for about 35 per cent of the total irrigated area. Tube wells accounted for about 6 per cent and canal and other sources of irrigation for about 5 per cent of the total irrigated area. The pattern, more or less, conforms to that of the district. (Table 5.5)

5.6 Irrigated Crops

Area under irrigated crops formed 21.26 per cent of the total cropped area. Of the total irrigated area of about 48 hectares 43 hectares were under foodgrains. The irrigated area under wheat was 29.47 hectares which formed 61.29 per cent of the area under the crop. The pulses, especially, gram, pea and moong jointly accounted for 28.18 per cent of the total irrigated area. The extent of irrigation in moong was 100%. Among other two non-foodgrain irrigated crops, sugarcane and vegetables accounted for 2.52 per cent and 8.01 per cent of the irrigated area respectively. (Table 5.6)

Table 5.4 Irrigation on the selected farms

Size group (Hectares)	No. of farms	Operational area	Average size	Irrigated area	Percentage of Irrigated area to operated area
Upto 5.00	13	36.44	2.80	14.00	38.39
5.01 to 10.00	10	69.93	6.99	13.76	19.68
10.00 & above	7	139.62	19.95	19.41	13.91
Total	30	215.99	8.20	47.17	19.18

Table 5.5 Source wise Irrigated area

Area - (Hectares)

Source	Group I Area	%	Group II Area	%	Group III Area	%	Total
Canal	2.16	15.43	-	-	-	-	2.16
Tubewell	-	-	0.81	5.89	5.66	29.16	6.47
Well	8.60	61.43	12.95	94.11	13.75	70.84	35.30
River	3.24	23.14	-	-	-	-	3.24
Tank	-	-	-	-	-	-	-
Total	14.00	100.00	13.76	100.00	19.41	100.00	47.17

5.7 Cropping Pattern

About 2/3rd of the total cropped area was accounted for by pulses while cereals accounted for only 27 per cent. The balance of 5 per cent of area was under other crops of minor importance. Among pulses and cereals, gram, and wheat with 31.50 per cent and 19.57 per cent respectively emerged as major crops. Lentil and pea are the other important pulse crops accounting for about 11 per cent and 10 per cent of the grossed cropped area respectively.

Gram ranked first in the cropping pattern of all the size groups. The farmers below five hectares of operational holdings, had the largest proportion (37.31 per cent) under this crop than the other groups. The smallest group had 61.83 per cent of the area under pulse crops while the II and III groups reported 4.38 per cent and 71.23 per cent of area respectively. The percentage distribution of acreage under different crops is very much similar to the district. (Table 5.7)

5.8 Area under Pulses

Of the total area under pulses gram occupied 45.49 per cent, lentil 16.54 per cent, pea 14.21 per cent, batri 7.36 per cent, arhar 5.94 per cent and teora 5.68 per cent. The area allocated to other crops did not exceed 2.50 per cent out of the total of 156.58 hectares of area under pulses. (Table 5.8). The pulse crops were grown as single crop and not mixed.

Table 5.6 Cropwise irrigated area on selected farms in different size groups

(Area in hectares)

S.No.	Crop	Group I			Group II			Group III		
		Area under the crop	Irrigated area	% of irrigated area to area under crop	Area under the crop	Irrigated area	% of irrigated area to area under the crop	Area under the crop	Irrigated area	% of irrigated are to area under the crop
1.	Wheat	9.24	7.62	82.47	16.36	7.28	44.44	13.62	14.57	78.25
2.	Jowar	0.81	-	-	2.02	-	-	6.47	-	-
3.	Paddy	-	-	-	1.21	-	-	4.45	-	-
4.	Kutki	0.40	-	-	-	-	-	0.81	-	-
5.	Gram	15.37	5.46	35.52	20.64	4.45	21.56	35.21	-	-
6.	Lentil	1.21	-	-	6.88	-	-	17.81	-	-
7.	Peas	2.02	-	-	2.02	-	-	18.21	1.62	8.90
8.	Batri	2.02	-	-	7.08	-	-	2.43	-	-
9.	Tur	1.21	-	-	3.64	-	-	4.45	-	-
10.	Teora	0.81	-	-	2.02	-	-	6.07	-	-
11.	Urad	0.81	-	-	1.21	-	-	-	-	-
12.	Moong	2.02	2.02	100.00	-	-	-	-	-	-
13.	Soybean	1.42	-	-	0.40	-	-	1.62	-	-
14.	Groundnut	-	-	-	0.81	-	-	-	-	-
15.	Til	-	-	-	-	-	-	0.81	-	-
16.	Sugarcane	-	-	-	1.62	0.81	50.00	0.40	0.40	100.00
17.	Vegetables	3.85	3.85	100.00	-	-	-	-	-	-
18.	Coriander	-	-	-	-	-	-	1.62	-	-
	Total area	41.19	18.95	46.01	67.55	12.54	18.56	117.36	16.59	14.13

Table 5.6 (continued)

S.No.	Crop	Total area under the crop (in hectares)	Irrigated area	Percentage to total irrigated area	Percentage of irrigated area to area of the crop
1.	Wheat	44.25	29.47	61.29	66.60
2.	Jowar	9.30	-	-	-
3.	Paddy	5.66	-	-	-
4.	Kutki	1.21	-	-	-
5.	Gram	71.22	9.91	20.61	13.91
6.	Lentil	25.30	-	-	-
7.	Peas	22.25	1.62	3.37	7.28
8.	Batri	11.53	-	-	-
9.	Tur	9.36	-	-	-
10.	Toora	8.90	-	-	-
11.	Urad	2.02	-	-	-
12.	Moong	2.02	2.02	4.20	100.00
13.	Soybean	3.44	-	-	-
14.	Groundnut	0.81	-	-	-
15.	Til	3.61	-	-	-
16.	Sugarcane	2.02	1.21	2.52	59.90
17.	Vegetables	3.85	3.85	8.01	100.00
18.	Coriander	1.62	-	-	-
		226.10	48.08	100.00	21.26

Table 5.7 Cropping Pattern on selected farms

(Area in hect.)

Crops	I Group		II Group		III Group		Total	
	Area	%	Area	%	Area	%	Area	%
Wheat	9.24	22.43	16.38	24.25	18.62	15.87	44.24	19.57
Jowar	0.81	1.97	2.02	2.99	6.47	5.52	9.30	4.11
Paddy	-	-	1.21	1.79	4.45	3.79	5.66	2.50
Kutki	0.40	0.97	-	-	0.81	0.69	1.21	0.54
Total cereals	10.45	25.37	19.61	29.03	30.35	25.86	60.41	26.72
Gram	15.37	37.31	20.64	30.56	35.21	30.00	71.22	31.50
Lentil	1.21	2.94	6.88	10.19	17.81	15.18	25.90	11.46
Peas	2.02	4.90	2.02	2.99	18.21	15.51	22.25	9.84
Batri	2.02	4.90	7.08	10.48	2.43	2.07	11.53	5.10
Other	1.21	2.94	3.64	5.39	4.45	3.79	9.30	4.11
Teora	0.81	1.97	2.02	2.99	6.07	5.17	8.90	3.94
Urad	0.81	1.97	1.21	1.79	-	-	2.02	0.89
Moong	2.02	4.90	-	-	-	-	2.02	0.89
Soybean	1.42	3.45	0.40	0.59	1.62	1.38	3.44	1.52
Total pulses	26.89	65.28	43.89	64.97	85.80	73.11	156.58	69.25
Groundnut	-	-	0.81	1.20	-	-	0.81	0.36
Til	-	-	-	-	0.81	0.69	0.81	0.36
Total oil seeds	-	-	0.81	1.20	0.81	0.69	1.62	0.72
Sugarcane	-	-	1.62	2.40	0.40	0.34	2.02	0.89
Vegetables	3.85	9.35	-	-	-	-	3.85	1.70
Coriander	-	-	1.62	2.40	-	-	1.62	0.72
TotalVege-tables &spies	3.85	9.35	1.62	2.40	-	-	5.47	2.42
All crops	41.19	100.00	67.55	100.00	117.36	100.00	226.10	100.00

Table 5.8 Area under different pulse crops

(Area in hectares)

Pulse crops	I Group Area	%	II Group Area	%	III Group Area	%	Total Area	%
Gram	15.37	57.17	20.64	47.03	35.21	41.04	71.22	45.49
Arhar	1.21	4.50	3.64	8.29	4.45	5.19	9.30	5.94
Urad	0.81	3.01	1.21	2.76	-	-	2.02	1.29
Moong	2.02	7.51	-	-	-	-	2.02	1.29
Teora	0.81	3.01	2.02	4.60	6.07	7.07	8.90	5.68
Pea	2.02	7.51	2.02	4.60	18.21	21.22	22.25	14.21
Soybean	1.42	5.28	0.40	0.91	1.62	1.89	3.44	2.20
Lentil	1.21	4.50	6.88	15.68	17.81	20.76	25.90	16.54
Batri	2.02	7.51	7.08	16.13	2.43	2.83	11.53	7.36
Total	26.09	100.00	43.89	100.00	85.80	100.00	156.56	100.00

CHAPTER VI

Use of Inputs and Pulses Production

The increase in production of pulses depends largely on the extent of package of practices adopted by the farmers. The improved strains require comparatively larger doses of inputs than the local varieties and the exploitation of the potential of the new varieties is closely associated with the degree of adherence to the recommended package of practices. The present chapter gives the details of per hectare use of some of the important inputs for pulses production on sample farms and also an analysis of the cost of cultivation and the production levels.

6.1 Seed rate

The quantity of seed used per hectare for different pulses was not uniform. Each farmer went by his own knowledge and experience. Among the gram growers, there was a tendency to use higher seed rate. The seed rate for other pulses also varied depending on the variety of seed used.

The average seed rate for gram was 108 kg. per hectre and that for arhar, 15 kg per hectare. The seed rate for urad, moong and teora was 25 kg., 27 kg. and 94 kg. respectively. (Table 6.1)

(figures-kg. per hectare)

Size group	Crop								
	Gram	Arhar	Urad	Moong	Teora	Peas	Soybean	Lentil	Batri
I	103	15	22	27	86	99	37	74	99
II	123	14	-	-	82	99	50	69	113
III	101	16	27	-	100	102	37	66	99
Total	108	15	25	27	94	101	38	67	107

6.2 Manure and Fertilizers

Farm Yard manure (FYM) was most commonly used and was generally applied to unirrigated lands. In fact cultivators used FYM as a basic ingredient for pulses cultivation, may it be local or high yielding variety, irrigated or unirrigated. FYM was measured in terms of bullock-cart loads, each weighing, on an average, about 5-6 quitals. Its cost varied between Rs. 10 and 12. Mostly FYM was prepared on individual farm and it was rarely purchased from outside. There was no standard per hectare rate of FYM. Moong received highest rate of FYM (10 cart loads) followed by gram (7 cart loads) and arhar and Urad (6 cart loads each)

Among the chemical fertilizers Di-ammonium phosphate was most popular and it was used by the sample farmers as a single fertilizer. The per hectare consumption was 88.00 kg. for gram, 57.70 kg. for arhar, 37.08 kg. for Urad and 49.50 kg. for moong (Table 6.2)

Table 6.2 Quantity of D.A.P. fertilizer by size groups

(Quantity-kg/ha.)

Size Group	Gram	Arhar	Urad	Moong	Teora	Peas	Soybean	Lentil	Batri	All Pulses
I	78.05	49.38	37.03	49.50	-	74.26	98.76	-	-	55.41
II	102.03	51.37	-	-	-	69.31	-	105.10	-	61.45
III	84.76	67.41	-	-	39.75	36.12	-	47.60	100.00	48.33
Overall	88.00	57.70	37.03	49.50	39.75	43.39	98.76	65.99	100.00	53.50

All the farmers had used D.A.P Fertilizer and of the total quantity consumed nearly 61 per cent was accounted by gram, 16 per cent by lentil and 10 per cent by pea. The proportion of fertilizer consumption did not reflect the proportion occupied by the respective crops. Thus gram occupied 45 per cent of the cropped area and lentil 16 per cent. Pea occupied 14 per cent of area. It showed that the preference of farmers as far as the fertilizer application was concerned was for gram followed by lentil and pea in that order (Fig. 6.1)

6.3 Pesticides

Though all the farmers had used pesticides in the reference year, the preference of the use had been observed in the order of D.D.T. followed by B.H.C., Aldrin and Carbaryl. (Table 6.3)

fig. 6.1

Proportion of Consumption of D.A.P fertilizer by different pulse crops & area under each

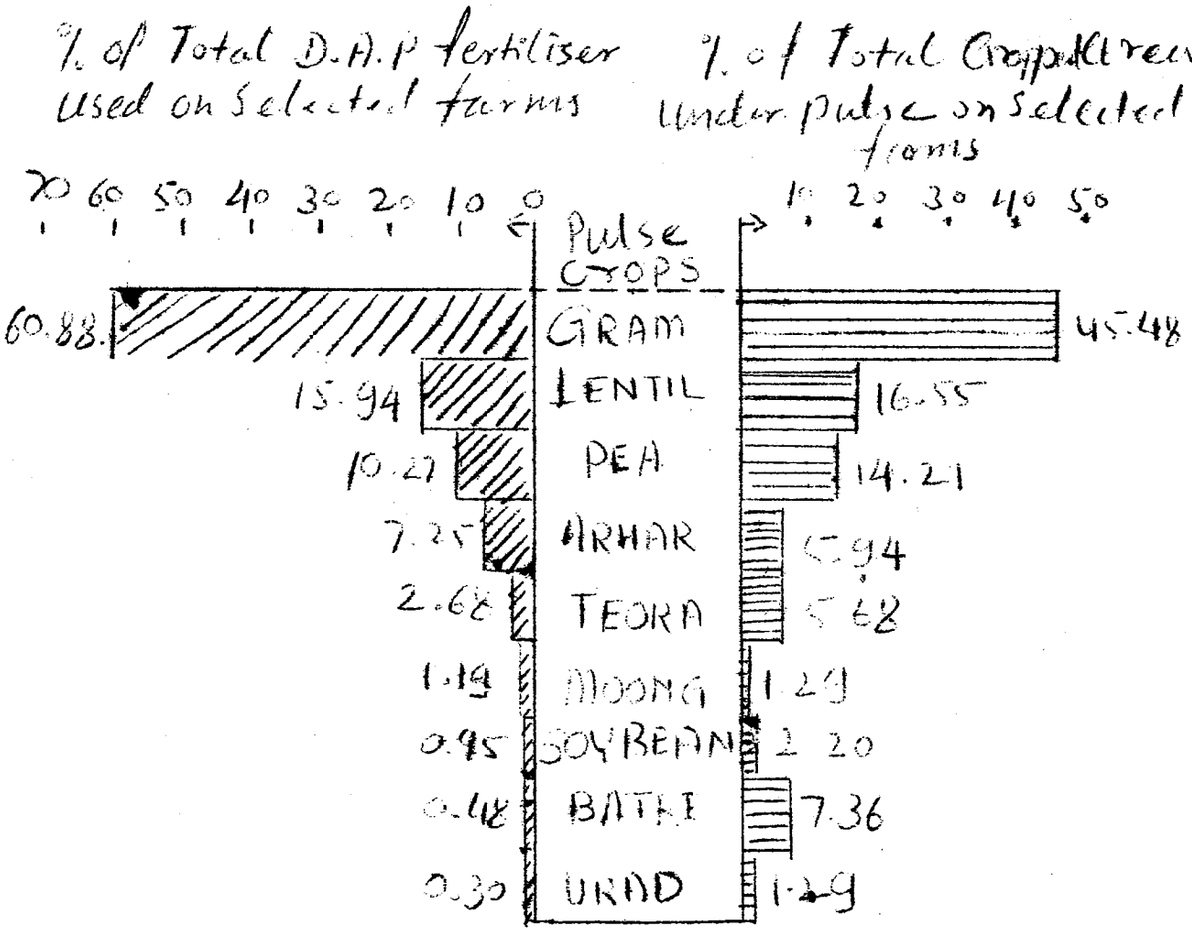

Table 6.3 Number of farmers using different pesticides

Size Group	D.D.T.	B.H.C.	Aldrin	Carbaryl	D.D.T.+ B.H.C.	D.D.T.+ Aldrin	D.D.T.+ Aldrin+ Carbaryl
I	10	3	1	1	-	-	1
II	7	4	2	-	1	2	-
III	6	2	-	-	2	-	-
Total	23	9	3	1	3	2	1

6.4 Human Labour

The average labour requirement was lowest for soybean and pea (26 days) and highest for moong (35 days). It was 31 days for gram.33 days for arhar. 30 days for urad and teora and 28 days for lentil.(Table 6.4)

Table 6.4 Human labour days requirement per hectare

Size Group	Gram	Arhar	Urad	Moong	Teora	Pea	Soybean	Lentil	Batri
I	27	27	32	35	31	32	24	32	29
II	35	36	-	-	27	32	32	22	30
III	31	33	30	-	30	23	27	29	29
Overall	31	33	30	35	30	26	26	28	30

The operations requiring human labour were mainly ploughing, sowing and harvesting. (Table 6.5)

Table 6.5 Operation-wise use of human labour days per hectare on selected farms

Operation	Gram	Arhar	Urad	Moong	Teora	Peas	Soybean	Lentil	Batri
Ploughing & Manuring	7	8	7	9	6	7	6	7	7
Sowing	7	5	6	7	6	4	4	5	6
Interculture	1	-	-	-	-	-	2	1	1
Harvesting	6	8	8	9	6	8	6	7	6
Threshing	5	6	5	7	6	4	4	4	5
Winnowing	3	4	3	3	3	2	3	2	3
Transporting	2	2	1	-	1	1	1	2	2
Total	31	33	30	35	30	26	26	28	30

6.5 Cost of Cultivation

For calculating the cost of cultivation, only cash expenses were taken into account. The items were: seed and seed treatment, fertilizers, pesticides, manures, irrigation charges and labour.

The average cost of cultivation of all the pulses taken together was Rs. 580.42 per hectare. It was Rs. 610.79 in the smallest group and Rs. 613.16 in the second group. It decreased to Rs. 554.15 in the largest size group.

The largest proportion of the cost was shared by seed (38.41 per cent). The second important item was labour and constituted 30.68 per cent of the total cost. Fertilizer was the third item and formed 18.50 per cent. (Table 6.6)

Almong the various pulses, cost of production was highest for gram (Rs.688.87). It was second highest for pea (Rs.598.27) and Rs.498.84 for teora (Table 6.7)

Table 6.7 Per hectare cost of production of different Pulse crops on selected farms.

(Value in Rs.)

Crops	Group I	Group II	Group III	Total
Gram	712.06	765.55	633.79	688.87
Arhar	457.89	357.92	480.49	429.58
Urad	514.89	-	151.24	297.06
Moong	444.80	-	-	444.80
Teora	379.43	533.95	503.09	498.84
Pea	780.49	679.54	569.04	598.27
Soybean	361.55	251.28	246.68	294.63
Lentil	318.22	556.08	462.00	480.69
Batri	409.69	485.64	285.02	430.06
Total Cost	610.79	613.16	554.16	580.42

6.6 Yields of Pulses

The yield per hectare or gram on the selected farms was 807 kg. as against 610 kg. for the district. The yield of urad was also higher (693 kg) as compared to the district average (500 kg). Moong, teora and pea which had the yield of 1188, 657 and 488 kg per hectare respectively recorded higher yield as compared to the district as a whole. However, arhar and lentil did not perform better than the district. (Table 6.8)

Table 6.8 Per hectare yield of different pulses

(Kg./Hect.)

Size group	Gram	Arhar	Urad	Moong	Teora	Pea	Soybean	Lentil	Batri
I	862	992	617	1188	556	1040	352	455	743
II.	1085	1078	-	-	495	619	1000	371	452
III	619	937	744	-	725	412	1049	467	576
Total:-	807	999	693	1188	657	488	756	441	529
Average Yield in the district	610	1490	500	500	620	340	-	560	-

6.7 Out put

The average value of output per hectare of all the pulse crops taken together was Rs.1841.23. Among different pulses, it was highest for Arhar (Rs.2495.95) followed by gram (Rs.2419.97). The value of outpur per hectare for moong was Rs.2376.24. (Table 6.9).

Table 6.9 Per hectare value of output of different pulse crops (Value in Rupees)

Crops	Group I	Group II	Group III	Over all
Gram	2586.21	3255.81	1857.43	2419.97
Arhar	2479.34	2695.60	2342.70	2495.95
Urad	1234.56	-	1485.60	1386.14
Moong	2376.24	-	-	2376.24
Teora	1111.10	990.10	1449.75	1314.61
Pea	2339.10	1392.32	926.69	1079.19
Soybean	704.23	2000.00	2098.76	1511.63
Lentil	1136.36	926.60	1167.88	1102.32
Batri	1856.43	1129.94	1440.33	1322.64
All pulses	2242.47	2210.07	1526.81	1841.23

6.8 Profit

The value of output minus the cost equalled profit. However, this could not be compared to " net profit " or any other measure of profit as only cash items were included in the cost. The profit per hectare was highest (Rs. 2066.37) in the case of arhar. Moong crop accrued a profit per hectare of Rs. 1,931.44. Gram, which is an important pulse crop of the area, earned a profit of Rs. 1,731.10 per hectare. Profit per hectare was lowest (Rs. 480.12) in the case of pea. (Table 6.10)

Table 6.10 Per hectare profit under different pulse crops among sample farmers.

(In Rupees)

Crops	Group I	Group II	Group III	Over all
Gram	1874.15	2490.26	1223.64	1731.10
Arhar	2021.45	2337.68	1862.21	2066.37
Urad	719.67	-	1334.36	1089.08
Moong	1931.44	-	-	1931.44
Teora	731.67	456.15	946.66	815.77
Pea	1558.61	712.78	357.65	480.92
Soybean	342.68	1748.72	1852.08	1217.00
Lentil	818.14	370.52	705.88	621.63
Batri	1446.74	644.30	1155.31	892.50
All pulses	1631.68	1596.91	972.65	1260.81

6.9 Input-Output Ratio

The input-output ratio was arrived at by dividing the total value of output by total input cost. At aggregate level input output ratio for arhar stood at 5.8, for moong 5.3, for soybean 5.1, for urad 4.7 and for gram 3.5. The average for all the pulse crops was 3.2. Farmers in group III have a highest input output ratio for urad and soybean which was 9.8 and 8.5 respectively. In group II the ratio for soybean (7.9) and arhar (7.5) were higher than for other crops. Group I had a favourable ratio for arhar (5.4) and moong (5.3) (Table 6.11)

Table 6.11 Input-Output ratio for different pulse crops

Size Group	Gram	Arhar	Urad	Moong	Peas	Soybean	Masoor	Batri	Total
I	3.6	5.4	2.4	5.3	2.9	3.0	1.9	3.6	4.5	3.7
II	4.2	7.5	-	-	1.9	2.1	7.9	1.7	2.3	3.6
III	2.9	4.5	9.8	-	2.9	1.6	8.5	2.5	5.1	2.8
Total	3.5	5.8	4.7	5.3	2.6	1.8	5.1	2.3	3.1	3.2

CHAPTER VII

EVALUATION OF THE PROGRAMME

A new strategy to boost up production of pulses and to minimise fluctuations in production was implemented by the Centre in Collaboration with the State Governments. The main thrust of the strategy was the promotion of pulses production under a centrally sponsored scheme through financial assistance to State Governments to motivate farmers to adopt new technology and multiplication of seeds of short duration and supply of improved varieties of pulses. It had been decided to provide subsidy on the cost of plant protection equipments to control pests and other diseases. The government had also provided funds for equipping microbiological laboratories for producting rhizobium culture on a large scale.

The Ministry of Agriculture and irrigation had launched a national campaign to boost the production of arhar, gram, lentil and moong in major producing states. Major emphasis was laid on gram to cover maximum area. Besides, steps were taken to provide facilities for pest control.

The Intensive Pulses Development Programme (IPDP), sponsored by the Centre, was implemented in Madhya Pradesh and the present chapter spotlights the problems relating to implementation of the programme in Narsinghpur district which has the highest production of pulses in the Jabalpur division of the State.

The Intensive Pulses Development Programme (IPDP) had, no doubt, played an important role in augumenting the production of pulses in Narsinghpur district. Therefore, there is acute need to intensify research work, which may help to increase the average productivity level of pulses and make pulses cultivation equally viable from the commercial point of view. Apart from this, much needs to be done to strengthen and intensify extension work-so that most of the researches done can reach the farmers and acquire popularity.

At the farm level (on the basis of the intensive study) the role of the extension agency and the attitudes and responses of the sample farmers in IPDP have been studied in some detail at various levels.

The main factors responsible for increased production have been studied in the follcwing paragraphs.

7.1 Factors of Increased Production

7.1.1 Soil Tests

A good proportion of sample farmers did not have much knowledge about soil testing and this is still to take roots. Without the proper knowledge of the deficiencies in the soils, a cultivator cannot be expected to follow the improved farm management techniques. This further strengthens the case for conducting large scale soil tests and systematic coverage of fields belonging to different soil types and educating the farmers. Secondly, proper planning is the key note of success in any endeavour. This is

doubly so in the farming industry, where soil is the capital of farming industry. The deficiency seems to lie in the absence of any link up between the soil testing programme and the IPDP at village level.

Applied research and adoptive trials for different targetted yields should be taken up by Agricultural University so that there are specific recommendations for mid level management practices in nutrient application.

7.1.2 Seed

The non-availability of good quality seed was an obstacle in the effective implementation of the programme. The respondents considered that supplies of kharif seed were inadequate. Though the supply of improved seed was stepped up during the programme, there was considerable scope for increasing it even more, particularly since the price was regarded as reasonable by most of the sample farmers.

To meet the requirement of quality seed following actions are suggested.

(a) A state Seed Corporation and seed certification agency should be immediately set up.

(b) to save the seed from fungus and termites infestation a mass scale programme for treatment of seeds and soil treatment should be launched.

(c) In pockets with less developed infrastructure seed should be procured on Government Account and distributed to farmers on Bank loans and Taccavi.

There are only two farms to produce foundation and certified Seed. These are not adequate. Two more seed farms in well drained areas be opened

7.1.3 Fertilizers

The strategic importance of fertilizer in pulse production programme needs no emphasis. This requires interalia, uninterrupted supply of fertilizers. The fertilizer scene in the district has undergone rapid changes and its consumption is showing a steady upward trend. Diammonium phosphate application has been a success. However, various problems of fertilizer distribution pointed out by farmers were: inadequate coordination between extension and distribution agencies, inadequate number of sale points, ultimately availbility of supplies of the required varieties of fertilizers and short weight. These problems have to be tackled by the officials of the State Agricultural and Co-operation Department in order to ensure officient use of costly fertilizers.

Presently, a large number of farmers in the district are quite unaware of the benefits of balanced doses of fertilizers. The relatively high increase in prices of fertilizers has further complicated the problem. Obviously, there is a need for considerable extension efforts (specially through demonstrations), soil testing facilities and research into the efficient use of fertilizers. The State Government should stock the requisite quantities of fertilizers in the district.

Further the State Government should arrange fertiliser manufactures located with in the State to produce special pulse grades. In the early years such grades should be given subsidy support so as to popularise them. Similar subsidy should be given to D.A.P. which is a highly suitable fertiliser for pulses.

7.1.4 Irrigation

During the past so many years irrigation facilities have been woefully inadequate in the district where hardly 7 per cent of total cultivable land gets irrigation. Maximum emphasis should be laid on improving water management to get better yields and full economic benefits of the programme.

The Assistant Director of Agriculture (Pulses) of Narsingpur district opined that controlled irrigation (1 or 2) would help in increasing pulses production to the extent of 200 per cent. In heavy clay soils controlled irrigation can only be given by sprinklers. Heavy cost of the equipment is beyond the reach of an average cultivator. Therefore, distribution of sprinklers to small farmers on subsidy will help in increasing area under irrigated pulses.

Besides, sprinkler irrigation has become popular for rabi pulses. The end use of irrigation water must receive high priority. Mass Scale training of farmers and farm workers in more efficient irrigation practices is needed. In IPDP

sprinkler irrigation could be promoted for popular use in ' problem' belts.

7.1.5 Control of insects, pests and other disease

Production of pulses can be increased by control of important pests and diseases. The losses caused by diseases are more. During the survey important diseases commonly reported were as follows.

i) The varities of gram and arhar were susceptible to diseases like wilt, root rot, collar rot and powdery mildew etc.

ii) Among gram varieties ' gulabi gram ' and 'Narsinghpur bold' were more common. Both the varieties were susceptible to wilt, root rot and collar rot.

iii) In arhar wilt and sterility mosaic diseases were limiting factors. Damage due to frost also occured in these varieties.

iv) Peas, viz. T 163,L163 and local batri were grown by the cultivators. In these varieties powdery mildew was the main disease. Cultivators did not use any fungicides for control of powdery mildew. Seed-treatment before sowing was also not done.

v) Lentil rust became epidemic during 1977-78. Bold seeded lentil varieties resistant to rust need to be evolved.

Besides diseases, the important insects and pests which caused heavy loss to gram, peas and arhar were gram pod borer and aphids. Narsinghpur is one of the endemic district for gram pod borers which attack pulse crops regularly every year.

The above mentioned diseases were most serious and have reduced the yield drastically i.e. 50-60 per cent in some of the fields. To increase the production suitable control measures and efforts to locate the sources of resistance against diseases must be made.

The farmers did not make investment in pulse crops because of the uncertainity of their maturity. The State Government should, therefore, arrange to intensify the pest surveillence units and launch special compaigns to protect the crops by timely control measures. In IPDP the Government should also provide fifty per cent grant to cultivators for purchase of sprayers and other instruments needed for fighting pests and other plant diseases.

7.2 Adequancy of the quantum of water made available to the farmers

During the course of enquiry, the sample farmers were asked if they had a supply of water to irrigation as much land as they would like to. The proportion of farmers not getting enough water for irrigation was very high. The most important problems were: shortage of water in the works, bad

state of repairs, neglect in maintenance, lack of boring facilities, failure of rains, etc., A considerable proportion of the farmers was handicapped by not having fields within the reach of any irrigation work.

In the district rabi pulses were given a priority for irrigation and one or two irrigations to gram and lentil could go a long way to improve the yield. Therefore, an all out attempt should be made to utilize the available irrigation water to the maximum by installation of diesel and electric pumping sets whereever water is available. Cultivator should be advised to ensure timely irrigation for pulse crop with a view to obtain the maximum yield and the present programme of irrigation development in the district needed to stepped up by the State Government. For better control of existing irrigation warabandi should be introduced by the Irrigation Department.

7.3 Percolation of the Programme

The Agriculture Department has organized a special drive to educate the cultivators to take up IPDP and the consent of almost all cultivators was obtained to start demonstration on their fields. The cost of extension demonstration (based on input-kits, plant protection measures, use of rhizobium culture and seed supply) was subsidised by the State Government. By this motivation the farmers have adopted new pulse technology as this has increased the productivity and production of pulses. The programme was carried

out by the cultivators themselves under the technical guidence of the departmental staff. It can be said that whatever progress had been achieved was largely due to enthusiasm of the pulse growers and extension work of the State Department of Agriculture.

Our study, however, showed that the cultivator was more interested in the economics of demonstration programme, this has to be demonstrated by calculating the economics and discussing it with farmers. In order to give adequate publicity to successful demonstration separate funds should be year marked for conducting field days.

7.4 Demonstration Effect on other areas

The continuous decline in the production of pulses in the district must be taken to be an indicator of basic weakness in the production techniques of pulses. The primitive farm management practice of the average pulse grower in the district has made pulse crops into low-value or inferior crops. As pulses are generally grown as mixed crops or the second crops, the farmers give secondary importance to the pulse crop from the point of view of cultural practices. Equally, the low inputs availability and absence of proper care affect productivity. Most of the farmers were following the age-old cultural practices. An example was the unresponsive attitude among farmers towards the use of phosphatic fertilizers and towards the adoption of dry farming practices.

Thus in increasing the productivity of pulses demonstrations laid out in IPDP under the technical guidence of officials of District Agriculture

Department have created a better impact on the farmers of other areas of the district. The note-worthy feature of the demonstration was that it envisaged not merely increased pulse production but also upgraded the technical skill and productivity of pulse farming system of the entire district.

These demonstrations were helpful in educating and convincing the farmers about the benefits of adopting modern methods and techniques of pulse crop cultivation and efficient management with the available resources of soil, water and inputs. Demonstration for midlevel management should also be taken up so that farmers with low investment capacity can also adopt these practices.

People's institutions, particularly Village Panchayats have a significant role to play in IPDP. They can help in developing among the farmers' consciosness and know-how about the programme and thereby create favourable conditions of cooperation in making the programme a success. Therefore, Panchayats should be associated with the programme.

7.5 Reactions of Farmers

It has been observed that a good proportion of the sample farmers were convinced of the utility of the programme. The respondent cultivators were generally aware of the demonstration on their fields; and most of the farmers had seen them in the neighbouring villages. They mentioned certain limiting factors or difficulties like complicated procedure in obtaining finance.

7.6 Constraints in increasing the popularity of the Programme

The present low level of pulse production in the district could be attributed to number of inherent constraints, besides the slow spread of new technology.

Shrinking areas under pulses, as the farmers in the district had switched over to more remunerative high yielding cereals, was one factor. As a result, pulse have been pushed back to marginal lands.

There were also major constraints namely inadequate supply of quality seed, lack of planned production machinery to provide the necessary coverage and selection of right variety to suit individual farm conditions.

Besides, the large tracts in the district lie fallow during kharif. In many cases these were due to the wrong notion that fallow lands would ensure a better rabi variety. For these areas high yielding 70 to 90 days duration crop of red gram, cowpea and green gram should be made available. Sown with the premansoon showers these would fetch extra cash and enrich the soil. However, kharif pulses face several problems. Ridge and furrow planting and inter-row cultivation with bullock drawn implements would enable to overcome these problems. In many cases individual farmer would not be able to use these implements. This problem could be solved by giving 75 per cent subsidy on implements to be owned by farmers.

The market forces had so far failed to buoy up pulses output to adequate levels. It should be the policy of the Government all along to ensure that the pulse cultivator must get the minimum guaranteed price which would cover not only his cost of production but also provide a reasonable margin of profit. This facility should be extended to pulses like lentil, peas and teora.

In view of the spiralling of pulse prices, precisely the opposite situation could be expected. Since pulses fetch relatively greater prices, one could have expected the farmer to switch land, and at that , better land, to pulses. The contrary reality suggests two related hypotheses as explanations. In the first place, price received by the farmers are only a fraction of retail prices. The retail prices are subject to considerable manipulations by the retail trade. Secondary, even with higher prices, dry cultivation of pulses on marginal land produces so little of net income to the farmers that greater investment in and attention to the crop is not considered remunerative by the farmer. At any rate, pulses are seldom grown as a main crop. They are grown on small plots as secondary crops.

The thrust of the IPDP to boost pulses output must thus integrate research translated into an effective package of farm practices, extension, price support and effective procurement.

7.7 Suggestions

For improving the programme in the light of the problems mentioned above, the following suggestions are

proposed to tackle the problems more intensively and efficiently.

7.7.1 Research Programme

1. Breeding of High Yielding Varieties of pulses which can compete with High Yielding Varieties of cereals crops under good management conditions.
2. Investigating the possibility of pulses varieties that could be grown to conditions where cereal or millet crops give low yield.
3. Breeding of varieties suitable as catch crops to replace monsoon fallows.
4. Breeding of diseases and pest resistant varieties keeping quality standards.
5. Standardisation of technique for fertilizers application for different targetted yields.
6. Development of pest control schedule.
7. Development of suitable bacterial culture.
8. Development of more effective agronomic practices.
9. Developing varieties for export quality.
10. Developing suitable implements for sowing and inter culture.

Apart from these, much needs to be done to strengthen and intensify, extension work so that most of the researches done can reach the farmer and acquire popularity. Field survey suggests that most of the farmers are still unaware of the viable

be made to supply the fertilizers to the consuming centres within the villages.

4. A large number of farmers keen to improve their pulses yield need to be told about new practices viz. selection of right variety to suit the farm conditions, proper plant stand and seed treatment with a mixture of Thiram and Brassicol mixture and coting the seeds with the right strain of rhizobium culture.

5. Kharif pulses face several problems. Ridge and furrow planting and inter-row cultivation with bullock drown implements will enable to overcome these problems. In many cases individual farmers will not be able to use these implements at full cost./implements are subsidised. However, they can solve the problem if the

6. Under the IPDP, demonstration should be laid on the plots of small cultivators so that they also feel encouraged to adopt new pulse technology. This measure will also help towards building up the confidence of the weaker section.

7. To meet the increased demand for gram, arrangement should be made by State Seed Corporation.

8. Under the rainfed conditions cultivators should be advised to use fertilizers according to the availability of moisture in the soil. Under irrigated conditions, optimum doses of fertilizers should be applied.

9. Under drought conditions, where use of fertilizers as basal dose is not possible, foliar spray of diammonium phosphate should be done on a mass scale.

10. To save the seed from the attack of fungus and termites a mass scale programme for treatment of seed and soil treatment has to be launched.

11. Cultivator should have been advised to adopt plant protection measures on a timely basis to save the crop from the attack of diseases and pests. Arrangements for pesticides should have been made through M.P. Agro-Industries Corporation.

12. Recent rise in the prices of iron and machinery and implements involved enormous intial investment by farmers in the replacement and purchase cost of these items. Rise in-prices of pesticides and fertilizers in relation to pulses crop price upset the farmers' budgets. This causes disincentive to expand pulse farming activity. It was desirable that parity formula be adopted between the input prices and the output prices by the Government to allay fears of pulse growers and remove uncertainities in pulse farming as the production of pulse crops keep on fluctuating.

13. The small pulse grower's interest in the district should be defended by the different rate of interest on the availbility of credit to them. The rate of interest may be fixed at 4 per cent

for this group of farmers. In general also the rate of interest may be brought down to a lower level than the present 9 to 10 per cent.

14. In existing and new command areas of well irrigation schemes including tube wells, irrigated farming of pulses should be given priority.

15. The production of pulses has progressively decreased which is a matter of great concern. One of the contributory factors for the low productivity of pulses was the loss caused by pests. Though effective techniques had been developed by various research institutes, failure to take timely measures had resulted in damage to pulse crops. Therefore, the need to take up pest surveillance at district level is imperative. So that it may possible to forecast and take preventive measures for psts control.

16. The special training courses for extension workers, particularly in the intensive puls cultivation districts should be organised dung each season so that they can further impart is training at farmer's level in their areas

17. The isolation of short duration varieties of moong and urad has opened possibilities of taking an additional crop of ng and urad in between the two major crops. is programme has vast scope. It is, therefore advised to cover large area under this proe in the district.

soaring prices of pulses in recent years.

18. In Madhya Pradesh moong can be cultivated as intercrop in between the rows of cotton and sugarcane. Similarly, moong can be intercropped in arhar and cotton growing areas, therefore, to cover large areas under moong will be fruitful.

19. In the final stage, the role of mass-media of communication in the dissemmation of knowledge can not be neglected because it can ensure a wide coverage and quick transmission. A co-ordinated apprcach is therefore, suggested so that the inter-personal channels of communication are blended with audio-visual methods. For example, the district agricultural officials can utilize various audio-visual methods while conveying various technical details about IPDP if a vehicle equipped with audio-visual aid is provided by the State Government.

Summing up, the setback of the production of pulses should be a cause for concern. The growth rates of production, area and yield for pulses are disappointing. In absolute terms, it appears that the output of pulses has virtually stagnated in recent years, brought on by both poor yields and diversion of area to other crops. This in turn has led to a growing demand-supply imbalance and soaring prices of pulses in recent years.

The importance of pulses is on account of two factors. In a country where protein deficiency is widespread, increased consumption of pulses could be an effective solution to the ' protein problem '. Secondly, pulses have a useful role to play in replenishing soil fertility. In fact, even now pulses crops add more nitrogen- the most important plant nutrient- to our soil than do fertilizers. Thus even in the interest of other crops, the cultivation of pulses should be encouraged.

CHAPTER VIII

SUMMARY AND CONCLUSIONS

The Pulse Development Programme was initiated towards the close of the IV Five Year Plan and in support of this programme a Centrally Sponsored Scheme was launched in 1972-73. This programme was continued and intensified in the V Plan. Under this programme financial assistance has been provided to the State Government as a subsidy for laying out of extension demonstrations (based on input-kit), seed multiplication, plant protection measures, use of rhizobium culture and seed supply in the selected district which is potential for pulse production.

The study was taken up with the objectives of evaluating Pulse Production Programme's contribution in making an all out effort to increase pulses production in Narsinghpur district of Madhya Pradesh.

The farm level data were collected from thirty farmers belonging to two blocks of Narsinghpur district in Madhya Pradesh. The data related to the year 1977-78.

Madhya Pradesh shares the largest of the area under pulses among all the States. In 1955-56 out of the total area of 24,665.2 thousand hectares in the country Madhya Pradesh had 4,804.6 thousand hectares or 19.48 per cent.

As regards production, the State's contribution was second largest, the largest being that of Uttar Pradesh. Out of the total production of 13,135.3 thousand tonnes, U.P. shared 2,637.0 thousand tonnes

(20.07 per cent) and M.P., 2,539.6 thousand tonnes (19.33 per cent).

In 1956-57 the area under pulses in the State was 3,622 thousand hectares. At the end of 20 years period i.e. 1975-76 it was 4,804 thousand hectares. In other words the increase in area was 32.63 per cent.

The regression equation $y = z + bx$ was fitted to the data of area where y stood for the expected value of area in a given year x. The equation obtained for the data was $y = 3383.30 + 57.89 x$ indicating that the average rate of growth of area under pulses was 58 thousand hectares per year.

The total production of pulses in 1956-57 was 1,625 thousand tonnes. Against this it stood at 2,540 thousand tonnes in 1975-76. Thus the percentage increase in production was 56.31.

The regression equation $y = a + bx$ was fitted to the data on production and the equation obtained was $y = 1344.96 + 41.89 x$ indicating an average rate of growth of 42 thousand tonnes per year.

Area under pulses formed 22.84 per cent of the gross cropped area in the State in 1976-77. It was, therefore, thought proper that all the district having more than 25 per cent of the gross cropped area under pulses be termed as ' pulse districts'. Thus on the basis of the data for the year 1976-77 there were 20 pulse districts in the State. Among these districts Narsinghpur ranked first in area under pulses. The district had more than 60 per cent of its area under pulses.

Analysing the pulses development programme at farm level it was observed that in all eight pulse crops were grown by the farmers. These crops were chick pea (gram), lentil (masur), pea (matar), batri, pigeon pea (arhar), teora, black gram (urad) and green gram (moong). . . From the sample farmers' point of view of area allotment to individual pulses crop; five pulse crops namely, gram, lentil, pea, batri and arhar were found prominent. Among these nearly one-third of the area was under gram during 1976-77 and thus the crop was first in respect of coverage.

The average cost of cultivation of all the pulses taken together was Rs. 580.42 per hectare. The largest proportion of the cost was shared by seed (38.41 per cent). The second important item was labour (30.68 per cent) and fertilizer was the third (13.50 per cent).

Among the various pulses, the cost of production was highest for gram (Rs. 688.37). It was second highest for pea (Rs. 598.27) and Rs. 498.84 for teora.

Analysing the yield aspect of the pulse crops among sample farmers it was seen that moong had maximum yield per hectare (11.88 quintals) followed by arhar (9.99 quintals) and gram (8.07 quintals). The other pulse crops namely pea, batri, teora and urad generated yield per hectare of the level between 4.88 quintals to 6.93 quintals. The lowest yield per hectare was of lentil (4.41 quintals).

The average value of output per hectare of all the pulse crops taken together was Rs. 1841.23. Among different pulses, it was highest for arhar (Rs. 2495.95) followed by gram (Rs. 2419.97) and moong (Rs.2376.24) . The profit per hectare was highest (Rs. 2066.37) in the case of arhar. Moong crop accrued a profit per hectare of Rs. 1931.44. Gram, which is an important pulse crop of the area, earned a profit of Rs. 1731.10 per hectare. The input-output ratio for arhar stood at 5.8, for moong 5.3, for soybean 5.1, for urad 4.7 and for gram 3.5. The average for all pulse crops was 3.2.

The main factors for IPDP have been studied at the farm level which revealed the following :
(1) There is a need for conducting large scale soil tests. (2) The non-availability of good quality seed was an obstacle in the effective implementation of the programme. (3) The fertilizer consumption is showing a steady upward trend and diammonium phosphate application has been a success. (4) The irrigation facilities have been woefully inadequate and (5) To increase the pulse production, the suitable control measures and efforts to locate the sources of resistance against diseases must be made.

The theme of the study is that if a significant increase in production of pulses is aimed at, the pulse growers need to be motivated to adopt new pulse technology.

Judged from this, it is evident that Pulse Production Programme has been able to fulfil most of its objectives. An essential feature in IPDP must be an adaptive research studying the local conditions for transferring the new technology and the same has to be greatly encouraged.

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