Ad-hoc Study No.57

EVALUATION OF WHEAT MINIKIT PROGRAMME IN MADHYA PRADESH

(A Study in Morena and Sagar districts)

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I N T R O D U C T I O N

Green revolution in the country became possible mainly due to the adoption of Mexican varieties of wheat, which proved highly responsive to the chemical fertilizers. Paddy and wheat are the two important cereals of the country. In 1982-83 wheat was sown on 23,567 thousand hectares and paddy on 38,262 thousand hectares occupying 13.65 and 22.16 per cent of the gross-cropped area of the country respectively. But in the field of production paddy contributed 36.37 per cent and wheat, 33.04 per cent of the total foodgrains production. It was because of the fact that the wheat varieties proved far more higher yielding and responsive to the chemical fertilizers as compared to the paddy varieties.

As is well known a popular variety becomes less effective with the passage of time. Similarly varieties have to be evolved looking to the agro-climatic and soil conditions of a particular region. These necessitate the evolution of new varieties through a regular breeding programme. Quick adoption of new research findings by the cultivators is another important aspect for the popularization of varieties. This can be a achieved only when the extension workers and cultivators are made partners with the research workers. Minikit programme was thought to be the best solution to this problem as it reduced the time lag to a bare minimum between the new research findings and their adoption by the cultivators.

1.1 Minikit Programme

The minikit demonstration scheme of paddy was initiated during rabi and summer seasons of 1971-72. This scheme provided encouraging results, therefore, similar schemes for other food crops including wheat, jowar, bajara, maize, ragi and barley were also started from 1974-75. For pulse crops it was started from 1981-82.

The main objective of the minikit programme was to popularize the promising research findings on the cultivators' farms without any loss of time. In other words, the farmers should be kept well acquainted with the particular variety before it is released. Thus the minikit programme as a central sector scheme was started in 1974-75 with the following aims :-

(i) Identification and popularization of promising pre-released/newly released varieties of wheat through farmers' participation

(ii) Popularisation of location specific high yielding varieties in problem areas

(iii) Speeding up the adoption of superior varieties

(iv) Acquainting the extension workers with the new varieties before they are actually released and feed back information to the research workers for further improvement of the varieties.

One very important aspect of this scheme was that it made extension workers and farmers as partners of researchers in the final decision about the suitablity of a variety under field conditions. As a result of this scheme, the time-lag between the

new research findings and their adoption by the cultivators was reduced to the barest minimum.

1.2 Distribution of Wheat Minikits

Minikit programme was started in 1974-75 to evaluate the continuously evolved wheat varieties through minikit demonstrations and adoptive trials in different agro-climatic zones for the identification of suitable popular varieties. This scheme proved very much fruitful and encouraged by its success it was accelerated from 1982-83 in the light of the 20 Point Programme of the Prime Minister and the celebration of productivity year, 1982.

The entire responsibility of planning, formulation and implementation of wheat minikit programme rests with the Food Crops Wing of the Crops Division of the Department of Agriculture and Cooperation, New Delhi. Under this scheme, 5 kg. minikits for plains and 2 kg. minikits for hilly areas were supplied to the state governments for free distribution to the farmers. During the sixth plan period a total of 5,64,756 wheat and barley minikits were distributed. Under the seventh plan, about 1.75 lakh wheat and barley minikits were distributed during 1985-86 and 1.30 lakhs in 1986-87.

States of Bihar, Madhya Pradesh, Uttar Pradesh and West Bengal were the major recipients of wheat minikits. These states were supplied 4,04,867 wheat minikits from 1980-81 to 1985-86. (Table 1.1)

Table 1.1 Number of wheat minikits supplied to the states of M.P., U.P., W.B. and Bihar from 1980-81 to 1985-86.

Year	States and Minikits				Total Minikits
	Bihar	M.P.	U.P.	W.B.	
1980-81	-	600	1,500	100	2,200
1981-82	-	1,260	3,670	-	4,930
1982-83	1,250	53,544	14,839	-	69,633
1983-84	10,000	50,100	17,294	4,000	81,394
1984-85	20,000	50,000	65,000	8,000	1,43,000
1985-86	15,720	49,990	36,000	2,000	1,03,710
Total	46,970	2,05,494	1,38,303	14,000	4,04,867

1.3 Wheat Minikit Varieties

In the first year of its operation 10 new varieties were introduced. Since wheat varieties are continuously being evolved for different agro-climatic zones, the new wheat varieties identified by the All India Wheat Worker's Workshop every year were included in the programme and 34 new varieties were recommended to the farmers during the 5th plan period and a large number of wheat varieties were tested under this programme during the Sixth Plan period.

The implementation of wheat minikit demonstrations and adoptive trials identified about 40 popular varieties which received adoption among the farmers without much loss of time. Adoption of these varieties among different states became popular in the light of the agro-climatic conditions and suitable characteristics of the varieties. (Table 1.2)

Table 1.2 States and the wheat varieties popularly Adopted

S.No.	States	Varieties with popular adoption
1.	Punjab	WL-711, WL-1562, HD-2009, DWL-5023, KSML-3
2.	U.P.	K-7410, HUW-12, UP-2003, UP-115, VL-421, HD-2204, HD-2177.
3.	Bihar	Sonalika, HP-1209, HP-1102, UP-262, C-306, UP-115
4.	Haryana	Kalyansona, Sonalika, WH-147, WH-157, HD-2009, C-306
5.	M.P.	Kalyansona, Sonalika, WH-147, 20K-1, HD-2236, HY-65, Narmada-112, Sujata C-306
6.	Rajasthan	Kalyansona, Sonalika, Raj-911, Raj-821, Raj-114, HD-2009, Raj-1482
7.	Assam	Sonalika, Janak, UP-262, UP-115, K-7410, C-306
8.	Orissa	Sonalika, Janak, UP-262, HP-1102, HUW-129, K-7410, UP-115, H.P.-1209, C-306.
9.	Gujarat	Kalyansona, J-24, WH-147, Sonalika, Raj-911, Meghdoot, Mukta.
10.	Maharashtra	Kalyansona, CC-464, HD-2189, NI-747, NI-543, NI-5643, Malvika.
11.	W.B.	UP-262, HP-1209, Sonalika.

1.4 Training of Extension workers

Dissemination of knowledge about the latest varieties and production technology among the farmers through the extension officers was an important activity of the wheat minikit programme. The Crops Division which is responsible for the implementation of this scheme, organised state level training courses on wheat production technology in association with Agricultural Universities, Research Institutes and Agricultural Colleges in each state before the commencement of crop season. This programme was highly appreciated by the state governments as it helped in the quick adoption of research recommendations on cultivator's farms and also provided immediate feed back to the research workers.

During the Sixth Plan period about 92 training courses were organised by the Crops Division. During the 7th Plan period it was proposed to conduct 20 training courses every year. Expenses were met by the Govt.of India, subject to the limit of Rs.7200 per training course.

1.5 Financial Allocations for Minikit Programme of wheat

Originally Rs.25 lakhs were allocated under sixth plan for this scheme. This was revised to Rs.168 lakhs in view of the productivity year 1982-83 to accelerate the programme to achieve the higher production target. At the end of the plan the allocation touched Rs.200.06 lakhs. The yearly expenditure during the sixth plan was Rs.1.55 lakhs in 1980-81, Rs.7.11 lakhs in 1981-82, Rs.57.20 lakhs in 1982-83, Rs.60 lakhs in 1983-84 and Rs.74.20 lakhs in 1984-85.

During the 7th five year plan the scheme was continued on ongoing basis in the central sector. The total outlay under this scheme was Rs.220 lakhs which included Rs. 70 lakhs for 85-86, Rs.50 lakhs for 86-87, Rs.40 lakhs for 87-88, Rs.30 lakhs for 88-89 and Rs.30 lakhs for the plan ending year 89-90.

1.6 Physical Achievements

During the sixth plan period a total number of 5,64,756 wheat and barley minikits were supplied to the State Governments for free distribution. Quantity of rust resistant varieties seed was 283.5 qtls. To test the varieties in different agro-climatic zones 412 adoptive trials were also laid. For dissemination of latest varieties and production technology Crop Division organised 92 training campss.

Under 7th plan it was proposed to distribute 5.60 lakhs minikits, to supply 1,200 qtls of seed of rust resistant varieties and to organise 100 training courses. During 1985-86 and 86-87 3.05 lakhs minikits, and 700 qtls of seed of rust resistant varieties was distributed. During these 2 years 40 training courses were also organised (Table 1.3)

Table 1.3 Physical Achievement under wheat Minikit Programme from 1980-81 to 1986-87.

Years	No.of wheat and barley minikits supplied	Qty.of Rust Resistant variety seed(Qtls)	Adoptive Trails No.	Training Courses No.
1980-81	5,393	150	76	16
1981-82	13,969	68.5	42	18
1982-83	1,42,300	65	60	18
1983-84	1,43,094	-	109	20
1984-85	2,60,000	-	125	20
1985-86	1,75,000	200	NA	20
1986-87	1,30,000	500	NA	20
All	8,69,756	983.5	412	132

Thus, during the span of 7 years (1980-86) the Crops Division supplied 8,69,756 minikits and 983.5 qtls of seed of rust resistant wheat varieties. It also organized 132 training courses to acquaint the extension workers with the latest researches on promising varieties and production technology of wheat crop.

1.7 The Present study

The Crops Division desired that the central sector scheme of minikit programme of wheat may be evaluated in the states of Bihar, Madhya Pradesh, Uttar Pradesh and West Bengal. Directorate of Economics and Statistics, (Department of Agriculture) Ministry of Agriculture and Cooperation, Govt.of India, directed this Centre to conduct the evaluation study of wheat minikit programme in Madhya Pradesh.

1.7.1 Objectives of Study :

The main aim of this study was to assess the role played by the Minikit Programme in the identification and adoption of popular varieties of wheat by the farmers and the dissemination of information about latest varieties and production technology among the extension workers and the farmers. It had the following spacific objectives

(i) To study the identification and adoption of wheat varieties by the farmers via-viz. the wheat minikit programme.

(ii) To study the dissemination of information among the farmers and the extension workers through the minikit programme.

(iii) To study the impact of minikit programme in the early adoption of popular varieties and new production technology of wheat.

(iv) To study the farmers reactions about the minikit programme of wheat.

(v) To indicate the policy issues raised and to make suggestions for improvement to do better in future.

1.7.2 Methodology

(a) The Sample

The State level data were collected from the Directorate of Agriculture, M.P. Bhopal regarding the districtwise distribution of wheat Minikits and the varieties covered under the programme. Discussions were held with state level officials about the sample of the study.

It was decided that study may cover two districts including one district from rainfed wheat growing districts and another district from irrigated wheat growing districts. Sagar district from rainfed group and Morena district from irrigated districts were suggested. These districts also received comparatively larger number of wheat minikits every year. This had been another reason for the selection of Sagar and Morena districts.

It was further decided that one block from each district, where larger number of minikits were taken by the farmers, be selected. Accordingly Shahgarh block of Sagar district and Ambah block of Morena district were selected. For the selection of sample at the gross-root level, the recipients of wheat minikits of 1986-87 were divided on the basis of size of holding and caste/tribe basis. On random sample basis 50 farmers from each block were selected to have a total sample of 100 farmers.

(b) Data Collection

Secondary data were collected from the concerned offices at Bhopal and in the selected districts. Primary data were collected from the selected farmers with the help of interview schedules. Wheat minikit varieties distributed during 1986-87 were mainly considered for discussion. Data were collected in the month of May and June 1987. With the help of interview schedules.

1.8 Reference Year

Year 1986-87 was taken as reference year for the study.

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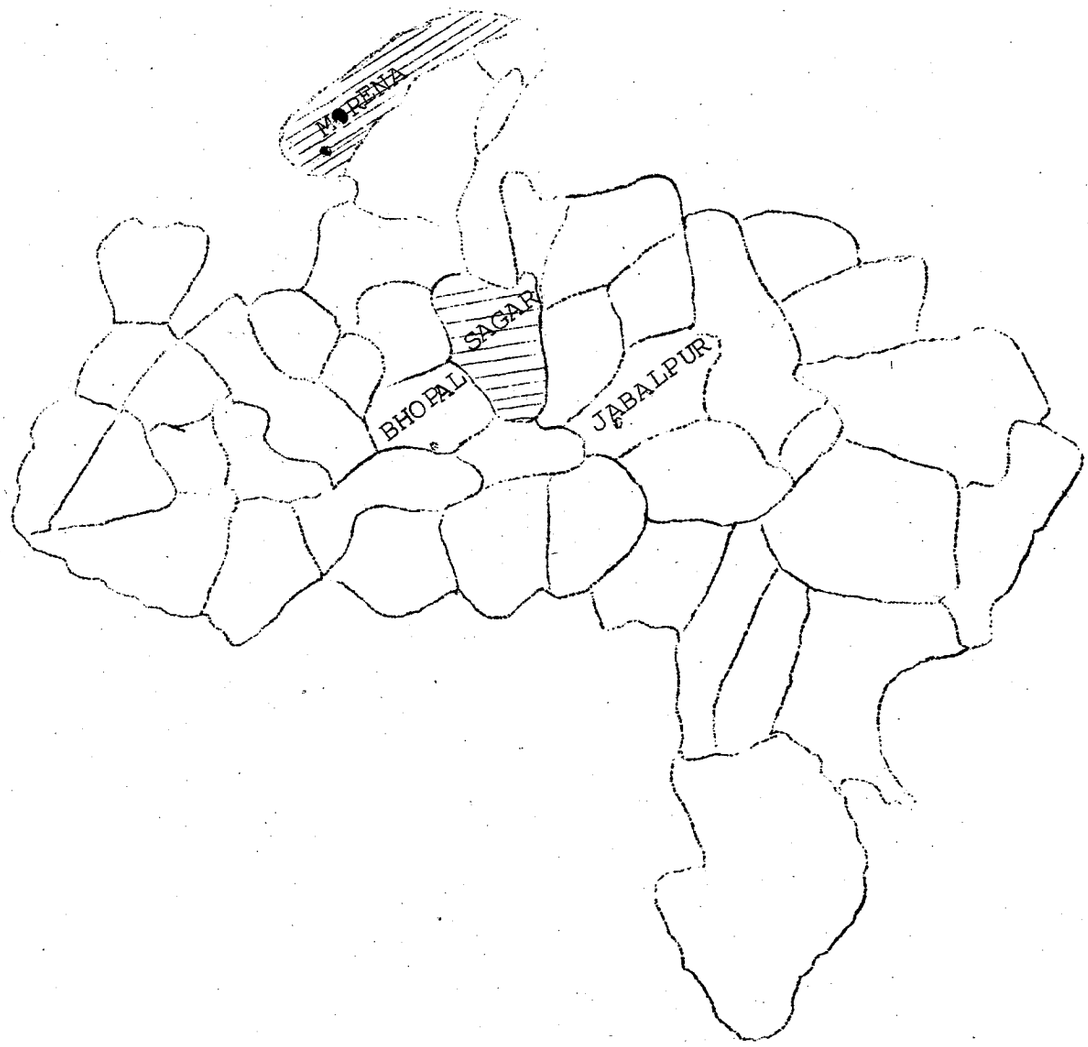
MAP OF
MADHYA PRADESH



C H A P T E R II

WHEAT IN MADHYA PRADESH

2.1 Importance of Wheat Cultivation in M.P.

Madhya Pradesh occupied 15.57 per cent of the total area under wheat of the country in 1984-85 and contributed 8.90 per cent to the total production of wheat. In the state itself wheat was second important crop in area, the first being paddy, and covered 16.06 per cent of the gross-cropped area of the state in 1984-85. Among fodgrains it constituted, 20 per cent area but contributed the largest share of 29.60 per cent in the total production. As against this 28.29 per cent production was received from paddy which covered 27.75 per cent of the total area under foodgrain in the state. Thus, wheat was the most promising crop among all the foodgrain crops of the state.

2.2 Area under Wheat

During 1966-67 when High Yielding Varieties were introduced, the state had 2,126 thousand hectares under wheat and 221 thousand hectares or 10.40 per cent of this was irrigated. With the passage of time, the area under wheat increased continuously and in the wake of new high yielding varieties it increased to 3,598 thousand hectares in 1984-85 which means an increase of nearly 70 per cent over the year 1966-67.

Wheat in M.P. was mainly grown under unirrigated conditions. Area under unirrigated wheat in 1966-67 was 1,905 thousand hectares which rose to 2,307 thousand hectares with an increase of 21.10 per cent in 1984-85.

A steady progress was made in the irrigated area which increased from 221 thousand hectares in 1966-67 to 1,291 thousand hectares in 1984-85, with a remarkeble progress of 84.16 per cent. Wheat cultivation in general depended on the longvity of monsoon rains and accordingly area varied from year to year. During the favourable years the area under wheat had an increased coverage and it crossed 37 lakh hectares area during these years. For example in 1978-79 it covered 3,778 thousand hectares and in 1983-84 it grew to 3,780 thousand hectares which was 77.80 per cent more over the year 1956-67. During the year 1984-85, wheat crop was grown on an area of 3,598 thousand hectares and it included 35.88 per cent irrigated and 64.12 per cent unirrigated area. (Table 2.1)

2.3 Area under wheat in different Districts

Wheat crop is more extensively grown than any other crop in the state. All the districts of the state grew wheat on small or big area. During 1984-85, proportion of wheat area to the gross-cropped area varied between 40 and 50 per cent in 4 districts namely, Satna, Bhopal, Vidisha and Sagar. These districts occupied 20.68 per cent of the total wheat area of the state. Area under wheat varied between 30 and 40 per cent in 6 districts including Rewa, Jabalpur, Damoh, Gwalior, Panna, and Raisen which covered 21.44 per cent of the total wheat area of the state. There were 9 districts where proportion of wheat area was between 20 and 30 per cent. These districts were Seoni, Morena, Indore, Shivpuri, Bhind, Hoshangabad, Sehore, Tikamgarh and Datia and 22.91 per cent of the total wheat area was under them.

Table 2.1 Area, production and yield of Wheat in M.P. 1966-67 to 84-85

1966-67 = 100

Year	AREA 000' Hect						Production		Yield	
	Irrigated	Index	Un-Irrigated	Index	Total	Index	000' Tonnes	Index	Kg/Hect.	Index
1966-67	221	100.00	1,905	100.00	2,126	100.00	1,031	100.00	505	100.00
1967-68	282	127.60	2,376	124.72	2,658	125.02	1,881	182.44	737	145.94
1968-69	340	153.85	2,671	140.21	3,011	141.63	1,964	190.49	680	134.65
1969-70	420	190.05	2,928	153.70	3,348	157.48	2,293	222.41	714	141.39
1970-71	520	235.29	2,883	151.34	3,403	160.07	2,592	251.41	794	157.23
1971-72	652	295.02	3,013	158.16	3,665	172.39	3,189	309.31	907	179.60
1972-73	687	310.86	2,590	135.96	3,277	154.14	2,285	221.63	727	143.96
1973-74	675	305.43	2,598	136.38	3,273	153.95	2,539	246.27	809	160.20
1974-75	613	277.38	2,175	114.17	2,788	131.14	2,351	228.03	880	174.26
1975-76	790	357.47	2,571	134.96	3,361	158.09	2,750	266.73	854	169.11
1976-77	820	371.04	2,324	121.99	3,144	147.88	2,308	223.86	766	151.68
1977-78	903	408.60	2,651	139.16	3,554	167.17	3,103	300.97	911	180.40
1978-79	980	443.44	2,748	146.88	3,778	177.70	3,523	341.71	973	192.67
1979-80	782	353.85	2,303	120.89	3,085	145.11	2,155	209.02	728	144.16
1980-81	977	442.08	2,388	125.35	3,365	158.28	3,143	304.85	974	192.87
1981-82	979	442.99	2,327	122.15	3,306	155.50	3,313	321.34	1,046	207.13
1982-83	1149	519.91	2,444	128.29	3,593	169.00	3,801	368.67	1,104	218.61
1983-84	1272	575.57	2,508	131.65	3,780	177.80	4,374	424.25	1,207.	239.01
1984-85	1291	584.16	2,307	121.10	3,598	169.24	3,935	381.67	1,141	225.94

Source : Agricultural Statistics Page 32

Wheat occupied largest proportion of 48 per cent in Sagar followed by 47.80 per cent in Vidisha district. Bastar district possessed the lowest proportion of 0.30 per cent under wheat crop in the total gross-cropped area of the district.

As per the state norms the districts which had more than 20 per cent of the total gross-cropped area under a crop are marked with that crop. Accordingly there were 19 wheat district in Madhya Pradesh. In these districts wheat area varied between 20 and 50 per cent and during 1984-85 constituted 65.03 per cent of the total area of wheat. Eight districts namely, Sagar, Vidisha, Raisen, Damoh, Sehore, Hoshangabad, Bhopal and Indore comprised wheat zone. Tikamgarh, Datia, Shivpuri, Panna, Gwalior, Morena and Bhind come under Jowar-wheat tract and Rewa, Jabalpur, Satna and Seoni form Paddy-Wheat tract of the state (Table 2.2)

2.4 Production and Yield of Wheat

Production of wheat in 1966-67 was 1,031 thousand tonnes and it went up more than four times in 1983-84, when the state had the record production of 4,374 thousand tonnes of wheat. Due to adverse behaviour of rains it came down to 3,935 thousand tonnes in 1984-85 but it continued to contribute highest propostion of 30 per cent to the total foodgrain production of the state. (Table 2.1)

Average yield of wheat during 1966-67 was 505 kg. per hectare and it increased steadly till 1983-84 when it was 1,207 kg per hectare which means and increase of 239 per cent.

Table No. 2.2 Wheat districts of M.P.

No.	Proportion of area under wheat crop to gross cropped area %	No of Districts	Area under wheat (Thousand hectares)	% to total wheat area	Names of Districts
1.	40-50	4	744.1	20.68	Satna, Bhopal, Vidisha, Sagar
2.	40-30	5	771.5	21.44	Rewa, Jabalpur, Damoh Gwalior, Panna, Raisen
3.	30-20	9	823.8	22.91	Seoni, Morena, Indore Shivpuri, Bhind, Hoshangabad, Sehore, Tikamgarh, Datia.
4.	20-10	10	625.0	17.37	Sidhi, Shahdol, Shajapur, Ujjain, Dhar, Narsingpur, Dewas, Betul, Mandla, Chhindwara.
5.	10- Less	16	625.2	17.38	Bestar, Raigarh, Raipur, Bilaspur, Durg, Surguja, Jhabua, Chhatarpur, Guna, Rajnandgaon, Balaghat, Khargone, Khandwa, Mandsour, Ratlam, Rajgarh
6.	Non Reported Area		8.0	0.22	
	Total	45	3,597.6	100.00	

During 1984-85 the average yield was 1,141 kg per hectare as against the all India average of 1,873 kg per hectare. Among different districts, there were 23 districts which had higher yield than the average for the state. The districts with lower than average yield numbered 22 and among them lowest yield of 527 kg per hectare was in seoni district. The highest yield of 2,540 kg per hectare was in Khargone district followed by 2,321 kg in Morena district.

During 1984-85 there were 7 districts with a yield more than 2,000 kg per hectare, ancther 7 districts had yield between 1500 - 2000 kg., 10 districts between 1000-1500 kg. and 21 districts had yield less than 1000 kg. per hectare. Out of 45 districts 8 districts namely Khargone, Morena, Khandwa, Mandsaur, Narsinghpur, Shajpur, Indore and Tikamgarh had yield average of more than the average yield of the country. (Table 2.3)

2.5 Popular Wheat Varieties Grown in M.P.

As indicated earlier wheat in M.P. is mainly grown in unirrigated conditions. This includes wheat grown in Haweli areas (rainfed areas) in partially irrigated areas and in dryland farming areas. Irrigated wheat was grown on 1,291 thousand hectares or nearly 36 per cent out of total wheat area of 3,598 thousand hectares in the state (1984-85). Thus, popular varieties grown in the state in accordance with the suitability to the different agro-climatic zone are classified into two groups :

Table 2.3 Yield rates in different districts

Yield in kg.Group	No of District	Name of Districts
Less-750	10	Seoni, Durg, Rajnandgaon, Balaghat, Bilaspur, Shahdol Sagar, Vidisha, Jabalpur, Rewa
750-1000	11	Sidhi, Panna, Satna, Mandla, Raipur, Damoh, Guna, Jabalpur, Raisen, Bhopa, Surguja.
1000-1250	6	Rajgarh, Betul, Bastar, Sehore, Shivpuri, Raigarh.
1250-1500	4	Dhar, Chhindwara, Dewas, Chhatarpur
1500-1750	4	Ujjain, Hoshangabad, Bhind, Gwalior
1750-2000	3	Ratlam, Datia, Tikamgarh
2000-2050	5	Indore, Shajapur, Narsinghpur, Mandsour, Khandwa.
2050- above	2	Morena, Khargone.
Total	45	

(I) Varieties popular in rainfed and dryland farming areas with or without any partial irrigation and,

(II) Varieties grown in irrigated conditions. Presently, 18 wheat varieties were quite popular in the state and among these 8 varieties were popular under unirrigated areas and 10 varieties were popular under irrigated areas. (Table 2.4)

Table 2.4 Maturity period and yields of different wheat varieties

Name of variety	Maturity period Days	Yield. kg/Hect.
Dry Varieties		
1. Narmada-4	123	1200
2. Narmada-112	125	1300
3. Narmada-195	125	1300
4. Hybrid 85	123	1100-1200
5. N.P. 404	135	1000-1100
6. Maghdoot	135	1100
7. Mukta (H1 385)	130	1300
8. Sujata (H.1.617)	130	1300
Irrigated varieties		
9. Sonalika	110	3000-3500
10. Kalyansona (H.D.M 1594)	125	3000-3500
11. W.H. 147	130	3500-4000
12. H.D. 4530	130	3500
13. Jairaj	115	3000-3500
14. Raj 1555	125	3500
15. H.D. 2236	130	3500-4000
16. Lok-1	125	3500
17. Tawa 215	125	3500
18. Tawa-267	125	3500

(i) Varieties suitable to Rainfed and Dry land Farmings areas

Most of the varieties in this group were developed within the state itself, particularly by the scientists of the J.N. Agricultural University. These varieties were Narmada-4, Narmada-112, Narmada-195, Sujata (H1-617) and Mukta (H1-385). Varieties HY-65, NP-404 and Meghdoot were also popular among the cultivators. These varieties were sown early in the residual moisture in the second half of October. Maturity period of these varieties varied between 123 and 135 days. Varieties HY-65, Narmada-4, Narmada-112 and that of the remaining four varieties viz Mukta, Sujata, Meghdoot and NP-404, between 130 and 135 days. The average yield from NP-404 HY-65, Narmada-4 and Meghdoot varied between 1000-1200 kg. per hectare and that of Sujata, Narmada-112, Narmada-195 and Mukta, 1300 kg per hectare. (Table 2.4)

(ii) Varieties Popular Under Irrigated Conditions

Varieties grown in irrigated conditions were Sonalika, Kalyansona, (HDM-1594), WH-147, HD-4530, Jairaj, Raj-1555, HD-2236, Lok-1, Tawa-215 and Tawa-267. These varieties were sown usually in the second half of November. Late sown varieties like Lok-1 and Sonalika were sown in the second half of December.

Sonalika and Jairaj were short duration varieties which matured between 110-115 days. Kalyansona, Lok-1, Raj-1555 and Tawa varieties had maturity span of 125 days and varieties WH-147, HD-2236, HD-4530 matured in 130 days.

Yield of irrigated varieties varied between 3000-4000 kg. per hectare. An average yield of 3500-4000 kg. was obtained from HD-2236 and WH-147 and between 3000-3500 kg per hectare from all other irrigated varieties (Table 2.4)

2.6 Varieties Recommended for Different Agro-climatic Zones in M.P.

Irrigated varieties including HD-2236, WH-147, Tawa-267 HD-4530, Raj-1555, Jairaj, Tawa-215 and Kalyansona were recommended to be sown all over the state. Sonalika and Lok-1, were recommended as late sown irrigated varieties for all parts of the state.

Varieties grown in rainfed and dryland farming conditions were recommended in the light of different agro-climatic zones of the state as under :-

(1) Malwa and Satpura Region

NP-404, Narmada-4, Narmada-112, Sujata, Mukta and Narmada-195.

(2) Vindhya Region

Narmada-4, Narmada-112, Mukta, NP-404, HY-65, Sujata and Narmada-195.

(3) Nimar Region

Narmada-4, Narmada-112, Narmada-195, Sujata, and HY-65

(4) Madhya Bharat

Narmada-4, Narmada-112, Narmada-195, Sujata, Mukta & HY-65

(5) Vainganga Region

Sujata, HY-65, Mukta, Narmada-4 Narmada-112 and Narmada-195

(6) Rainfed Areas (Haveli Region)

C-306, Mukta, HY-65, Sujata, Narmada-4, Narmada-112, and Narmada-195

(7) Narmada Valley and Bundelkhand Regions

Meghdoot, Sujata, Mukta, HY-65, Narmada-4, Narmada-112 and Narmada-195

(8) Chhatisgarh Region

HY-65, Narmada-4, Narmada-112 and Narmada-195.

Varieties like Narmada-4, Narmada-112, Narmada-195 and HY-65, were recommended to be grown in all the regions. Sujata and Mukta were also to be grown among all the regions except Chhatisgarh region, while, varieties like C-306 NP-404, Meghdoot were to be grown in some specific regions.

2.7 Wheat Minikit Programme in M.P.

Under the Central Sector Scheme of wheat minikit demonstrations programme, minikits were supplied to the state by S.F.C.I., New Delhi and M.P. State Seed Corporation. Each minikit contained 5 kg seed to be sown on 1/20 hectare plot Control plot of similar size of the check variety was necessary with the wheat minikit demonstration plot. Wheat minikit was supplied free of cost while the cost of seed of the check variety was to be born by the farmer. It was stressed by the state government that selection of the farmers should be done from the list supplied by the Sarpanch of the Grampanchayat. Farmers belonging to the scheduled castes, and scheduled tribes, marginal and small farmers might be included on priority basis in this programme.

Minikit demonstrations should be carriedout as per the guidelines specified under the scheme.

2.7.1 Targets and Achievements

From 1980-81 to 1986-87 Madhya Pradesh was given a target of 2,75,180 wheat minikit demonstrations. Of this, 2,61,916 minikits or 95.18 per cent were supplied to the farmers. Yearly target and achievement figures indicated that during 1980-81 the achievement was 66-67 per cent, it decreased to 61.54per cent in 1981-82 but it increased to 87.70 per cent in 1982-83. Achievement in 1983-84 crossed the target by 102.54 per cent but it was slightly lower than target with 94.34 per cent in 1984-85. During 1985-86 achievement was much above the target (108.37,per cent). During 1986-87 the state was to distribute 20 thousand minikits and it actually, supplied 14,208 or 71.04 per cent wheat minikits to the farmers.

Yearly breakeup of minikit distribution indicated that scheme received momentum from 1982-83 and maximum number of 94,335 minikits were distributed in 1984-85 followed by 54,186 minikits in 1985-86. (Table 2.5)

2.7.2 Varietywise Breakeup of minikits in M.P.

Variety wise data on wheat minikits was available for last 3 years i.e. 1984-85,85-86 and 86-87. During these years in all 19 wheat varieties were used under minikit demonstrations. A large number of varieties numbering 18 were used in 1984-85 by supplying 89,667 minikits and among these 46.04 per cent were of Lok-1, 12.50 per cent of H.D. 2236, 10.03 per cent of WH-147 and 9.78 per cent of Raj-1482. Remaining minikits were of 14 varieties of wheat. Six varieties were used in 1985-86 by supplying 54,188 minikits comprising 33.49 per cent of HDM-2189,

Table 2.5 Physical Targets and Achievements of wheat minikits in M.P.

Year	Target No	Achievement No.	% to Target
1980-81	600	400	66.67
1981-82	1,360	837	61.54
1982-83	53,220	46,678	87.70
1983-84	50,000	51,272	102.54
1984-85	1,00,000	94,335	94.34
1985-86	50,000	54,186	108.37
1986-87	20,000	14,208	71.04
Total	2,75,180	2,61,916	95.18

33.80 per cent of HD-2285 and 32.04 per cent of HD-2329. Less than one per cent minikits were of WL-2265 and J-405 varieties. During 1986-87, only two varieties were included and 14,208 minikits were distributed. Of these 13,408 or 94.37 per cent were of HD-2329 and remaining 800 or 5.63 per cent of HDM-1553 variety of wheat.

Among the varieties used under minikit distribution 7 were pre-released varieties and 12, released varieties. Pre-released varieties were PBW-34, HD-2329, WH-331, WL-2265, DL-1532 and J-405. Released varieties were Narmada-112, Lok-1, HD-2236, Raj-1483, Raj-1555, WH-147, HD-2285, HD-2204, HD-2281, DWL-5023, HDM-1553 and HDM-2189. (Table 2.6).

Table 2.6 Distribution of variety wise minikit

S.No.	Varieties	1984-85		1985-86		1986-87	
		No.	%	No.	%	No.	%
1.	HD- 2281	2148	2.40	-	-	-	-
2.	WL- 2265	146	0.16	236	0.44	-	-
3.	J- 405	268	0.30	124	0.23	-	-
4.	WH- 147	9000	10.03	-	-	-	-
5.	HDM-2189	2618	2.92	18148	33.49	-	-
6.	Lok-1	41281	46.04	-	-	-	-
7.	HD- 2285	2661	2.97	18318	33.80	-	-
8.	HD- 2329	-	-	17360	32.04	13408	94.37
9.	HD- 2236	11211	12.50	-	-	-	-
10.	DL- 1532	143	0.16	-	-	-	-
11.	Narmada-112	830	0.93	-	-	-	-
12.	HD- 2327	408	0.45	-	-	-	-
13.	PBW-34	80	0.09	-	-	-	-
14.	WH- 331	25	0.03	-	-	-	-
15.	HD- 2204	2160	2.40	-	-	-	-
16.	DWL-5023	1890	2.11	-	-	-	-
17.	Raj-1482	8769	9.78	-	-	-	-
18.	HDL-1553	3000	3.35	-	-	800	5.63
19.	Raj.1555	3027	3.38	-	-	-	-
20.	Other	2	-	2	--	-	-
	All	89667	100.00	54188	100.00	14208	100.00

2.7.3 Check Varieties Used on Control Plots

Most popular and widely sown varieties were used as check varieties in different areas. These were WL-711, HD-2009, C-308, WL-410, Lok-1, Sonalika and Swati. (Table 2.7)

Table 2.7 Minikit varieties of wheat and check varieties used in M.P.

S. No.	Minikit varieties	Check varieties	Conditions in which Demonstration be laid.	Stage of minikit variety
1.	PBW- 34	DWL- 5023	Irrigated Timely sown Good Fertility Condition	Pre released variety For adoptive trial
2.	HD- 2329	WL-711 or HD- 2009	-- do ---	-- do ---
3.	WH- 331	C- or WL-410	Rainfed timely sown Low fertility condition	-- do --
4.	Narmada112	- do -	-- do ---	Released variety for adoptive trial
5.	WL- 2265	- do -	-- do --	Pre released variety for adoptive trial
6.	DL- 1532	- do -	-- do --	-- do --
7.	HD- 2327	Lok-1 Sonalika Or Swati	Irrigated late sown and good fertility condition	-- do --
8.	Lok- 1	--do --	-- do --	-- do --
9.	J- 405	--do --	-- do --	-- do --
10.	HD- 2236	-- do -	Irrigated timely sown good fertility condition	Released variety for adoptive trial.
11.	Raj- 1482	--do --	-- do --	-- do --
12.	Raj- 1555	-- do -	-- do --	-- do --
13.	WH - 147	-- do --	Irrigated timely sown medium/good fertility condition	-- do --
14.	HD- 2285	-- do -	Irrigated late sown good fertility condition	-- do --
15.	HD- 2204	-- do -	Irrigated timely sown and good fertility condition	-- do --
16.	HD- 2281	-- do --	--- do --	-- do --
17.	DWL- 5023	-- do --	--- do --	-- do --
18.	HDM- 2189	-- do --	Irrigated for normal sown/ medium/high fertility condition	-- do --
19.	HDM- 1553	-- do --	---- do ----	-- do --

2.7.4 Package of Practices Recommended

It was stressed that the field selected should be located so as to serve as a demonstration plot. It should be properly levelled and the soil should be free from weeds etc. Secondly, the most popular and widely grown wheat variety should be used as check variety on control plot so that farmers may feel convinced of the merits of new varieties used under minikit demonstrations. Minikit demonstrations should be laid down in the presence of extension worker who should personally ensure the adoption of prescribed package of practices. (Table 2.8)

2.7.5 Training Courses Conducted

Directorate of Agriculture, M.P. Bhopal organised 3 training courses every year from 1982-83 to 1986-87 (except in 1984-85) to disseminate latest technology to its extension workers. These trainings were of 4 days duration each and were held under the supervision of J.N. Agricultural University Scientists at Jabalpur, Gwalior and Indore which covered most of the wheat growing districts. In these trainings problems of the extension workers were listened as feed back by the scientists who apprised the extension workers about the lastest devèlopments in the field of wheat cultivation. In all 13 training courses were conducted including 4 at Jabalpur and Gwalior and 5 at Agriculture College, Indore. Further 4 trainings were conducted in the month of October, 5 in the month of November and the remaining 4 in the month of December. (Table 2.9)

Table 2.9 Guidelines and package of practices for conducting wheat minikit Demonstrations

S. No.	Package of guidelines	For timely sown good fertility irrigated	Late sown good fertility irrigated area	Timely sown low fertility Rainfed conditions
1.	2.	3.	4.	5.
1.	Selection of Field	Field should be levelled with defect free soil having reasonable fertility and assured irrigation	Same as Col.3.	Field should be levelled. It should have defect free soil with low fertility.
2.	Check variety to be used	Most popular and widely grown variety should be used as check variety to convince the farmers.	Same as Col.3	Same as Col.3.
3.	Sowing	10th to 25th November but not after 30th November seed beds must have good moisture.	From 1st weak to 3rd week of December but not after Dec. Seed beds must have good moisture.	From 1st week to last week of October but not later than 10th November.
4.	Fertilizer Application	Basal 50 kgN 50 kg P and 40 kg K/hectare Topdressing-50 kgN/hectare before 1st irrigation, after 21 to 25 days at crown root stage.	Basal 50 kg N, 50 kg P and 20 kg K/ hectare Topdressing- As col.3	Apply during last ploughing 40 kgN, 20 kgP/hectare at 10cm depth.
5.	Irrigation Schedule	I. Irrigation just after topdressing (after 21-25 days of sowing) II. Irrigation at fillering completion stage III. Irrigation at flag leaf stage. IV. Irrigation at flowering stage. V. Irrigation at Milk stage of grain.	As Col.3	N.A.
				As coloum 3.

Table 2.8 Continued.....

6.	Plant Protection	Protect the crop from damages by insects, diseases, rates, birds and animals	As col.3	As col.3
7.	Weeding	Plots should be kept free of weeds		
8.	Harvesting etc.	Should be done in time to avoid grain shattering and damages by birds and animals.	As col.3	As col.3

Table 2.9 Details of Training Camps held under Wheat Minikit Programme in M.P.

S. No.	Place of Training camp.	Dates of camp.	Months	Year
1.	J.N.K.V.V.Jabalpur	8-11	November	1982
2.	Agriculture College, Gwalior	9-12	November	1982
3.	J.N.K.V.V. Jabalpur	19-22	October	1983
4.	Agriculture College, Indore	22-24	November	1982
5.	Agriculture College, Gwalior	25-28	October	1983
6.	Agriculture College Indore	26-29	October	1983
7.	Agriculture College Indore	10-13	October	1984
8.	J.N.K.V.V. Jabalpur	3-7	December	1985
9.	Agriculture College, Gwalior	24-27	November	1985
10.	Agriculture College, Indore	3-7	December	1985
11.	J.N.K.V.V. Jabalpur	31.12.86 to 3.1.87	December January	1986 1987
12.	Agriculture College, Gwalior	24.27	December	1986
13.	Agriculture College, Indore	31.12.86 to 3.1.87	December January	1986 1987

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CHAPTER- III

SAMPLE DISTRICTS

3.1 SAGAR DISTRICT

3.1.1 Location

Sagar district is situated in the north central part of Madhya Pradesh. It derives its name from the large lake at the district headquarters town of the same name. The district is situated between $23^{o}10'$ and $24^{o}27'$ North latitudes and $78^{o}4'$ and $79^{o}21'$ East longitudes.

Jhansi district of Utter Pradesh borders Sagar district in the north. The other surrounding districts are, Narsinghpur and Raisen to the south, Vidisha to the West and Damoh to the east. Chhatarpur district forms the north-east boundary and Guna district is on the north-west.

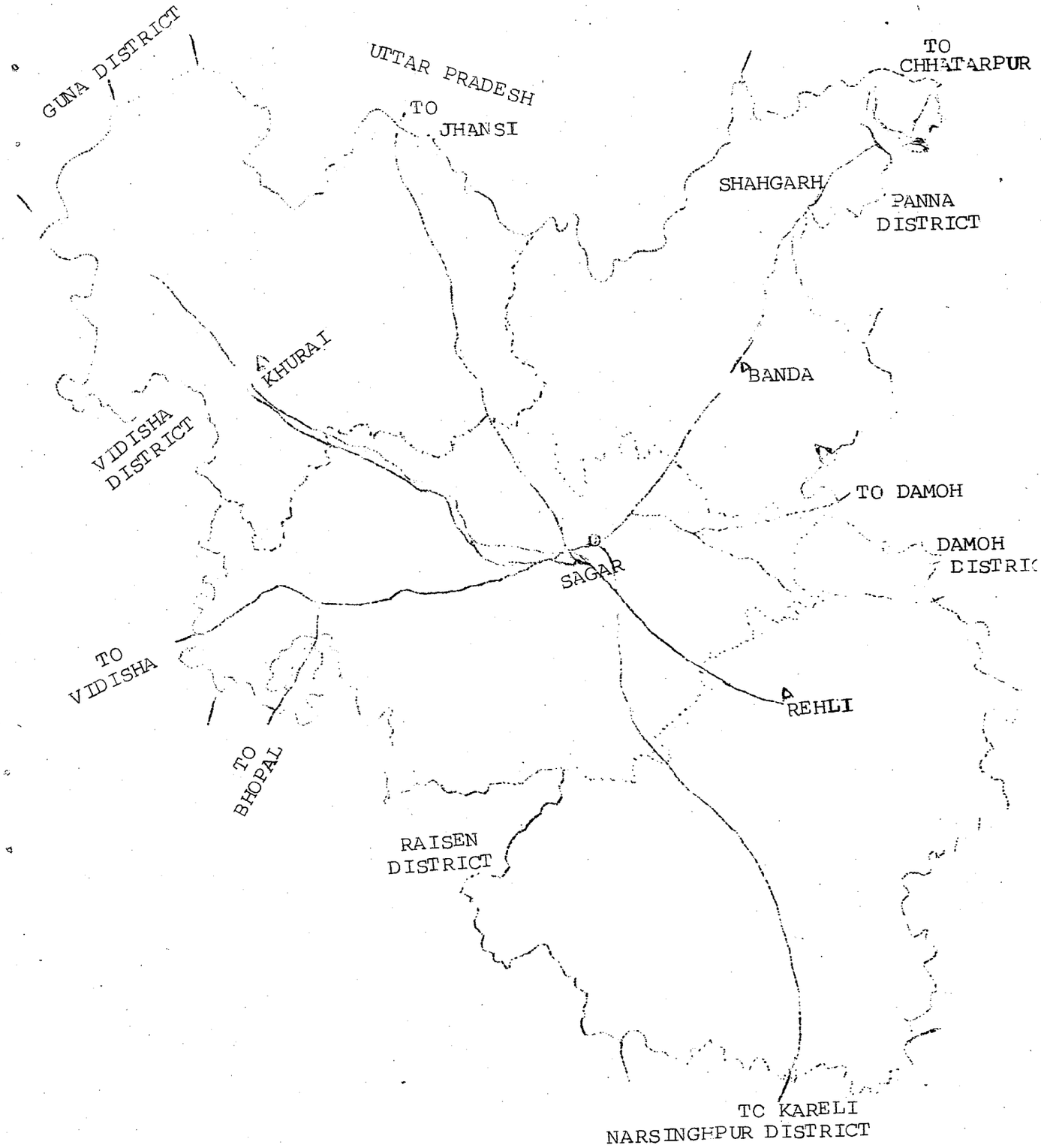
3.1.2 Area and Sub-divisions

Sagar district occupied an area of 10,259 sq.km. or 10,23,166 hectares. The district had 1,856 villages scattered in 4 tehsils namely Sagar, Khurai, Rahli, and Banda. For developmental purpose Sagar district is divided into 11 development blocks, namely, Sagar, Rahatgarh, Jaisinghnagar, Khurai, Bina, Rahli, Deori, Kesli, Banda and Shahgarh.

3.1.3 Population Characteristics

According to the census 1961, Sagar district had a population of 7,96,547 persons and it increased to 10,62,300 persons in 1971. In the census of 1981, there returned 13,23,132 persons. Thus during the last two decades, the population of the district has gone up by 66.10 per cent. Sagar is a rural district and its 72.14 per cent population resided in the rural areas.

MAP OF
SAGAR DISTRICT



In the 1981, census the 'other' castes people preponderated in its population (78.69 per cent) and scheduled tribes constituted only 8.68 per cent. The scheduled castes people comprised 20.84 per cent in the district population.

The district population included 4,59,734 or 34.76 per cent workers including 12.48 per cent cultivators, 6.34 per cent agricultural labourers and 15.94 per cent other workers.

There returned 27.89 per cent literates in its population during 1971. (Table 3.1)

Table 3.1 Population characteristics of Sagar and Morena districts, 1981

Characteristics	Sagar		Morena	
	No.of persons	%	No.of persons	%
1. Total population	1323132	100.00	1303213	100.00
i) a) Rural	954527	72.14	1124963	86.32
b) Urban	368605	27.86	178250	13.68
ii) a) Scheduled castes	275765	20.84	262183	21.18
b) Scheduled Tribes	114856	8.68	68567	5.26
2. Total Workers	459734	34.76	380152	29.17
a) Cultivators	165271	12.48	285823	21.94
b) Agri.Labourers	83970	6.34	25687	1.97
c) Other workers	210493	15.94	68642	5.26

3.1.4 Geography

a) Topography

Sagar district lies at the south-eastern edge of the great Malwa plateau and it is separated from the Narmada-valley region which lies to the south, by a steep escarpment. The elevation of the district ranges from 353.57 metres in the extreme north to 682.75 metres in the south-west, general elevation varied from 396 to 579 metres.

Separated from the Narmada valley by a steep escarpment and having a general slope towards the north, Sagar district forms the catchment of the river Ganges though river Narmada is only 10km from the southern corner of the district. The principal rivers are the Sonar, the Betwa, the Dhaban, the Bina and the Babas.

b) Soil Types

Local names for different soil types in this district are Mar, Kabar, Mund, Rathia, Raiyan, Pataruna and Bhatua. The Mar is a clayey soil very retentive of moisture and occuring in level country. Kabar is a first rate black cotton soil. Mund is a black or brown soil of good quality but inferior to Mar or kabar. Rethia is an inferior type of kabar soil. Raiyan is a black soil. Pataruna is an inferior variety of Mund and is a thin soil. Bhatua is the poor land.

c) Climate and Rainfall

Climate of the district is generally pleasant and salubrious. The average rainfall of the district is 1,235.00mm. The rainfall during the year 1985-86 was 1,363.0 mm. January is the coldest month of the year with a mean daily maximum temperature of 24.7°C and a mean of daily minimum temparature of 11.4°C. The maximum temparature rises in May but even in the hottest seascn, the nights are

cool and pleasant.

3.1.5 Land Utilization

The geographical area of the district was 1,023.2 thousand hectares and in 1984-85, of this, 47.33 per cent was under non-agricultural uses and 52.67 per cent under agricultural uses. Area under non-agricultural uses included 28.50 per cent under forests, 6.02 per cent not available for cultivation, 12.41 per cent under pastures and trees and 0.37 per cent under cultivable waste land. Area under agricultural uses included 2.36 per cent fallow land and 50.31 per cent net area sown. (Table 3.2)

Table 3.2 Land Utilization of Sagar and Morena districts.

(Area -Thousand Hectares)

Particulars	Sagar		Morena	
	Area	%	Area	%
1. Total Geographical Area	1023.2	100.00	1168.3	100.00
2. Area under non-Agri.uses	484.3	47.33	751.3	64.31
a) Forests	291.9	28.50	324.7	27.79
b) Land not available for cultivation	61.6	6.02	269.6	23.08
c) Uncultivated land	127.0	12.41	67.4	5.77
d) Culturable waste land	3.8	0.37	89.6	7.66
3. Area under agril. uses	538.9	52.67	417.0	35.69
a) Fallow Land	24.1	2.36	19.4	1.66
b) Net area sown	514.8	50.31	397.6	34.03

3.1.6 Utilization of Land under Agricultural Uses, 1984-85

Land under agricultural uses was 538.9 thousand hectares and it included 24.1 thousand hectares or 4.47 per cent under fallows including 1.74 per cent old fallows and 2.73 per cent current fallows.

An area of 514.8 thousand hectares (95.53 per cent) was net-sown area. Area sown more than once was 34.8 thousand hectares or 7.54 per cent of the net area sown. Thus, the district had gross cropped area of 549.6 thousand hectares which means 106.75 per cent cropping intensity. Net irrigated area was 36.5 thousand hectares or 6.77 per cent. Of this nearly one thousand hectares were irrigated more than once. (Table 3.3)

Table 3.3 Utilization of Land put to Agricultural uses Sagar and Morena districts, 1984-85

(Area- Thousand hectares)

Particulars	Sagar		Morena	
	Area	% to total	Area	% to total
1. Total Land under Agri. (2+3)	538.9	100.00	417.0	100.00
2. Fallow lands	24.1	4.47	19.4	4.65
a) Old fallow	9.4	1.74	9.8	2.35
b) Current fallows	14.7	2.73	9.6	2.30
3. Net Area Sown	514.8	95.53	397.6	95.35
4. Area sown more than once	34.8	7.54	34.2	8.60
5. Gross cropped area	549.6	106.75	431.8	108.60
6. Area Irrigated net	36.5	6.77	182.0	42.62

3.1.7 Main features of Cropping Pattern

The main feature of the cropping pattern was that it thrived on food crops largely sown in rabi season. Rabi crops were sown on an area of 398.5 thousand hectares or 72.51 per cent of the gross-cropped area. Among the crops grown cereals and millets were important and these crops covered 65.75 per cent of the gross-cropped area. Area under pulses was 7.62 per cent and oil seeds, 11.12 per cent (Table 3.4).

Table 3.4 Cropping Pattern Sagar and Morena districts, 1984-85

(Area-thousand hectares)

Particulars	Sagar		Morena	
	Area	%	Area	%
1. a) Food crops	436.5	79.42	244.4	56.60
b) Non-Food crops	113.1	20.58	187.4	43.40
2. a) Kharif Crops	151.1	27.49	133.3	30.87
b) Rabi Crops	398.5	72.51	298.5	69.13
3. a) Cereals & Millets	311.9	56.75	176.4	40.85
b) Pulses	41.9	7.62	57.4	13.29
c) Oil Seeds	61.1	11.12	180.3	41.76
d) Fruits	0.3	0.05	0.1	0.02
e) Vegetables	3.2	0.58	1.5	0.35
f) Spices	0.7	0.13	1.2	0.28
g) Fiber Crops	0.3	0.05	0.1	0.02
h) Sugarcane (Harvested + sown)	0.3	0.05	6.3	1.46
i) Other Crops	129.9	23.65	8.5	1.97
Gross Cropped Area	549.6	100.00	431.8	100.00

3.1.8 Main Crops of the District

Wheat was the most important crop of the district. It was sown on 263.6 thousand hectares occupying 47.96 per cent of the total gross-cropped area of the district. Gram was second important crop sown on 63.4 thousand hectares or 11.54 per cent area. Lentil was sown on 37.9 thousand hectares or 6.90 per cent followed by soybean on 30.2 thousand hectares or 5.49 per cent area. These four crops together covered nearly 72 per cent of the gross cropped area of the district. (Table 3.5)

Table 3.5 Area under different crops, Sagar & Morena districts

(Area-thousand hectares)
yield in kg.

Crops	Sagar			Morena		
	Total	%	Yield	Total	%	Yield
Paddy	15.2	2.77	551	1.8	0.42	1577
Wheat	263.6	47.96	714	88.6	20.52	2321
Jowar	21.7	3.95	912	19.0	4.40	1020
Maize	4.4	0.80	1342	0.7	0.16	1204
Gram	63.4	11.54	441	32.7	7.58	1139
Tur	1.7	0.30	450	16.9	3.91	995
Urad	3.3	0.60	206	1.0	0.23	369
Moong-moth	2.0	0.36	245	6.7	1.55	298
Pea	7.9	1.44	169	0.1	0.02	570
Masoor	37.9	6.90	249	1.5	0.35	582
Groundnut	6.2	1.13	583	0.5	0.12	522
Sesamum	3.6	0.65	125	9.8	2.27	204
Rape & Mustard	1.1	0.20	295	152.9	35.41	1039
Linseed	18.1	3.29	177	5.9	1.37	349
Soybean	30.2	5.49	697	0.6	0.14	944

3.1.9 Yield of Important Crops

Yield obtained for different crops during 1984-85 was lower than the state average for all the crops. The yield of wheat was 714 kg per hectare as against the state average of 1,141 kg per hectare. Yields for different crops were : paddy 551 kg, jowar 912 kg, maize 1,342 kg, gram 441 kg, groundnut 583 kg, soybean 697 kg and rape-mustard 295 kg/hectare. (Table 3.5)

3.1.10 Irrigated Area and Crops

During 1984-85, gross-irrigated area of the district was 37.5 thousand hectares which constituted only 6.82 per cent of the gross cropped area. Irrigation was done by canals, tanks, wells and other sources. As per the area irrigated by sources, 'other' sources shared 40.81 per cent, wells 39.73 per cent, canals 18.13 per cent and tanks 1.33 per cent of the gross irrigated area. (Table 3.6)

Table 3.6 Area irrigated by different sources Sagar and Morena districts, 1984-85

(Area thousand Hectares)

Source	Sagar		Morena	
	Area	%	Area	%
Canals	6.8	18.13	115.9	63.13
Tanks	0.5	1.33	1.7	0.93
Wells	14.9	39.73	55.2	30.06
Other sources	15.3	40.81	10.8	5.88
Total	37.5	100.00	183.6	100.00

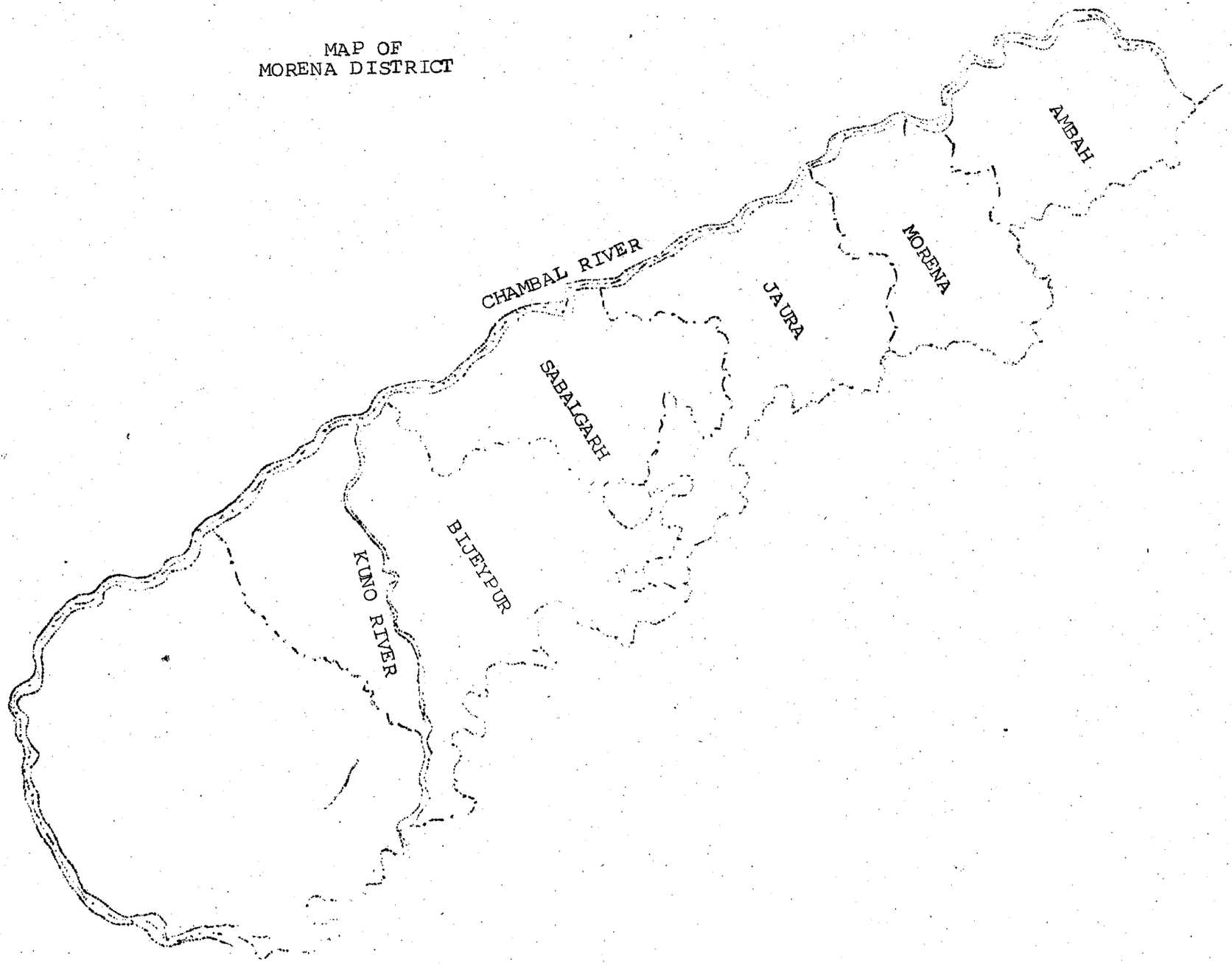
Irrigated area was mainly under wheat occupying 82.15 per cent of the gross irrigated area. Gram occupied 3.25 thousands hectares or 8.97 per cent of the irrigated area followed by vegetables and spices which formed 5.20 per cent of the irrigated area. These three crops covered 96.32 per cent of the gross irrigated area. (Table 3.7)

Table 3.7 Cropwise irrigated area Sagar and Morena districts, 1984-85

(Unit- Hundred Hect.)

S.No.	Crop	Sagar		Morena	
		Area	%	Area	%
1.	Paddy	6.0	1.66	14.0	0.77
2.	Maize	0.1	0.03	-	-
3.	Wheat	297.7	82.15	775.4	42.70
4.	Barley	1.1	0.30	17.6	0.97
5.	Gram	32.5	8.97	86.8	4.78
6.	Masoor	0.6	0.17	0.4	0.02
7.	Peas	0.8	0.22	0.5	0.03
8.	Rape Seed and Mustard	-	-	837.2	46.09
9.	Linseed	0.7	0.19	3.8	0.21
10.	Sugarcane Harvested + sown	2.9	0.80	62.9	3.46
11.	Vegetabl & Spices	19.4	5.16	9.7	0.54
12.	Fodder	-	-	7.8	0.43
13.	Other Crops	13.2	0.35	20.00	-
	All	375.00	100.00	1836.00	100.00

MAP OF
MORENA DISTRICT



Scheduled castes persons returned 2,62,183 and formed 20.12 per cent of the district population. The Scheduled Tribesmen covered 5.26 per cent population (Table 3.1)

Literacy percentage of the district was 25.58. Among the males the proportion of literates was 38.48 per cent and among the females, 10.13 per cent.

3.2.4 Geography

(a) Topography

In shape, the district resumbles a gourd. Some low hills are visibles in the Bijaypur and Sheopur tehsils. Ambah, Morena and Jaura tehsils are full of chambal and Kunwari river ravines which are quite deep and provide safe shelter for the lawless elements popularly called Bagi or dacoits. The remaining are of the district is generally plain. Broadly speaking the district has two distinct physical features viz (i) area covered by plains, criss-crossed by rivers and ravines. (ii) the other covered with forests. The forests occupied nearly two thirds of the area but are of poor quality.

Another important feature of the district is that as many as eight rivers flow across it. These are the Chambal, the Kunwari, the Kuno, the Asan, the Parvati, the Sip the Sank and the Sonrekha.

(b) Climate

The district is subjected to extremes of climate the maximum and minimum temperatures reaching 47.78°C and 4.44°C in summer and winter respectively. The rainfall varied between 635 mm.and 889mm. being less in Morena and Ambah tehsils and heavier in Bijaypur and Sheopur tehsils which are covered with forests.

3.2.5 Land Utilization

The geographical area of Morena district was 1168.3 thousand hectares, of which 64.31 per cent was under non-agricultural uses including, forests, 27.79 per cent, land not available for cultivation, 23.08 per cent, pastures and trees, 5.77 per cent, and cultivable waste land, 7.66 per cent.

An area of 417 thousand hectares or 35.69 per cent was put under agricultural uses and it comprised 1.66 per cent fallow land and 34.03 per cent net area sown. Thus the proportion of area under agricultural uses was quite lower in the district as compared to Sagar district. (Table 3.2)

3.2.6 Utilization of Agricultural land

Area available for agricultural purposes was 417 thousand hectares. Of this 397.6 thousand hectares or 95.35 per cent was net sown area. Fallows accounted for 4.65 per cent of the agricultural area.

Area sown more than once was 34.2 thousand hectares or 8.60 per cent of the net area sown. Thus cropping intensity in the district was 108.60 per cent. The proportion of irrigated area was 42.62 per cent which was above the state average and was far higher than Sagar district (Table 3.3)

3.2.7 Main Features of Cropping Pattern

Like Sagar district, cropping pattern of Morena district was dominated by food crops sown mainly in rabi season. Area sown under rabi crops covered 69.13 per cent of the gross-cropped area. The proportion of area under food crops was 56.60 per cent. Oil Seeds covered the largest area of 180.3 thousand hectares or 41.76 per cent. Cereals and millets occupied 40.85 per cent area.

Pulses also occupied important position in the cropping pattern and covered 13.29 per cent of the gross-cropped area. Thus, the cereals, millets, oilseeds and pulses were grown on nearly 96 per cent and the remaining crops almost had no say in the cropping pattern of the district (Table 3.4)

3.2.8 Main Crops grown in the District

Area occupied by the different crops in the cropping pattern of the district has indicated that wheat and jowar were prominant among the cereals, gram and tur among pulses and rape-mustard among the oilseed crops. Rape-mustard was sown on largest area as cash crop (152.9 thousand hectares or 35.41 per cent). Wheat was next important and grown on 20.52 per cent followed by gram 7.58 per cent, jowar 4.40 per cent and tur 3.91 per cent area. Crops like moong, sesamum, linseed were also sown on a considerable area. (Table 3.5)

3.2.9 Yield of some Important Crops

Yields of different crops in Morena district were much higher than Sagar district and in many cases they were higher than the state averages. In the case of wheat Morena occupied second position in the state with an average yield of 2,321 kg/hectare while the state figure was 1,141 kg/hectare and that of all India, 1,873 kg/hectare. The average yield of the district was considerably higher than the state average in the case of paddy, jowar, gram, tur, mustard and soybean. The average yield for the district for some important crop was : paddy 1,577 kg, jowar, 1,020 kg, maize, 1,204kg. gram 1,139 kg tur 995 kg lentil 582 kg groundnut 522 kg mustard 1,039 kg and soybean 944 kg/hectare (Table 3.5)

3.2.10 Irrigated Area and Crops

Canals, wells, tanks and other sources irrigated the crops of the district. Net area irrigated was 182.6 thousand hectares and of this 1.6 thousand hectares were irrigated more than once. Thus, the district had 183.6 thousand hectares of gross irrigated area. Canals were main sources of irrigation covering 63.13 per cent of the irrigated area. Wells came next with 30.06 per cent of the irrigated area commanded by them. Other sources of irrigation covered 5.88 per cent of the gross irrigated area. (Table 3.6)

Rape-mustard, wheat, gram and sugarcane were mainly irrigated and these crops accounted for 97.03 per cent of the gross-irrigated area. Rape-mustard covered the largest area of 46.09 per cent, and wheat occupied second largest position (42.70 per cent) Gram covered 4.78 per cent and sugarcane 3.46 per cent irrigated area (Table 3.7).

3.3 Achievements under Wheat Minikit Programme in the Sample districts

3.3.1 Distribution of Minikits

Data regarding wheat minikits distribution was collected from both the districts for last seven years i.e. from 1980-81 to 1986-87. Distribution of minikits in Sagar district was during all the years while in Morena it started from 1982-83, two years later. In Sagar district a total number of 5,305 minikits were distributed during the period of seven years while this figure for Morena district was more than double i.e. 11,513 minikits were distributed during the last five years. Larger number of minikits in both the districts were distributed 1982-83. In Sagar district of the total minikits 79.05 per cent were distributed during 1982-85 and in Morena this momentum continued till 1985-86. (Table 3.8).

Table 3.8 Distribution of Wheat Minikits in Sagar and Morena districts, 1980-81 to 1986-87.

Years	Sagar		Morena	
	No.	%	No.	%
1980-81	69	1.30	-	-
1981-82	42	0.79	-	-
1982-83	1440	27.14	2196	19.08
1983-84	1448	27.29	3312	28.77
1984-85	1306	24.62	2195	19.06
1985-86	500	9.43	2810	24.41
1986-87	500	9.43	1000	8.68
Total	5305	100.00	11513	100.00

3.3.2 Varietywise Distribution of Minikits

During the last three years (1984-85 to 86-87) in all 10 varieties of wheat were included under minikit demonstration programme. These varieties were WH-147, Lok-1, HD-2189, HD-2285 HD-2329, PBW-34, WH-331, WL-2265, DL-1532 and J-405.

During 1984-85 minikits distributed in Sagar district numbered 1,306. Of these 51.03 per cent were of variety Lok-1, 45.91 per cent of WH-147 and the remaining 3.07 per cent of HD-2189. In Morena district 2195 minikits were distributed and varieties WH-147 and Lok-1 shared most of them (61.26 and 31.66 per cent respectively). The remaining 155 minikits or 7.08 per cent were of other 5 varieties namely HD-2329, PBW-34, WH-331, WL-2265 and DL-1532.

During 1985-86 the number of minikits distributed was 500 in Sagar district and that in Morena district 2,810. These minikits

in both the districts generally were of three varieties namely HD-2189, HD-2285 and HD-2329. Some minikits in Morena district were also of WL-2265 and J-405 varieties of wheat. During 1986-87 HD-2329 variety seed was distributed through 500 minikits in Sagar and 1,000 in Morena district.

In Sagar district two wheat varieties namely HD-2189 and HD-2329 were repeated for two years, and in Morena this position was in the case of HD-2329 and WL-2265. The rest of the varieties were used in minikits only once (Table 3.9).

3.3.3 Adoptive Trials and Demonstrations

During the period of seven years 131 adoptive trials including 127 in Sagar district were conducted on the farmers fields. Demonstrations laid during the same period numbered 56: of them 49 were laid in Morena and 7 in Sagar district. (Table 3.10)

Table 3.10 No.of Adoptive trials and Demonstrations conducted on farmers fields

Years	Adoptive Trials No.			Demonstration No.		
	Sagar	Morena	Total	Sagar	Morena	Total
1980-81	18	-	18	-	10	10
1981-82	12	1	13	-	8	8
1982-83	28	1	29	1	8	9
1983-84	35	-	35	2	-	2
1984-85	--	1	1	1	4	5
1985-86	17	1	18	-	-	-
1986-87	17	-	17	3	19	22
Total	127	4	131	7	49	56

Table 3.9 Varietywise break up of minikits distributed during, 1984-85, 86-87

S. No.	Varieties	1984-85				1985-86				1986-87			
		Sagar		Morena		Sagar		Morena		Sagar		Morena	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1.	WH-147	600	45.91	1345	61.26	-	-	-	-	-	-	-	-
2.	Lok-1	666	51.03	695	31.66	-	-	-	-	-	-	-	-
3.	HD-2180	40	3.07	-	-	300	60.00	776	27.61	-	-	-	-
4.	HD-2285	-	-	-	-	100	20.00	962	34.23	-	-	-	-
5.	HD-2329	-	-	60	2.73	100	20.00	954	33.96	500	100.00	1000	100.00
6.	PBW-34	-	-	50	2.28	-	-	-	-	-	-	-	-
7.	WH-351	-	-	15	0.69	-	-	-	-	-	-	-	-
8.	WL-2265	-	-	15	0.69	-	-	64	2.28	-	-	-	-
9.	DL-1532	-	-	15	0.69	-	-	-	-	-	-	-	-
10.	J-405	-	-	-	-	-	-	54	1.92	-	-	-	-
	Total	1306	100.00	2195	100.00	500	100.00	2810	100.00	500	100.00	1000	100.00

Varieties covered in Sagar district under adoptive trials and demonstrations included Hl-784, Hl-617, WH-147, Lok-1, HD-2189, HD-2285 and HD-2329. In Morena district Raj-1553, HD-2285, WH-147, PBW-34, DWL-5023, WL-2265, HD-2236, HD-2329, HD-2189, J-405 were included under the adoptive trials and demonstrations. Scientist from J.N. Agricultural University and the Subject Matter Specialists of the Agriculture Department of the State laid trials and conducted demonstrations. (Table 3.11)

Table 3.11 No.of varieties used under Adoptive trials and Demonstrations.

Years	No.of varieties		Varieties included in Sagar district	Varieties included in Morena district
	Sagar	Morena		
1980-81	1	1	Hl- 784	Raj- 1553
1981-82	1	2	Hl- 617	HD-2285, WH- 147
1982-83	1	1	WH-147	PBW-34
1983-84	2	4	Lok-1, WH-147	DWL-5023, WH- 147, HD- 2285, WL-2265
1984-85	2	4	Lok-1, WH-147	PBW-34, HD-2236, WH-147, HD-2329
1985-86	3	5	HD-2189, HD-2285, HD-2329	PBW-34, WL-2265, HD- 2189, J- 405, HD- 2329
1986-87	1	1	HD-2329	HD- 2329

3.3.4 Training Camps

Deputy Directors of Agriculture from both the districts attended 4 days training camps organized every year by the state government in cooperation with J.N. Agricultural University. Special workshops were also held in both the districts to apprise the extension officers about the wheat varieties and latest production technology. Farmers tours were also organised to the J.N.Agricultural University farms for this purpose.

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CHAPTER-IV

WHEAT MINIKITS IN THE SELECTED BLOCKS

Wheat varieties included in the minikit programme were mainly meant for irrigated area and therefore, needed soil with reasonable fertility and assured irrigation facilities as pre-conditions to show its merits to convince the farmers. Ambah Block in Morena district and Sahgarh Block in Sagar district were selected. These blocks were supplied largest number of minikits as compared to other blocks in the districts. Ambah block was under Chambal Command Area and the farmers had assured sources of irrigation including tubewells, bore-wells and dug-wells. Sahgarh block was under Beela Dam and Chandia Dam canal systems but lacked in assured sources of irrigation.

4.1 Area, Villages and Population of selected Blocks

Ambah block occupied an area of 51,122 hectares which was inhabited by the 1,21,118 persons (1981) residing in 73 villages. Of its population 23.70 per cent were scheduled castes people.

Sahgarh block spread on an area of 66,369 hectares. It had 109 inhabited villages populated by 70,457 persons. Among them 22.58 per cent were scheduled castes people, 11.30 per cent scheduled tribesmen and 66.12 per cent belonged to other social groups. (Table 4.1)

Table 4.1 Caste/Tribewise of population of selected Blocks (1981).

Caste/Tribe	Ambah		Shahgarh	
	No.	%	No.	%
Scheduled Castes	28,702	23.70	15,911	22.58
Scheduled Tribes	-	-	7,960	11.30
Other castes	92,413	76.30	46,586	66.12
All	1,21,118	100.00	70,457	100.00

4.2 Utilization of Agricultural land

Area under agricultural uses in Ambah block was 37,413 hectares or 73.18 per cent of the total geographical area of the block. During 1986-87, crops were grown on 36,565 hectares or 97.73 per cent and an area of 848 hectares or 2.27 per cent was fallow. Area sown more than once was 5,057 hectares or 13.83 per cent.

Gross cropped area of Ambah block was 41,622 hectares, of which 74.54 per cent was sown under rabi crops and 25.46 per cent under kharif crops. Besides, an area of 742 hectares was sown under summer crops like moong, urad, vegetables and fodder crops. The proportion of irrigated area was quite high in the block. The net irrigated area was 18,533 hectares which covered 50.68 per cent of net area sown and the gross-irrigated area was 18,637 hectares or 44.78 per cent of the gross-cropped area.

Shahgarh block had larger area under non-agricultural uses covering 38,143 hectares or 57.47 per cent of the total area. Area under agricultural uses was 28,226 hectares or 42.53 per cent only. During 1986-87, fallows land covered 3,423 hectares or 12.13 per cent and crops were sown on 24,803 hectares or 87.87 per cent of the total area under agriculture. Proportion of area sown more than once to the net sown area was 23.83 per cent which means gross cropped area of 30,729 hectares or 123.89 per cent cropping intensity which was 16 per cent more than Ambah block.

In Shahgarh block larger area, 54.56 per cent, was sown under kharif crops and 45.44 per cent under rabi crops. Proportion of net irrigated area and gross-irrigated area was lower as compared the Ambah block. Net irrigated area in Shahgarh covered 23.14 per cent of the net area sown and the gross-irrigated area 22.81 per cent of the gross cropped area. (Table 4.2)

Table 4.2 Land utilization of the selected blocks

(Area in Hect.)

Particulars of land use	Ambah		Shahgarh	
	Area	%	Area	%
Total Geographical Area	51,122	100.00	66,369	100.00
Area under non Agri.uses	13,709	26.82	38,143	57.47
Area under Agri. uses	37,413	73.18	28,226	42.53
Net area sown	36,565	97.73	24,803	87.87
Fallow Land	848	2.27	3,423	12.13
Area sown more than once	5,057	13.83	5,926	23.83
Gross Cropped area	41,622	113.83	30,729	123.89
Area Sown in Kharif	10,596	25.46	13,963	54.56
Area Sown in Rabi	31,026	74.54	16,766	45.44
Area Sown in Summer	742	-	-	-
Gross Irrigated area	18,637	44.78	7,008	22.81
Net Irrigated area	18,533	50.68	5,740	23.14

4.3 Important crops grown in 1986-87

Cropping pattern of Ambah block was dominated by the rabi crops while kharif crops were largely grown in Shahgarh block.

In Ambah block bajara, moong and tur (Arhar) were the important kharif crops and covered 11.74 per cent, 7.41 per cent and 3.36 per cent of the gross cropped area respectively. Rape-mustard was the most important rabi crop and it dominated by covering 36.20 per cent of total gross cropped area. Wheat occupied second position and covered 26.49 per cent of the gross cropped area. Gram was another important crop covering 6.63 per cent area. These three rabi crops-mustard, wheat and gram-covered 69.32 per cent

of the gross cropped area. Thus the important six crops of the block were bajara, moong, tur in kharif and mustard, wheat and gram in rabi which collectively covered nearly 92 per cent of the gross cropped area of the Block. In Shahgarh block wheat was largely sown covering 34.84 per cent area. Gram and lentil were other two important crops comprising 4.19 and 2.14 per cent in the cropping pattern. In kharif, paddy and soybean were largely grown and these crops were sown on 9.84 and 6.20 per cent area respectively. Jowar, urad, maize and linseed were also sown on a considerable area and these crops togather covered 8.08 per cent of the total gross cropped area. (Table 4.3)

Table 4.3 Important crops grown in Ambah and Shahgarh blocks (1986-87).

(Area in Hect.)

Crops	Ambah		Shahgarh	
	Total area	%	Total area	
Paddy	18	0.04	3,025	9.84
Jowar	468	1.12	933	3.04
Maize	4	0.01	344	1.12
Bajara	4,888	11.74	-	-
Moong	3,086	7.41	52	0.17
Tur	1,398	3.36	45	0.15
Urad	119	0.28	816	2.66
Wheat	11,025	26.49	10,708	34.84
Gram	2,759	6.63	1,288	4.19
Lentil	-	-	658	2.14
Mustard	15,069	36.20	-	-
Linseed	-	-	355	1.16
Soybean	-	-	1,904	6.20
Total Gross Cropped Area	41,622	100.00	30,729	100.00

Thus, wheat crop occupied important place in both the blocks and contributed largest area among the foodgrain crops. Wheat was the staple food grain of the area. It was mainly grown as irrigated crop. In Ambah block it was grown as irrigated crop to the extent of nearly 94 per cent and in Shahgarh block, 58 per cent.

4.4 Area Irrigated under different Crops

The crops grown on 18,637 hectares were irrigated in Ambah block. Wheat covered the largest irrigated area of 10,353 hectares or 55.55 per cent. Mustard was irrigated on 7,006 hectares or 37.59 per cent. These two crops covered 93.14 per cent of the gross irrigated area.

In Shahgarh block irrigated area was mainly covered by wheat to the extent of 88.04 per cent of the gross-irrigated area. Gram crop, was next important and occupied 9.65 per cent irrigated area Paddy also shared the irrigated area(2.31 per cent). (Table 4.4)

Table 4.4 Irrigated area under different crops,(1986-87)

(Area/hectares)

Crops	Ambah		Shahgarh	
	Irrigated area	%	Irrigated area	%
Paddy	18	0.10	162	2.31
Wheat	10,353	55.55	6,170	88.04
Gram	447	2.40	676	9.65
Mustard	7,006	37.59	-	-
Other crops	-	4.36	-	-
Gross Irrigated Area	18,637	100.00	7,008	100.00

4.5 Area Irrigated and Sources of Irrigation

Wells including tubewells and borewells were the main sources of irrigation in Ambah block and these assured sources irrigated 58.19 per cent out of total irrigated area of 18,533 hectares. Chambal canals commanded 41.76 per cent irrigated area in the block.

In Shahgarh block canals were main sources of irrigation and they covered 75.65 per cent of the irrigated area of 5,740 hectares. Wells irrigated 965 hectares or 16.81 per cent area. Other sources of irrigation covered 7.02 per cent irrigated area. Canals in both the blocks were dependent on rains which was deficient in 1986-87. Therefore only 2-3 irrigations could be given. The unirrigated crops suffered ((Table 4.5).

Table 4.5 Area irrigated by different sources 1986-87.

(Area-Hectares)

Source of Irrigation	Ambah		Shahgarh	
	Area	%	Area	%
Wells	10,519	56.76	965	16.81
Tubewells	264	1.43	-	-
Tank	-	-	30	0.52
Canal	7,740	41.76	4,342	75.65
Other sources	10	0.05	403	7.02
Total	18,533	100.00	5,740	100.00

4.6 Selection of Minikit Farmers

As per the guidelines of the minikit scheme the farmers from weaker sections including marginal and small farmers and persons belonging to the scheduled castes and scheduled tribes were to be included on priority basis for the distribution of wheat minikits. Selection of these farmers was to be done by the Sarpanch of the Gram Panchayat. Thus the lists of farmers was prepared by the Sarpanchas, and given to the Agriculture Department. In the opinion of the agriculture extension workers, the list from the Sarpanch mainly included the farmers from his faction and many of the deserving farmers did not find place in this list. The farmers not having necessary facilities and interest about the cultivation were included in the list and they were given minikits.

4.7 Supply of Wheat Minikits to the Extension Workers

The extension workers pointed out that minikits were supplied to them quite late when sowing of wheat crop was almost over. This caused another problem to select the suitable fields for wheat minikit demonstrations. Thus, many of the minikit demonstrations were laid in the fields, not suitable for the purpose. In Shahgarh minikits were supplied in the 2nd week of December, 86 and in Amban in the last week of December, 86 and Ist week of January 87. In Ambah it was a problem to have minikit demonstration as all wheat fields were already sown and these demonstrations were desperately conducted on the area on which potato crop was sown earlier. Thus late supply of minikits hampered the selection of suitable farmers and the fields. All these factors did not allow convincing yields from minikit fields to impress the farmers.

4.8 Distribution of Minikits to the farmers

During 1986-87, Shahgarh block was supplied 150 minikits containing 5kg treated seed of HD-2329 variety. Ambah was allotted 104 minikits of the same variety.

In Shahgarh block 111 or 74 per cent minikits were given to the marginal farmers, 25 or 16.67 per cent to the small farmers and 14 or 9.33 per cent to the large farmers having more than 4 hectares land. In Ambah block also the marginal farmers were covered in the larger number (51.92 per cent). The small farmers formed 25.96 per cent and large farmers 22.12 per cent. These farmers were scattered over 21 villages in Shahgarh block and 13 villages in Ambah block. (Table 4.6)

Table 4.6 Size of farms, Minikit farmers

Size group	Shahgarh		Ambah	
	No.	%	No.	%
Marginal	111	74.00	54	51.92
Small	25	16.67	27	25.96
Others	14	9.33	23	22.12
Total	150	100.00	104	100.00

According to caste and tribe, in Shahgarh block, out of 150 farmers 33.33 per cent were scheduled caste people, 2.67 per cent other caste men. In Ambah block 23 or 22.12 per cent farmers belonged to scheduled castes and 77.88 per cent were from other castes. Thus, both scheduled castes and scheduled tribes, marginal and small farmers were given due representation in the distribution of wheat minikits. (Table 4.7)

Table 4.7 Caste/Tribewise minikits farmers.

Caste/Tribe	Shahgarh		Ambah	
	No.	%	No.	%
Scheduled castes	50	33.33	23	22.12
Scheduled Tribes	4	2.67	-	-
Other castes	96	64.00	81	77.88
Total	150	100.00	104	100.00

4.9 Sowing Dates of Wheat Minikits in the blocks

As per the sowing dates indicated in the official records, not a single minikit demonstration was laid in prescribed time. HD-2329 variety seed was supplied under the minikits distributed during 1986-87. It was suitable under irrigated conditions for good fertility soil if sown timely. As per the recommendations it was to be sown between 10th to 25th November and in no case after 30th November to have convincing yield from it.

In Shahgarh block in 108 (72 per cent) cases the minikit demonstration plots were sown during the 2nd week of December and the remaining 42 or 28 per cent during the 3rd week of December, 86. Sowing of minikits was actually done from 8th to 22nd December, 86.

when sowing of other varieties of wheat in the block was almost over.

Sowing of minikit in Ambah block was much more delayed where out of 104 minikits, 31.73 per cent were sown in the last week of December 86, 35.58 per cent in the 1st week of January 87, 25.00 per cent in the 2nd week of January, 87 and the remaining 7.69 per cent in the 3rd week of January, 87. Minikits were sown at a time when top dressing and 1st irrigation of other wheat fields were nearing completion. (Table 4.8)

Delay in the supply of minikits was responsible for the late sowing of minikit plots. This also hampered the selection of suitable fields and farmers.

Table 4.8 Date of sowing and No. of Minikits

	Shahgarh		Ambah	
	No.	%	No.	%
IInd week of Dec.86	108	72.00	-	-
III week of Dec.86	42	28.00	-	-
IV week of Dec.86	-	-	33	31.73
Ist week of Jan.87	-	-	37	35.58
IInd week of Jan.87	-	-	26	25.00
II week of Jan.87	-	-	8	7.69
Total	150	100.00	104	100.00

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CHAPTER V

CHARACTERISTICS OF SAMPLE HOUSEHOLDS

5.1 Villages and Population of Households

From each block 50 farmers participating in the wheat minikit demonstrations were selected to collect primary data. Sample farmers in Ambah block represented 7 villages namely Thara, Ambah, Bareh, Nawali, Bhanpur, Kukthari and Ruar. In Shahgarh block selected farmers belonged to 9 villages including Baraj, Narwa, Amarman, Naranwa, Kankhedi, Kishanpur, Garoli, Bodanganj and Shahgarh. Population of sample households in Ambah block was 441 and in Shahgarh block 277.

5.2 Caste/tribewise Households and Population

In Ambah block 12 households belonged to scheduled castes, 2 households to backward castes and 36 households to other castes. They formed 26.53, 3.63 and 69.84 per cent respectively of the total population of 441 persons.

In Shahgarh sample, 18 household were scheduled castes, 5 backward castes and 27 belonged to other castes. They comprised 37.19, 8.66 and 54.15 per cent respectively in the total population. (Table 5.1)

5.3 Population by Age and Sex

Sample households of both the blocks together had 718 persons including 403 or 56.13 per cent males and 315 or 43.87 percent females. Among them 38.72 per cent were children (under-14 years, 54.73 per cent adults (15-59 years) and 6.55 per cent aged persons (60 years and above). (Table 5.2)

Table 5.1 Castewise households and population

S.No.	Caste/Tribe	Shahgarh				Ambah				Both			
		Households		Population		Households		Population		Households		Population	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
1.	Scheduled Castes	18	36.00	103	37.19	12	24.00	117	26.53	30	30.00	220	30.64
2.	Back ward Castes	5	10.00	24	8.66	2	4.00	16	3.63	7	7.00	40	5.57
3.	Other Castes	27	54.00	150	54.15	36	72.00	308	69.84	63	63.00	458	63.79
	Total	50	100.00	277	100.00	50	100.00	441	100.00	100	100.00	718	100.00

Table 5.2 Population by age and sex

Age Groups	Shahgarh				Ambah				Both			
	Male		Female		Male		Female		Male		Female		Persons	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
0-14	64	[illegible]	46	36.51	110	39.71	97	38.49	71	37.57	168	38.09	161	39.95	117	37.14	278	38.72
15-59	79	52.32	69	54.76	148	53.43	137	54.37	108	57.14	245	55.56	216	53.60	177	56.19	393	54.73
60& Above	8	5.30	11	8.73	19	6.86	18	7.14	10	5.29	28	6.35	26	6.45	21	6.67	47	6.55
Total	151	100.00	126	100.00	277	100.00	252	100.00	189	100.00	441	100.00	403	100.00	315	100.00	718	100.00

5.4 Literacy Standards of Heads of Households

Among the heads of the households, 31 were illiterate, 16 were educated upto primary level and 26 attended schooling upto middle standard. There were 18 heads who passed the higher secondary examination and 9 heads completed graduation or post-graduation. Thus nearly 70 per cent of the heads of households were literates.

5.5 Size of Holdings and Households and their population

In the total sample there were 22 marginal farmers, 60 small farmers, 14 medium size farmers and 4 large farmers. These groups covered 17.97, 56.68, 19.92 and 5.43 per cent population respectively.

In Ambah marginal farmers were 10, small farmers were 32, medium farmers 6 and large farmers 2. In Shahgarh block, the sample included 12 marginal farmers, 28 small farmers, 8 medium farmers and 2 large farmers. The small farmers were in larger number among the selected farmers of both the blocks, (Table 5.3).

Table 5.3 Size groupsof land and Households & population

...ps	Shahgarh	Ambah	Both		
	No.H.H.	No.H.H.	No.H.H.	Popu-lation	%
Marginal (Less than 1 Hect.)	12	10	22	129	17.97
Small (1-4 Hect.)	28	32	60	407	56.68
Medium (4-10 Hect.)	8	6	14	143	19.92
Large (10-& Above)	2	2	4	39	5.43
All	50	50	100	718	100.00

5.6 Land owned and land cultivated

Sample farmers of both of blocks together owned 252.81 hectares of land and of this, 15.48 hectares or 6.13 per cent was occupied by marginal farmers, 111.80 hectares or 14.22 per cent by small farmers, 73.47 hectares or 29.06 per cent by medium farmers and 52.06 hectares or 20.59 per cent by large farmers. On an average a farmer owned 2.53 hectares of land. The proportion of land cultivated was 94.10 per cent and this figure in Shahgarh block was 88.61 per cent and in Ambah block 99.68 per cent.

Proportion of land cultivated was highest among marginal farmers with 98.71 per cent followed by large farmers, 95.33 per cent. The small farmers cultivated 93.80 per cent of the land owned and this proportion among medium size farmers was 92.71 per cent. In Ambah block all farmers except medium size farmers cultivated their entire owned land. The medium size farmers cultivated 98.70 per cent of the land owned. In Shahgarh block the position was some what different. In this block the proportion of cultivated area was 97.51 per cent among marginal farmers, 86.48 per cent among small farmers, 88.37 per cent among medium size farmers and 90.47 per cent among the large farmers. (Table 5.4)

Table 5.4 Land owned and area cultivated

(Area/Hect.)

Size group	Shahgarh			Ambah		
	Land owned	Land cultivated	%	Land owned	Land Cultivated	%
Marginal	8.03	7.83	97.51	7.45	7.45	100.00
Small	51.28	44.35	86.48	60.52	60.52	100.00
Medium	42.57	37.62	88.37	30.90	30.50	98.70
Large	25.49	23.06	90.47	26.57	26.57	100.00
All	127.37	112.86	88.61	125.44	125.04	99.68

5.7 Land Cultivated and Land Irrigated

An area of 237.90 hectares was sown under different crops and of this, 208.91 hectares or 87.81 per cent was irrigated. The proportion of irrigated area among the marginal farmers was 97.32 per cent, followed by large farmers who irrigated to the extent of 95.33 per cent. The small and the medium size farmers irrigated their land to the extent of 84.82 per cent.

In Shahgarh block the marginal and large farmers irrigated the entire cultivated area while in Ambah block they irrigated to the extent of 94.50 and 91.27 per cent respectively. The small farmers irrigated to the extent of 89.31 per cent in Ambah block and to 78.69 per cent in Shahgarh block. Among medium size farmers cultivated area was irrigated to the extent of 86.02 per cent in Shahgarh block as against 83.34 per cent in Ambah block. In Shahgarh block sample farmers irrigated the cultivated area upto 86.97 per cent while in Ambah block this proportion was little higher (88.58 per cent). (Table 5.5)

Table 5.5 Proportion of Area irrigated.

(Area/hect.)

Size of farms	Shahgarh			Ambah			Both		
	Net area sown	Irri. area	%	Net area sown	Irri. area	%	Net area sown	Irri. area	%
Marginal	7.83	7.83	100.00	7.45	7.04	94.50	15.28	14.87	97.92
Small	44.35	34.90	78.69	60.52	54.05	89.31	104.87	88.95	84.82
Medium	37.62	32.36	86.02	30.50	25.42	83.34	68.12	57.78	84.82
Large	23.06	23.06	100.00	26.57	24.25	91.27	49.63	47.31	95.33
All	112.86	98.15	86.97	125.04	110.76	88.58	237.90	208.91	87.81

5.8 Irrigated area by Source

Canals, wells including tubewells, borewells and dug wells and 'other' sources were used for irrigation purposes. Largest area of 125.08 hectares or 59.87 per cent was irrigated by canals, 81 81 hectares or 39.16 per cent by the wells and the remaining 2.02 hectares or 0.97 per cent by 'other' sources. In Ambah block 70.12 per cent area was irrigated by the wells and the remaining 29.88 per cent by the canals. In Shahgarh block largest area (93.72 per cent) was irrigated by canals. The wells and other sources irrigated a very meagre area covering 4.23 and 2.05 per cent of the irrigated area respectively. (Table 5.6)

Table 5.6 Area Irrigated by source

(Area/hect.)

	Shahgarh		Ambah		Total	
	Area	%	Area	%	Area	%
1. Wells	4.14	4.23	77.67	70.12	81.81	39.16
2. Canals	91.99	93.72	33.09	29.88	125.08	59.87
3. Other Sources	2.02	2.05	-	-	2.02	0.97
All	98.15	100.00	110.76	100.00	208.91	100.00

5.9 Area under Different Crops

Cropping intensity among the sample farmers was 147.15 per cent and this figure in Shahgarh block was larger 163.57 per cent as compared to Ambah block (132.30 per cent).

Sample farmers raised crops on gross- cropped area of 350.05 hectares which was largely sown under cereals and millets occupying 59.70 per cent. Oilseeds were next and covered 24.53 per cent and

pulses, 6.92 per cent. Crop mixtures like jowar or bajara sown with urad, moong, tur, sesamum also covered 4.24 per cent area. Vegetables were grown on 3.49 per cent area and 1.12 per cent area was put under other crops including sugarcane and fodder crops.

Among the different crops grown, wheat was sown on largest area of 40.11 per cent. Soybean and mustard were other important crops covering 11.89 and 10.92 per cent area respectively.

In Shahgarh block gross cropped area was 184.61 hectares. The area under cereals and millets was 66.48 per cent. Oilseeds covered 25.16 per cent and pulses, 8.36 per cent. Wheat, paddy, gram, urad and soybean were other important crops. Wheat covered 47.69 per cent area. Second important crop was soybean which occupied 21.67 per cent area. Paddy was another important crop covering 10.36 per cent. Minor millets Kodo-kutki, gram- urad and sesamum were also sown on some areas.

Farmers of Ambah block had a gross cropped area of 165.44 hectares which was sown under wide range crops than Shahgarh block. Of the gross cropped area 52.14 per cent was under cereals and millets, 23.83 per cent under oilseeds, 5.31 per cent under pulses 8.97 per cent under mixed crops, 7.37 per cent under vegetables and the remaining 2.38 per cent under other crops. The cropping pattern was mainly dominated by wheat, mustard and bajara which covered 31.65, 23.11 and 17.41 per cent area respectively. Mixed crops also had an important place. The mixed crops had three combinations: (i) jowar +urd +moong +tur +til (ii) bajara + urd + moong + tur +til (iii) jowar +bajara + urad + moong +tur + til.

These mixed crops covered 8.97 per cent of the gross cropped area. Among vegetables, potato was important but it was mainly grown for family consumption. Onion, garlic were also grown for the same purpose.

Among all the crops wheat was the only crop which was irrigated entirely. (Table 5.7)

Table 5.7 Area under different crops

(Area/hect.)

S.No. Crops	Shahgarh		Ambah		Both	
	Area	%	Area	%	Area	%
A. Total cereal & Millets	122.73	66.48	86.24	52.14	208.99	59.70
1. Wheat	88.05	47.69	52.36	31.65	140.41	40.11
2. Paddy	19.12	10.36	-	-	19.12	5.46
3. Barley	1.71	0.93	0.93	0.56	2.64	0.75
4. Jowar	2.33	1.26	4.16	2.52	6.49	1.86
5. Bajra	-	-	28.81	17.41	28.81	8.23
6. Minor millets	11.52	6.24	-	-	11.52	3.29
B. Total Pulses	15.43	8.36	8.78	5.31	24.21	6.92
1. Gram	6.48	3.51	4.52	2.73	11.00	3.14
2. Arhar	-	-	1.38	0.84	1.38	0.40
3. Urd	7.46	4.04	2.88	1.74	10.34	2.95
4. Lentil	1.49	0.81	-	-	1.49	0.43
C. Total Oil seeds	46.45	25.16	39.42	23.83	85.87	24.53
1. Soybean	40.01	21.67	0.61	0.37	41.62	11.89
2. Groundnut	0.60	0.32	-	-	0.60	0.17
3. Mustard	-	-	38.23	23.11	38.23	10.92
4. Linseed	0.40	0.22	-	-	0.40	0.13
5. Till	5.44	2.95	0.58	0.35	6.02	1.72
D. Total mix crops	-	-	14.84	8.97	14.84	4.24
1. Jowar +urd + moong +arhar + till	-	-	3.82	2.31	3.82	1.09
2. Bajra+ urd + moong+till + arhar	-	-	5.99	3.62	5.99	1.71
3. Jowar + bajra + urd + moong gwar + til	-	-	5.03	3.04	5.03	1.44
E. Total Vegetables	-	-	12.20	7.37	12.20	3.49
F. Total other crops	-	-	3.94	2.38	3.94	1.12
1. Sugarcane	-	-	0.33	0.20	0.33	0.09
2. Fodder crops	-	-	3.61	2.18	3.61	1.03
All	184.61	100.00	165.44	100.00	350.05	100.00

5.10 Irrigated crops

In Shahgarh block farmers mainly depended on canals for rabi crop irrigation. Wheat, barley, gram and lentil crops were irrigated. Entire wheat area of 88.05 hectares was irrigated and it covered nearly 90 per cent of the area under irrigated crops. Irrigated area under gram was 6.50 hectares or 6.62 per cent. Remaining 3.60 hectares or 3.67 per cent was under barley and lentil crops.

In Ambah block 112.17 hectares were irrigated and it included 1.41 hectares, irrigated more than once. Irrigated area was largely covered by wheat and mustard crops. These crops occupied 46.68 and 34.09 per cent of the gross irrigated area. In this block also the entire area under wheat was irrigated. Vegetables covered 9.02 per cent of the irrigated area, bajara, 4.42 per cent and gram 3.41 per cent. (Table 5.8)

Table 5.8 Cropwise irrigated area

Crops	Shahgarh		Ambah		Total	
	Area	%	Area	%	Area	%
Wheat	88.05	89.71	52.36	46.68	140.41	66.76
Barley	1.71	1.74	0.93	0.83	2.64	1.26
Bajra	-	-	4.96	4.42	4.96	2.36
Gram	6.50	6.62	3.83	3.41	10.33	4.90
Lentil	1.89	1.93	-	-	1.89	0.90
Mustard	-	-	38.23	34.09	38.23	18.18
Vegetables	-	-	10.12	9.02	10.12	4.81
Sugarcane	-	-	0.33	0.29	0.33	0.16
Fodder crops	-	-	1.41	1.26	1.41	0.67
Total	98.15	100.00	112.17	100.00	210.32	100.00

5.11 Yield of Important Crops

The overall yield of both the blocks was wheat 2,252 kg., paddy 882 kg., jowar 649 kg., bajara 824 kg., gram 880 kg., urd 201 kg., soybean 920 kg., and mustard 927 kg. paddy and soybean were mainly grown in Shahgarh block and bajra and mustard in Ambah block. Wheat, jowar, gram and urd were grown in both the blocks.

Average yield of wheat in Ambah block was quite high (2971 kg./hectare) as compared to 1,745 kg. in Shahgarh block. Average yield of jowar, gram and urd was also much higher in Ambah block than Shahgarh block. It was mainly attributed to high fertility of soil and the assured sources of irrigation of Ambah block. (Table 5.9)

Table 5.9 Yield of important crops

Crop	Shahgarh	Ambah	Both
	Yield kg/ha	yield kg/ha	yield kg/ha
Wheat	1745	2971	2252
Paddy	882	-	882
Jowar	300	844	649
Bajra	-	824	824
Gram	614	1261	880
Urd	184	243	201
Soybean	934	-	920
Mustard	-	927	927

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CHAPTER- VI

CULTIVATION OF WHEAT

6.1 Soil Preparation

During 1986-87, monsoon withdrew much earlier i.e. in the 1st week of September 86. Therefore it was necessary to adopt pre-sowing irrigation to have desired level of moisture. Before pre-sowing irrigation, fields were harrowed and ploughed 2 to 3 times. After the irrigation, the farmers of Shahgarh block first harrowed the field and than ploughed the field 2 to 3 time till the soil was fully pulverized. Farmers of Ambah block did 2 to 3 ploughings. After every ploughing and harrowing they used leveller for the conservation of moisture.

After final ploughing, the levelling was done much carefully and sometimes the leveller was moved more than once to break the clods completely.

Seed bed for minikit wheat was separately demarcated and it was prepared in much better way. If necessary, additional ploughing was done and it was made clod free and was properly levelled by using leveller more than once.

6.2 Varieties Adopted for sowing

Apart from the minikit variety HD-2329, the farmers adopted 8 more wheat varieties. These included WH-147, Sonalika-1553, UP-308, HDM-1593, Tawa-267, Lok-1 and HD-2236. Among these Tawa-267 was sown in Shahgarh block only and HD-2236 in Ambah block only. Besides the minikit variety, 12 farmers in Shahgarh block and 10 farmers in Ambah block adopted more than one variety and the remaining farmers in both the blocks cultivated only one variety.

Among the varieties adopted WH-147 was most popular in Shahgarh block which was sown by 35 farmers (70 per cent). Second

place was occupied by UP-308 which was grown by 16 farmers (32 per cent). Sonalika-1553 was sown by 5 farmers, HDM-1593 by 3 farmers, Lok-1 by 2 farmers and Tawa-267 was grown by one farmer only.

In Ambah block Sonalika (HDM-1553) was most popular and it was grown by 48 out of 50 farmers. WH-147 was next important and it was grown by 6 farmers. Lok-1 was adopted by 3 farmers. The remaining 3 varieties including HDM-1593, HD-2236 and UP-308 were grown by one farmer each.

Thus WH-147 and Sonalika (HDM-1553) were most popular varieties in Shahgarh and Ambah blocks respectively. (Table 6.1)

Table 6.1 Different varieties sown by the farmers

Variety	Shahgarh	Ambah	Total
	No.	No.	No.
1. Minikit HD-2329	50	50	100
2. WH- 147	35	6	41
3. Lok-1	2	3	5
4. Tawa-267	1	-	1
5. Sonalika-1553	5	48	53
6. HDM-1593	3	1	4
7. UP- 308	16	1	17
8. HD-2236	-	1	1

6.3 Area sown under different varieties

Area to be sown under minikit was demarcated when lay out was done by the RAEO and in his absence, the farmers used their own discretion. However, it was to cover 0.05 hectare, meaning thereby 2.50 hectares under minikit variety HD-2329 in the sample of one block and a total of 5 hectares in the two blocks taken together.

Area actually sown under minikit variety covered 2.84 per cent in Shahgarh and 4.77 per cent in total area sown under wheat in Ambah block.

In Shahgarh block wheat crop was raised on 88.05 hectares by the sample farmers and of this more than 46.59 hectares or 52.92 per cent was sown under WH-147 and more than one third, (30.46 hect. or 34.59 per cent) under UP-308. The remaining 8.50 hectares or 9.65 per cent was shared by Lok-1, Sonalika and Tawa-267 varieties of wheat.

In Ambah block, the sample farmers cultivated wheat on 52.42 hectares and of this 45.52 hectares or 86.84 per cent were sown under Sonalika (HDM-1553). Other varieties in this block covered a very nominal area of 4.40 hectares including WH-147 sown on 1.98 hectares and Lok-1 on 1.48 hectares.

In terms of area WH-147 and UP-308 were largely sown varieties in Shahgarh block and that Sonalika (HDM-1553) in Ambah block. (Table 6.2)

Table 6.2 Area under different varieties

(Area/hectares)

Variety	Shahgarh		Ambah		Total	
	Area	No.	Area	No.	Area	%
Minikit HD-2329	2.50	2.84	2.50	4.77	5.00	3.56
WH-147	46.59	52.92	1.98	3.78	48.57	34.58
Lok-1	1.49	1.69	1.48	2.82	2.97	2.11
Tawa-267	0.20	0.23	-	-	0.20	0.14
Sonalika- 1553	3.21	3.64	45.52	86.84	48.73	34.69
HDM-1593	3.60	4.09	0.54	1.03	4.14	2.95
UP - 308	30.46	34.59	0.35	0.67	30.81	21.93
HD - 2236	-	-	0.05	0.09	0.05	0.03
Total	88.05	100.00	52.42	100.00	140.47	100.00

6.4 Dates of Sowing

Dates of sowing play an important role in the production but the minikits were supplied quite late. In Shahgarh block wheat is sown generally after the harvest of paddy crop when water is released from Bela dam canals for pre-sowing irrigation. Thus sowing of wheat in this block generally takes place from the last week of November to the 2nd week of December. The fields kept fallow in kharif are sown earlier if residual moisture persists. In Ambah block farmers generally have own, assured sources of irrigation and also do not grow paddy which may delay wheat sowing. Therefore, the farmers of Ambah block are in a position to start the sowing of wheat from the 1st week of November.

As per the recommendations, sowing of all the varieties was to be completed latest by the 30th November. Sonalika- HDM-1553 and Lok-1 were also to be sown as late varieties till 15th December.

(a) Adoption of Sowing Dates for Minikits

Sowing of minikit variety HD-2329 was to be completed latest by 30th November as it was a timely sown irrigated variety. In Shahgarh block 23 farmers did sowing of minikits in the 1st and 2nd week of December, nearly 15 days late, and 27 farmers during 3rd and 4th week of December, 86, about 20 to 30 days late.

In Ambah block sowing of minikits was done much later. One farmer did sowing in the 2nd week of December and 22 farmers during 3rd and 4th weeks of December 86. The remaining 27 farmers did sowing in the month of January, 87 including 23 farmers in the 1st and 2nd week and 4 farmers in the 3rd week of January.

Thus, minikits in both the blocks were sown late. In Ambah block minikits in larger numbers were sown in the month of January

when no wheat variety is recommonded for sowing in Madhya Pradesh. In Ambah minikits could be alloted fields due to the harvest of potato crop. Late supply was the cause of late sowing of wheat minikits. Due to this, control plots in this block were not laid-out.

b) Adoption of sowing dates for other varieties

In Shahgarh block sowing of wheat varieties was mainly done during 1st and 2nd week of December when 39 farmers completed it. There were 14 farmers who did sowing prior to that i.e. during the month of November including 6 farmers in the 1st and 2nd week and 8 farmers in the 3rd and 4th week of November, 86. During 3rd and 4th week of December, 86, sowing was done by 9 farmers.

In Ambah block 25 farmers sowed in the month of November including 15 farmers during 1st fortnight and 10 during 2nd fort-night. In the month of December sowing was done by 17 farmers during 1st and 2nd week and 16 farmers did it during 3rd and 4th week. There were 2 farmers who also did sowing in the month of January in potato fields. (Table 6.3)

Table 6.3 Dates of sowing adopted by the farmers

Dates of sowing	Minikits			Other varieties		
	Shahgarh	Ambah	Both	Shahgarh	Ambah	Both
1. Ist and IInd week of November	-	-	-	6	15	21
2. IInd & IV Week of November	-	-	-	8	10	18
3. I & II week of December	23	1	24	39	17	56
4. III & IV week of December	27	22	49	9	16	25
5. I & II Week of January	-	23	23	-	1	1
6. III Week of January	-	4	4	-	1	1

6.5 Dates of Sowing varieties and area sown

In the case of H.D. 2329 supplied under minikits, in Shahgarh block 46.00 per cent area was sown during 1st and 2nd week and remaining 54 per cent during the 3rd and 4th weeks of December. In Ambah block 2 per cent area was sown during 1st and 2nd week, 44 per cent during 3rd and 4th week of December and the remaining 54 per cent area was sown in January including 46 per cent during the 1st and 2nd week.

Among other varieties sown in Shahgarh block, WH-147 was most popular variety grown on 46.59 hectares and of this, 35.09 per cent area was sown during the month of November including 27.69 per cent during the 3rd and 4th week and remaining 64.91 per cent area was sown during December including 52.16 per cent in the 1st and 2nd weeks. UP-308 was another popular variety which was sown on 30.46 hectares which was largely sown during the month of December to the extent of 91.79 per cent including 51.87 per cent in the 3rd and 4th weeks. All other varieties in this block were sown during the 1st and 2nd week of December. (Table 6.4(a)

In Ambah block Sonalika HDM-1553 was the most popular variety and it was sown on 45.52 hectares. Since it was both timely sown as well as late sown variety its sowing period ranged from 1st week of November to 2nd week of January. Its sowing on 64.98 per cent area was completed within the stipulated date of 15th December, and 35.02 per cent was sown late including 31.90 per cent during 3rd and 4th week of December and 3.12 per cent during the 1st and 2nd weeks of January. Sowing of WH-147 was completed on 65.15 per cent area in the month of November including 53.53 per cent during the 1st and 2nd week. The remaining 34. 85 per cent area of this variety was sown by the end of 2nd week of

Table 6.4 Dates of Sowing, varieties and area sown (Area/hect.)

Varieties		Weeks of Sowing											
		Shahgarh					Amba n						
		I & II Nov.	II&IV Nov.	I&II Dec.	III&IV Dec.	Total	I&II Nov.	III&IV Nov.	I&II Dec.	III& IV Dec.	I & II Jan.	III Jan.	Total
Minikit	He	-	-	1.15	1.35	2.50	-	-	0.05	1.10	1.15	0.20	2.50
	%	-	-	46.00	54.00	100.00	-	-	2.00	44.00	46.00	8.00	100.00
WH-147	He	3.45	12.90	24.30	5.94	46.59	1.06	0.23	0.69	-	-	-	1.98
	%	7.40	27.69	52.16	12.75	100.00	53.53	11.62	34.85	-	-	-	100.00
Lok-1	He	-	-	1.49	-	1.49	0.35	1.13	-	-	-	-	1.48
	%	-	-	100.00	-	100.00	23.65	76.35	-	-	-	-	100.00
Tawa-267	He	-	-	0.20	-	0.20	-	-	-	-	-	-	-
	%	-	-	100.00	-	100.00	-	-	-	-	-	-	-
HDM-1553	He	-	-	3.21	-	3.21	11.59	5.45	12.54	14.52	1.42	-	45.52
	%	-	-	100.00	-	100.00	25.46	11.97	27.55	31.90	3.12	-	100.00
HDM-1593	He	-	-	3.60	-	3.60	0.54	-	-	-	-	-	0.54
	%	-	-	100.00	-	100.00	100.00	-	-	-	-	-	100.00
UP- 308	He	1.33	1.17	12.16	15.80	30.46	-	-	0.35	-	-	-	0.35
	%	4.37	3.84	39.92	51.87	100.00	-	-	100.00	-	-	-	100.00
HD-2236	He	-	-	-	-	-	-	-	0.05	-	-	-	0.05
	%	-	-	-	-	-	-	-	100.00	-	-	-	100.00
Total of all other Varieties	He	4.78	14.07	44.96	21.74	85.55	13.54	6.81	13.63	14.52	1.42	-	49.92
	%	5.59	16.45	52.55	25.41	100.00	27.12	13.64	27.30	29.09	2.85	-	100.00

December. Area under Lok-1 and HDM-1593 was sown in the month of November, HD-2236 and UP-308 were sown during 1st and 2nd week of December. (Table 6.4(b).

Thus, the area under minikits in Ambah block was sown very late when the sowing of other varieties was almost completed but larger area under other varieties was sown within the recommended dates. In Shahgarh block situation was different where minikits were received when sowing was infull swing. In this block out of 85.55 hectares area of other varieties, 35.20 hectares or 41.14 per cent was sown in time and remaining 50.35 hectares or 58.86 per cent was sown late by the end of December.

6.6 Seed Rate Adopted

Minikits were sown @ 100 kg/hectare. The seed rate followed by the farmers did not vary and it was same for all the varieties. It varied when sowing was delayed much. Seed used for different varieties was either retained from last year's production or taken from others including friends etc. It was not graded but winowed.

Usually farmers in Ambah adopted the seed rate of 115 to 125 kg. per hectare for different varieties but after 15th December the seed rate was increased to 125-140 kg.per hectare. In Shahgarh block farmers used the seed rate of 125 kg/hectare and in the late sowing it was increased to 150 kg/hectare. In both the blocks majority of farmers used 125 kg/hectare seed rate for the varieties. They kept the higher seed rate due to the ungraded seed.

6.7 Seed Treatment and Seed Inoculation

Minikit seed was already treated one. In all 14 farmers in the sample treated the seed before sowing and among them 9 belonged to Ambah block and 5 to Shahgarh block. In Ambah block 6 farmers treated the seed of Sonalika-1553 and 3 farmers treated WH-147

variety which was also treated by 5 farmers of Shahgarh block.

Inoculation of seed with rhizobium culture was done by 11 farmers including 10 from Shahgarh block. Sonalika-1553 was inoculated by one farmer from Ambah block and 2 farmers from Shahgarh block. WH-147 variety seed was inoculated by 8 farmers of Shahgarh block.

6.8 Methods of Sowing Adopted.

Broadcasting method of sowing was adopted by all the farmers of Shahgarh block where soil was not thought fit for line sowing with a seed drill. Under this method after the final ploughing seed was broadcasted in the field and then light leveller was used to cover the seed with earth. They also guarded the field both in the morning and evening to protect the seed from the birds till germination. Therefore row to row and plant to plant distances were not practically possible in Shahgarh block.

In Ambah block entire sowing was done by line sowing method. Both, application of basal doses of fertilizers and sowing were done simulteniously by 3 persons one for driving the plough, second to pour the fertilizer in the drill and third to sow the seed by hand by keeping himself about a metre away from the plough so that the fertilizer may get covered by earth before the seed is dropped. With this method the fertilizers were placed at 10-12 cm' depth and the seed depth was kept between 4-5 cm. The row to row distance was kept between 20-25 cm.

Sowing was done in good moisture conditions and there was good germination in both the blocks.

6.9 Fertilizer Application

(a) Basal Dose

In Shahgarh block basal dose of fertilizers was broadcasted

before the final ploughing. As per the local practice basal doses of fertilizers were broad casted and then the field was ploughed. After this the seed was broad casted and a light leveller was moved to cover the seed. For basal application 125 to 150 Kg. D.A.P. and 50-60 Kg. urea per hectare were used. Basal application was done by 45 farmers in this block.

In Ambah block basal application was done with the help of fertilizer drill attached with the plough to place the fertilizer at 10 cm. depth. Farmers used 225-250 Kg. of super phosphate and 100-125 Kg. of urea per hectare as basal dose. In this block all the farmers applied basal doses of fertilizers.

(b) Top Dressing

For top dressing farmers of both the blocks of used 100-125 Kg. Urea per hectare. In Ambah block top dressing was done by all the sample farmers and they applied urea in one dose after 1st irrigation when the crop was 20-25 days old.

In Shahgarh block, the quantity of urea for top-dressing was divided into two parts. In this block 39 farmers did the top dressing and they used 125 Kg. urea per hectare, and of this, 75 Kg. per hectare was applied after 1st irrigation and 50 Kg. per hectare after 2nd irrigation.

(c) Foliar Spray

Foliar spray was also done by the 3 farmers including one from Ambah block and 2 from Shahgarh block.

Thus in the sample 95 farmers applied basal doses of fertilizers and 89 did top dressing and 3 farmers adopted foliar spray. (Table 6.5)

Table 6 5 Fertilizer application in Ambah and Shahgarh blocks

Particulars	Shahgarh	Ambah	Total
	No.	No.	No.
Basal dose	45	50	95
Top dressing	39	50	89
Foliar Spray	1	2	3

6.10 Irrigation

For timely sown irrigated varieties, 4-5 irrigations were recommended in Shahgarh block and 5-6 irrigations in Ambah block according to soil conditions. The stages when irrigations were to be applied were well specified. As mentioned earlier pre-sowing irrigation was done by all the sample farmers in both the blocks and thereafter some of the farmers applied 5 irrigations and no one applied sixth irrigation.

(a) Irrigation for Minikit fields

In Ambah block at the time of Ist irrigation all the farmers irrigated their minikit fields and in Shahgarh block it was done by 48 farmers. Again at the second irrigation all farmers in Ambah block irrigated miniki fields while it was done by 18 farmers in Shahgarh block. Third irrigation was done by 38 farmers in Ambah and 6 farmers in Shahgarh block. Fourth irrigation was given by 45 farmers in Ambah and 7 farmers in Shahgarh block. Fifth and final irrigation was applied by 34 farmers in Ambah and by one farmer in Shahgarh block.

(b) Irrigation for other varieties

In Ambah block Ist and 2nd irrigations were given by 49 farmers and 27 farmers also gave 3rd irrigation. The fourth

irrigation was given by 42 farmers and the number decreased to 23 at fifth and final irrigation.

In Shahgarh block 48 farmers irrigated at the 1st irrigation stage and 18 at 2nd stage irrigation. Actually canal provided irrigation water for 2 irrigations including first time for pre-sowing irrigation and second time for 1st stage irrigation. It also released some water at the time of 2nd stage irrigation therefore some of the farmers were able to do 2nd irrigation. Canal water was not released for 3rd irrigation, therefore, those who could irrigate from assured sources, could give third irrigation. Therefore, remaining irrigations could be done by a few farmers such as 3rd irrigation by 6 farmers 4th irrigation by 7 farmers and 5th irrigation was done by one farmer in this block. Wheat crop in this block could survive due to the occasional showers. But absence of timely irrigations hampered the steady growth of the crop and the production of the wheat. (Table 6.6)

Table 6.6 No.of Irrigations given

No.of Irrigation	Ambah block		Shahgarh block		Both blocks	
	Minikits	Other varieties	Minikits	Other varieties	Minikits	Other varieties
Presowing	50	50	50	50	100	99
After sowing						
I	50	49	48	48	97	97
II	50	49	18	18	67	67
III	38	27	6	6	33	33
IV	45	42	7	7	49	49
V	34	23	1	1	24	24

6.11 Plant Protection and weed control

Plant protection measures were not adopted by the sample farmers in both the blocks.

Systematic weedings were also not done in any block. The weeds were used as green fodder, therefore, the farmers did not practise weeding till tillering. After this they up rooted the weeds by hand regularly to meet the demand of green fodder. This procedure was adopted in both the blocks. Moreover, the weeds proliferated more in Shahgarh block as compared to Ambah block. Therefore, 14 farmers in Shahgarh used labourers to clear the weeds.

6.12 Harvesting & Threshing

When the wheat crop was fully matured, the farmers harvested it manually at a right time. After harvesting, the produce was left for drying for 10-15 days.

When the crop was completely dry, the threshing was started. In Ambah block entire crop produce including the produce of minikits was threshed with the help of threshers. In Shahgarh block threshing of minikit produce was done by thresher by 42 farmers, with the help of bullocks 7 farmers, and manually by one farmer. The threshing of other varieties was done with the help of threshers by 44 farmers. The remaining 6 farmers did threshing with the help of bullocks in the traditional way.

6.13 Yield of Different Varieties

It is important to mention that the demarcation of control plots was done in some cases. The variety sown in rest of the area of the field was taken to be the control variety and the farmers were asked to demarcate an area of 0.05 hectare to evaluate the yield of minikit sown on the similar area. When the minikit seed

were sown very late after the harvest of potato crop as in Ambah block, the control plots were not laid down in many cases. Further, the farmers who made the demarcation did not keep the produce of control plots separately but with the rest of the produce. Thus, they had separate production of minikit varieties but not of control plots. They told the entire production of the remaining area. Therefore, the average yield obtained from the remaining area sown under other variety was taken as yield of control plot and that variety as control variety for the present discussion. In Shahgarh block WH-147 was sown as control variety by 29 farmers, UP-308 by 13 farmers, HDM-1593 by 3 farmers, and sonalika-1553 by 5 farmers.

In Ambah block 31 farmers took Sonalika-1553 as control variety. The remaining minikits did not have control plots. In these cases the field sown earlier under other varieties were taken as control plots. These included 17 plots of Sonalika-1553 and 2 plots of WH-147. Therefore, it was not possible to compare the yields of minikits with those of control plots. However, average yields of different varieties under different sowing dates have been compared with the yields obtained from minikit plots to form some idea about the performances of minikit variety of wheat.

The average yield of minikit variety HD-2329, in Shahgarh block was 1,376 kg/hectare which was lower than the average yield of other varieties (1,745 kg/hectare) Minikit variety lagged far behind the varieties UP-308, WH-147, Tawa 267 and Sonalika-1553 which yielded 1,926 kg, 1,745 kg, 1,750 kg and 1,435 kg respectively. It faired well against Lok-1 and HDM-1593.

Yield of different varieties also varied according to the date of sowing. The minikit varieties sown during first fortnight

of December yielded 1,525 kg as against 1,226 kg. sown during the 2nd half of December. Varieties sown during 1st and 2nd week of December gave a comparatively higher yield as compared to sown on other dates. The varieties U.P.308 and WH-147 were most popular in this block and both of them established good lead in yield over the minikit variety. These varieties were sown by good number of farmers from first week of November till the second week of December. Their yields were lowest in the case of first half of November and it was highest in the case of sown during the first half of December.

In Ambah block the average yield of minikit plots was 2,226 kg per hectare. Its yield was 3,000 kg for the plots sown in the 1st and 2nd week of December and 1,125 kg/hectare from the plots sown in the 3rd week of January. Thus the yield decreased with the delay of sowing as it was 230 kg. for III & IV weeks of December and 2,304 kg. for the 1st and 2nd week of January.

The minikit plots yield in this block was also lower than the 4 varieties and higher than 2 varieties. WH-147 returned with the highest yield of 3,535 kg/hectare followed by Lok-1 with 3,521 kg. The most popular variety of sample farmers was Sonalika-1553 and it occupied third position with an average yield of 2,950 kg/hectare. UP-308 also closely followed it with 2,857 kg/hectare. HDM-2236, gave 2000 kg and HDM-1593 provided the lowest yield of 1,296 kg/hectare.

In this block the fields sown during the month of November gave higher yields as compared to those sown during December. In the case of Sonalika-1553 which had the wider sowing span, yield for the first half of November sown plots was 3,197 kg. which decreased to 2,838 kg on the plot sown during second half of the December. The variety WH-147 registered 3,774 kg yield for first half of November and it went down to 3,188 kg. for the plots sown in the first half of December. (Table 6.7)

Table 6.7 Dates of sowing, varieties and yield per hect.

Varieties	Week of sowing											
	Shahgarh					Ambah						
	I&II Nov. 86	III&IV Nov.86	I&II Dec. 86	III&IV Dec.86	Total	I&II Nov. 86	III&IV Nov.86	I&II Dec. 86	III&IV Dec.86	I&II Jan.86	III Jan. 87	Total
Minikit HD-2329	-	-	1525	1226	1376	-	-	3000	2309	2304	1125	2226
WH 147	1594	1628	1897	1575	1745	3774	3478	3188	-	-	-	3535
Lok-1	-	-	671	-	671	2857	3727	-	-	-	-	3521
Tawa-267	-	-	1750	-	1750	-	-	-	-	-	-	-
Sonalika (1553)	-	-	1435	-	1435	3197	3173	2751	2838	2982	-	2950
HDM-1593	-	-	917	-	917	1296	-	-	-	-	-	1296
UP-308	977	1147	1444	2432	1926	-	-	2857	-	-	-	2857
HD-2236	-	-	-	-	-	-	-	2000	-	-	-	2000
Average	1423	1592	1622	2161	1745	3157	3275	2773	2838	2982	1125	2971

The yields registered by different varieties indicated that 1st and 2nd week of December was favourable sowing period for Shahgarh block and 1st and 2nd week of November for Ambah block.

In the opinion of the farmers, the minikit variety suffered in the yield mainly due to late sowing which did not allow to see its full performance to form an idea for its adoption. Due to late sowing it did not mature fully and the grains did not come up to its original form.

6.14 Utilization of Minikit Produce

Total production of minikit plots was 91.04 qtls.and of this, 66.05 per cent was retained for seed purposes, 27.06 per cent was used for consumption and 6.89 per cent was sold. There were 68 farmers from both the blocks who kept 60.13 qtls. production of minikits for seed purposes.

In Shahgarh block 55.92 per cent minikit production, out of 34.39 qtls was kept for seed purposes, 33.56 per cent was used for consumption and 10.52 per cent was sold. In this block 28 farmers retained its production for seed purposes.

In Ambah block farmers obtained production to the tune of 56.65 qtls and 40 farmers retained 40.90 qtls.or 72.20 per cent for seed purposes. The remaining production was either used for consumption or sold. (Table 6.8)

Table 6.8 Utilization of Minikit Production by the farmers

(Qty.in Qtls)

Utilization	Shahgarh			Ambah			Total		
	No.	Qty.	%	No.	Qty.	%	No.	Qty.	%
Retained for seed	28	19.23	55.92	40	40.90	72.20	68	60.13	66.05
Consumed	22	11.54	33.56	11	13.10	23.12	33	24.64	27.06
Sold	7	3.62	10.52	2	2.65	4.68	9	6.27	6.89
Total		34.39	100.00		56.65	100.00		91.04	100.00

6.15 Varieties Preferred by the Farmers

The Sample households were requested to indicate their choice of variety and reasons thereof. The replies received are discussed here to indicate the choice of variety along with a most strong valid ground in support of this.

Among the varieties grown by the farmers in Shahgarh block, WH-147 was preferred by the 30 farmers and 16 of them liked it due to its higher yield, 8 thought it most fit for consumption and 2 farmers each liked it on the basis of its shining grains higher price and more straw. The varieties HD-2329 and Lok-1 were liked most by 7 and 2 farmers respectively on the grounds of consumption purposes (good test). The variety UP-308 was best in the opinion of 7 farmers, HDM-1553 of 3 farmers and Tawa-267 of one farmer on account of good yield.

In Ambah block an overwhelming majority of 39 farmers considered Sonalika-1553 as the best variety. As many as 21 of them admired it due to its higher yield, 9 farmers considerd it tasteful and good for consumption, 5 farmers liked it due to the shining and boldness of the grains, 2 farmers, due to good price and another 2 farmers due to sufficient straw received. Minikit variety HD-2329 was liked by 9 farmers and 4 of them preferred it due to its yield, 3 farmers due to its good taste and 2 farmers due to the size and boldness of the grain. The variety WH-147 was also preferred by 2 farmers for the reasons other than the higher yield. (Table 6.9)

Table 6.9 Varieties preferred by the farmers and reasons thereof

Varieties	Shahgarh						Ambah					
	Higher yield	Good for consumption	Bold Grain and shining	More straw	Higher price	Total	Higher yield	Good for consumption	Bold Grain and shining	More Straw	Higher price	Total
HD-2329	-	7	-	-	-	7	4	3	2	-	-	9
WH- 147	16	8	2	2	2	30	-	1	-	1	-	2
Lok-1	-	2	-	-	-	2	-	-	-	-	-	-
Tawa-267	1	-	-	-	-	1	-	-	-	-	-	-
Sonalika-1553	3	-	-	-	-	3	21	9	5	2	2	39
UP- 308	7	-	-	-	-	7	-	-	-	-	-	-
All	27	17	2	2	2	50	25	13	7	3	2	50

Thus, WH-147 and UP-308 were still preferred most by the farmers of Shahgarh block. Among, these WH-147 was largely considered the best variety among all. In Ambah block Sonalika-1553 was commonly accepted as best variety by the farmers due to its good yield, longer sowing span, suitability for late sowing, non-shattering habit and such other characteristics.

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CHAPTER-VII

FARMERS OPINIONS ON MINIKIT SCHEME OF WHEAT

In this chapter the farmers knowledge and opinions about the wheat varieties and cultivation technology are discussed to understand the level of production technology and improvement they want for future.

7.1 Wheat Varieties so far cultivated

Since the introduction of high yielding and improved varieties of wheat, the sample farmers had tried quite a good number of varieties. The wheat varieties hithertc grown were not all remembered by them but they could name 14-15 varieties. These varieties included Sanora, Lerma Rajo, Kalyansona, Sonalika including RR-21, HDM-1553 and 1555, HDM-1594, WH-147, Shera, Narmada-4, Narmada-112, Tawa-267, HD-1593, HD-2236, C-306, S-227 UP-308. Among these, WH-147, Sonalika-1553, and UP-308 received wider acceptance and were grown by larger number of farmers. Other important varieties which were grown by 10 to 25 farmers in the sample were RR-21, HDM-1594, Shera and Lok-1. The remaining varieties were grown by a few farmers. It is evident from this that the farmers had come across a good number of wheat varieties so far and were in a position to pick up the most suitable variety. (Table 7.1)

7.2 Knowledge about Cultivation Technology

There were as many as 82 farmers including 43 from Ambah and 39 from Shahgarh block who knew correctly the seed rate to be adopted for wheat crop. Regarding the dates of sowing 95 farmers were well aware that timely sown varieties of irrigated conditions must be sown during the month of November and late varieties like sonalika-1553 and Lok-1 may be sown upto 15th December but not later.

Table 7.1 Wheat varieties so far grown by the farmers

Variety	No. of farmers		
	Shahgarh	Ambah	Both
1. WH- 147	41	13	54
2. Sonalika-1553	11	47	58
3. C- 308	26	16	42
4. RR-21	7	18	25
5. Kalyan Sona-1594	11	4	15
6. Shera	13	1	14
7. Lok-1	6	6	12
8. Narmada-4	5	2	7
9. Sanora	2	6	8
10. Lerma Rajo	4	1	5
11. C- 306	2	-	2
12. HD-1593	4	-	4
13. Raj- 1555	-	1	1
14. HD-2236	-	1	1

The row to row distance and depth of seed was known to 88 farmers and 69 farmers also knew that seed might be treated with Monoson or theerum @ 2.5 gram per kg. The recommended doses of fertilizers for different wheat varieties were also known to them. Basal doses were known to 66 farmers, 55 farmers were also aware about the dose to be applied for top dressing. Only 2 farmers correctly knew the doses for foliar spray. Irrigation Schedule of 5 irrigations was known to 82 farmers. Knowledge about the plant protection was not encouraging. Only 23 per cent of the farmers could tell about the common diseases and insects and could tell one or two brand names of insecticides.

7.3 Trainings and Tours

Farmer's training camps were organised from time to time to import knowledge about the latest varieties and cultivation technology of wheat crop. There were 10 farmers in the sample of Ambah blocks, who attended the camps organized specifically for the cultivation of wheat crop.

Under the tour and visit programme, 3 farmers from Shahgarh and 4 farmers from Ambah block were taken to other places particularly on Agricultural University farms and research stations under the wheat minikit scheme.

7.4 Participation in Minikit Programme

Farmers were asked when they came to know about the minikit programme of wheat. Their responses indicated that 7 of them came to know about the scheme as early as in 1980-81, 11 in 1981-82, 25 in 1982-83, 41 in 1983-84, 9 in 1984-85 and 7 in 1985-86. Thus a large number of 84 farmers became aware of this scheme by 1983-84. Among them 21 farmers also received wheat minikits during the previous years : one each in 81-82 and 82-83 4 in 83-84, 9 in 84-85 and 6 in 85-86. During the year 1986-87 55 farmers including 30 from Shahgarh and 25 from Ambah block approached the REAO to get the minikits (Table 7.2).

Table 7.2 Knowledge and participation in minikit programme

Year	When did he first come to know about wheat minikit programme			When did he first grow wheat Minikit		
	No.of farmers			No.of farmers		
	Shahgarh	Ambah	Both	Shahgarh	Ambah	Both
1980-81	2	5	7	-	-	-
1981-82	4	7	11	1	-	1
1982-83	11	14	25	-	1	1
1983-84	26	15	41	2	2	4
1984-85	5	4	9	3	6	9
1985-86	2	5	7	-	6	6
All	50	50	100	6	15	21

7.5 Reasons for Acceptance of Minikits

Farmers were requested to express the main reason for the acceptance of the minikit of wheat. Among them 36 farmers told that they accepted the minikits because of its free distribution and 34 farmers accepted them due to their desire to multiply the seed of a new variety for the next year. There were 23 farmers who took minikits with the intention to test its yield with the other varieties (Table 7.3).

Table 7.3 Main reasons for accepting the minikit

	Shahgarh	Ambah	Both
Why he accepted the Minikit?			
a) Free of cost	26	10	36
b) To test the variety	9	14	23
c) Seed multiplication	13	21	34
d) No response	2	5	7
All	50	50	100

7.6 Opinion about variety and size of minikit

In all 93 farmers including 47 from Shahgarh and 46 from Ambah block liked the variety of the minikit as it comparatively yielded good results even after late sowing. As many as 68 farmers including 28 from Shahgarh and 40 from Ambah block retained its production for next years seed.

About the present size of minikit, 40 farmers offered no comments, 32 farmers expressed their satisfaction over the present size and 28 farmers opined it to be too small to cover an area on which agricultural operation could be done properly. Its production also did not suffice for the next years requirements.

7.7 Objectives of Minikits-the farmers view

Among the sample farmers 27 thought that government wanted to test the variety on farmers fields, 30 farmers thought that it was given to multiply the seed for the next year. There were 16 farmers who thought that government did it to popularize a particular variety by exhibiting its convincing yield and remaining 37 farmers thought that minikits were distributed to help the poor farmers.

Whatever it might be, 95 farmers from both the blocks accepted that minikits were of great help in the selection of varieties and popularization of pre-released and newly released varieties of wheat.

7.8 Opinions about Wheat Minikit Scheme

All the farmers favoured the scheme by expressing their views that it was much helpful in the development of wheat cultivation. This scheme provided them latest varieties which were either released or under trial. They were also kept informed about the new cultivation practices through RAEC's and training camps. The minikit scheme helped them in three ways (1) It helped in the selection of most suitable variety for the next year, (2) in the adoption of latest cultivation technology (3) and finally in the multiplication of seed for the next year.

7.9 Farmers Suggestions on Minikit Programme

(1) All the farmers laid much stress on the fact that the farmers for minikit demonstrations should be selected well in advance so that they may select the area for this purpose from a fertile and good field.

(2) Minikits should be supplied in time, if not in advance. They were supplied minikits quite late which did not allow them to evaluate the yield potential of new variety. Thus minikits must be supplied in advance so that they may do sowing in time on a suitable plot.

(3) A good number of 54 farmers also suggested that the size of the minikits should be increased to 10 kg to cover 1/10 of hectare. On this area they will be able to do operations well and will also get sufficient production to meet the seed requirement of the next year.

(4) Most of the marginal farmers requested that they should also be supplied required fertilizers for the minikits free of cost.

(5) It was also suggested that along with minikit, seed for the control variety should also be supplied free of cost. But such farmers were a few.

(6) The marginal farmers suggested that they should be given minikit every year.

In short the farmers in general desired that selection should be done in well advance, minikits must be made available in time and it will be much helpful if the size of minikit is increased to 10 kg.

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C H A P T E R-VIII

SUMMARY AND CONCLUSIONS

8.1 Introduction:

It is experienced that the seeds of high yielding varieties start devitalising over the years. Therefore, a popular variety becomes obsolete with the passage of time. Similarly a popular variety is not suitable in all the areas of a state. It is therefore necessary that new varieties are continuously developed through a regular breeding programme. Quick dissemination of newly developed varieties and production technologies among the extension workers and the farmers is an important aspect of popularizing the varieties. This is possible only when both extension workers and cultivators are made partners of the research workers for early identification and ready acceptance of the popular varieties.

Minikit demonstration programme was devised as a master solution for the speedy identification and adoption of new varieties and production technologies. The minikit demonstration programme of paddy was initiated in 1971-72. Encouraged by its results, similar schemes for wheat, barley, jowar, bajara, maize, ragi were taken up in 1974-75. Pulse crops also came under this scheme from 1981-82.

Main objectives of this scheme were :-

(1) Identification and popularization of pre-released and newly released varieties (2) Popularization of area specific high yielding varieties (3) Speedy adoption of most suitable and superior varieties and (4) Acquainting the extension workers about the new varieties and production technologies and obtaining of feed back from them for further improvement. One very important aspect of this scheme is that it involves both extension workers and cultivators

as equal partners with the research workers in the final decision about the suitability of the varieties under specific agro-climatic field conditions.

Minikit demonstration programme of wheat was started in 1974-75 to evaluate the continuously evolved wheat varieties through the minikit demonstrations, field trials in different agro-climatic zones. Encouraged by its success the scheme was given new thrust from 1982-83 in the light of the productivity year, 1982. This scheme was introduced with 10 new varieties in the first year and till now it has exposed about 40 popular varieties with the help of 8,69756 minikit demonstrations, 412 adoptive trials and 132 training courses from 1980-81 to 1986-87.

8.2 The Present Study

The Directorate of Economics and Statistics, Ministry of Agriculture, Govt.of India, asked this Centre to conduct an evaluation study on minikit demonstration programme of wheat in M.P.

8.2.1 Objectives of the Study

The main objective of the study was to evaluate the role played by minikit programme of wheat in the identification and popularization of pre-released and newly released varieties among the cultivators and dissemination of information about the developed production technology among the extension workers. Thus, the study had following specific objectives:

(i) To study the identification of wheat varieties by the farmers vis-a-vis the wheat minikit programme.

(ii) To study the impact of minikit programme on the speedy adoption of pre-released, newly released varieties and the improved production technology of wheat crop among the cultivators.

(iii) To study the role played by the minikit programme in the timely dissemination of information among the extension workers and the cultivators about the wheat varieties and improved cultivation techniques of wheat crop.

(iv) To study the farmers reactions on different aspects of minikit programme of wheat.

(v) To indicate the policy issues raised and to make suggestions for improvements.

8.2.2 Sample of Study

Sagar district from rainfed area and Morena district from irrigated wheat districts were selected in consultation with the state Govt.Officials. These districts also received larger number of wheat minikits during the years. From each district, one block which received largest number of minikits during 86-87 was selected. Accordingly, Shahgarh block from Sagar district and Ambah block from Morena district were selected. From each district 50 minikit recipient farmers were selected. Thus study had a sample of 100 farmers.

8.2.3 Data Collection and Reference year

Both secondary and primary data were collected by survey method with the help of interview schedules specially designed for this study. Data were collected in the months of May and June,1987.

The year of 1986-87 was taken as reference year.

8.3 General Findings

8.3.1 Importance of Wheat in M.P.

(i) Madhya Pradesh occupied 15.57 per cent of the total wheat area of our country. Wheat covered second largest area,

20 per cent among the foodgrain crops and comprised 29.60 per cent of the total foodgrain production of the state. Area under wheat included 35.88 per cent irrigated area and 64.12 per cent unirrigated area in 1984-85.

(ii) Wheat is the most spread out crop in M.P. and is grown in all the 45 districts. There were 20 districts where area under wheat covered more than 20 per cent of the gross cropped area of the district. The proportion of wheat area in these districts varied between 20 and 50 per cent in the gross cropped area and together comprised 65.03 per cent of the total area under wheat in the state. These districts were Sagar, Vidisha, Raisen, Damoh, Sehore, Hoshangabad, Bhopal, Indore, Tikamgarh, Datia, Shivpuri, Panna, Gwalior, Morena, Bhind, Rewa, Jabalpur Satna and Seoni.

(iii) Popular varieties identified under irrigated conditions were sonalika, kalyansona (HDM-1594), WH-147, HD-4530, Jairaj, Raj-1555, HD-2236, Lok-1, Tawa-215 and Tawa-267. The varieties adopted under unirrigated conditions were mainly developed by the scientists of J.N. Agricultural University, Jabalpur. Popular varieties under this group included Narmada-4, Narmada-112, Narmada-195, Sujata(HI-617), Mukta (HI-385), HY-65, NP-404 and Meghdoot.

(iv) Varieties sown under irrigated conditions were identified as popular varieties for the entire state but the varieties grown under unirrigated conditions were recommended in the light of 8 agro-climatic regions namely, Malwa and Satpura region, Vindhya region, Nimar region, Madhya Bharat,

Bengana region, Haveli region,Narmada valley, Bundelkhand region and Chhatishgarh region.

8.3.2 Minikit Programme of Wheat in M.P.

(i) As envisaged in the scheme, for free distribution of wheat minikits mainly marginal and small farmers were included. The farmers belonging to the scheduled castes and scheduled tribes were given due consideration under the scheme.

(ii) From 1980-81 to 1986-87, the state was given a target of 2,75,280 minikits and of this, 2,61,916 minikits or 95.18 per cent were actually distributed. The scheme got accelerated from 1982-83 when it crossed the target by 102.54 per cent in 1983-84 and by 108.37 per cent in 1984-85.

(iii) During the last 3 years 19 wheat varieties were exposed to the cultivators and the extension workers. These included 7 pre-released and 12 newly released wheat varieties. Pre-released varieties were PBW-34, HD-2329, WH-331, WL-2265, DL-1532 and J-405. Newly released varieties included Narmada-112, Lok-1, HD-2204 HD-2281 DWL-5023, HDM-1553 and HDM-2189. Check varieties used in the state were WL-711, HD-2009, C-308, WL-410, Lok-1, Sonalika and Swati.

8.3.3 Sample districts & blocks

(i) In Sagar district wheat was sown on an area of 263.6 thousand hectares covering 47.96 per cent of the gross cropped area and was irrigated to the extent of 11.30 per cent. In Morena wheat covered 88.6 thousand hectares or 20.52 per cent of the gross-cropped area and it was irrigate

to the extent of 42.70 per cent.

(ii) During the years 1980-81 to 1986-87 Sagar district was supplied 5,305 minikits. In Morena district, during last 5 years from 1982-83 to 86-87,11,513 minikits were distributed during the last three years, 1984-85 to 86-87, 10 wheat varieties were covered under the wheat minikit demonstrations and these varieties were: WH-147, Lok-1, HD-2189, HD-2285, HD-2329, PBW-34, WH-331, WL-2265, DL-1532 and J-405. During 1986-87, HD-2329 variety was supplied under minikit demonstration in both the districts. Sagar district was supplied 500 minikits and Morena, 1,000 minikits.

(iii) During the last seven years, 131 adoptive trials were conducted in both the districts including 127 in Sagar district. During the same period 56 demonstrations including 49 in Morena district were laid on the farmers fields.

(iv) In Ambah block wheat covered 26.49 per cent and in Shahgarh block 34.84 per cent of the gross-cropped area. It was irrigated to the extent of 94 per cent in Ambah block and 58 per cent in Shahgarh block. Due to drought conditions Beela Dam canal in Shahgarh block and Chambal canals in Ambah block could not supply sufficient irrigation water

(v) Shahgarh block was supplied 150 and Ambah block 104 minikits of HD-2329 variety for distribution to mainly small and marginal farmers free of cost. In Shahgarh block 111 or 74 per cent minikits were given to marginal farmers and 25 or 16.87 per cent to the small farmers. In Ambah block 51.92 per cent minikits were given to marginal farmers and

25.96 per cent to small farmers.

Cultivators belonging to the scheduled castes and scheduled tribes were given due attention and 36 per cent minikits in Shahgarh block and 22.12 per cent in Ambah block were given to these weaker sections.

(vi) Minikits in both the blocks were supplied quite late when the sowing of wheat crop was almost over and no suitable field could be spared for this crop.

As per the recommendation HD-2329 variety was to be sown between 10th and 25th November and in no case after 30th November. None of the minikit was sown during this period in both the blocks. In fact minikits in Shahgarh block were supplied in the 2nd week of December, 86 and in Ambah block in the last week of December, 86 and in the 1st week of January, 87. In Ambah block it was a problem to chose fields for minikit demonstrations. The minikits were sown on the area available after harvesting of potatoes. Therefore control plots could-not be taken in this block.

(vii) Actual sowing of wheat minikits in Shahgarh was done between 8th to 22nd December, 86. In Ambah block 35.58 per cent minikit wheat was sown in the last week of December, 86, and the remaining 64.42 per cent from 1st week to the end of 3rd week of January, 87. Minikit wheat in this block was sown when top dressing of other wheat fields was almost completed.

8.3.4 Sample Farmers

(i) The sample farmers included 30 scheduled caste people, 7 farmers belonging to the backward castes and 63 farmers of other castes. As regards size of holdings, there were 22 marginal farmers, 60 small farmers, 14 medium size farmers (4 to 10 hectares) and 4 large farmers (more than 10 hectares).

(ii) The sample farmers owned 252.81 hectares and of this 94.10 per cent was cultivated. The cultivated area was 237.90 hectares and of this 87.81 per cent was irrigated. Cropping intensity was 147.15 per cent: 163.27 per cent in Shahgarh block and 132.30 per cent in Ambah block.

(iii) Sample farmers raised crops on 350.05 hectares: 59.20 per cent under cereals, 24.53 per cent under oilseeds, 6.4 per cent under pulses, 3.49 per cent under vegetables and spices and 4.24 per cent under other crops.

(iv) Wheat was sown on 40.11 per cent of the gross cropped area. This figure in Ambah block was 31.65 per cent and in Shahgarh block, 47.65 per cent.

(v) The average yield of wheat was 2,252 kg/hectare and this figure in Ambah block was as high as 2,971 kg and was lower (1745 kg/hectare) in Shahgarh block.

8.3.5 Identification of Wheat varieties

(i) Varieties identified and grown

From 1974-75 to 1986-87, a number of suitable varieties were identified and adopted for cultivation. But the farmers could remember the names of 14 varieties including WH-147, Sonalika (1553), C-308, RP-21, Kalyansona (1594), Shera, Lok-1, Narmada-4, Sanora, Larma Rajo, C-306, HD-1593,

Raj-1555 and HD-2236.

(ii) Varieties grown in 1986-87

(a) Beside growing HD-2329 under minikit, the sample farmers adopted 7 other varieties which were popularised during previous years. These varieties were WH-147, Lok-1, Tawa-267, Sonalika (HDM-1553), HDM-1593, UP 308 and HD-2236. Among these varieties, Tawa-267 was returned from Shahgarh block and HD-2236 from Ambah block alone. There were 22 farmers including 12 in Shahgarh and 10 in Ambah who raised more than one variety, otherwise, all the farmers adopted only one variety which they thought most suitable and productive.

(b) Sonalika (HDM-1553) was returned as the most popular variety and it was grown by 53 farmers including 48 from Ambah block. Next place was occupied by the WH-147 which was grown by 41 farmers including 35 from Shahgarh block. Another popular variety was UP-308 which was grown by 17 farmers including 16 from Shahgarh block. Lok-1 was grown by 5 farmers, HDM-1593 by 4 farmers and Tawa-267 and HD-2236 by one farmer each. Thus Sonalika (HDM-1553) was popularly grown in Ambah block and WH-147 and UP-308 varieties in Shahgarh block.

(iii) Area Under Wheat Varieties in 86-87

Area sown under minikit variety HD-2329 was 5 hectares, 2.50 hectares in each block. Wheat was grown on 140.47 hectares and of this, largest area was covered by Sonalika (HDM-1553) and WH-147. These two varieties covered nearly equal area. The variety UP-308 was next and covered 21.93 per cent of the total wheat area. Other varieties were

grown on a smaller area Sonalika (HDM-1553) was predominantly adopted in Ambah block where it covered 86.84 per cent area sown by 48 farmers. WH-147 dominated in Shahgarh block with 52.92 per cent area and 35 farmers. UP-308 was also popular in Shahgarh block and it was grown by 16 farmers on 34.59 per cent area.

(iv)Varieties and Dates of Sowing

(i) In Ambah block wheat was taken after maize, bajara, jowar, til and in Shahgarh block after paddy. Some of the fields in this block were kept fallow in kharif to sow wheat in the residual moisture, particularly for UP-308 variety. In Shahgarh block wheat was sown on 22.04 per cent area in the month of November, 52.55 per cent during first half of December and the remaining 25.41 per cent during the second half of December 86. In Ambah block where farmers had their own sources of irrigation sowed 40.76 per cent area during the month of November, 27.30 per cent during the first half and 29.09 per cent during the second half of December 86. The remaining 2.85 per cent area was sown in the month of January, 87.

(ii) WH-147 variety was to be sown latest by the end of November. In Shahgarh block 35.09 per cent and in Ambah block 65.15 per cent area was sown in November. The remaining 34.85 per cent area in Ambah and 52.16 per cent in Shahgarh block was sown during the first two weeks of December. The remaining 12.75 per cent area under this variety was sown during the second half of December.

Sonalika (HDM-1553) was mainly sown in Ambah block. This variety was sown as a late sown variety, therefore, it

could be sown upto 15th December. It was sown from first week of November to the second week of January. However its 64.98 per cent area was sown during the stipulated period till 15th December including 37.43 per cent in November and 31.90 per cent during the second half of December and 3.12 per cent during the first half of January, 87. In Shahgarh block it was sown well in time by 15th December.

UP-308 was mainly sown in the month of December including 39.92 per cent in the first half and 51.87 per cent in the second half of the month. The remaining 8.21 per cent area was sown in the month of November in the residual moisture.

The remaining varieties in Shahgarh block were sown during the first half of December and in Ambah block mostly in November.

8.3.6 Adoption of Production technology

(i) Soil preparation for minikit wheat was done much better than other varieties. Since the monsoon discontinued earlier, all the farmers used pre-sowing irrigation after breaking the soil by 2-3 ploughings and harrowings. After this they did 2-3 ploughings or harrowings and used leveller every time to preserve the desired level of moisture and to pulvarise the soil. They made the fields levelled and free from clods and weeds.

(ii) Seed rate adopted in Ambah block varied between 115-125 kg/hectare and it was increased to 125-140kg/hectare for sowing after 15th December. In Shahgarh block, farmers used 125kg/hectare and it was increased to 150 kg after 15th December.

All the farmers used ungraded seed from the last years stock.

(iii) Seed treatment and seed inoculation was not common. There were 14 farmers who treated the seed all 11 farmers also inoculated it with rhizobium culture. Minikit seed was pretreated.

(iv) In Shahgarh block 14 farmers completed sowing well in time during the month of November, 39 farmers during the first half of December and 9 farmers delayed the sowing by more than 15 days as they completed sowing during the second half of December. In Ambah block 25 farmers completed sowing in time i.e. in the month of November, 17 farmers continued it till first half and 16 farmers till second half of December 86. There were 2 farmers who sowed in the first half of January, 87. Minikit wheat in both the blocks was sown late, after November. In Ambah larger number of minikits were sown in the month of January when no variety is sown. In Shahgarh block 23 farmers did sowing of minikits during the first half and remaining 27 farmers during the second half of December 86.

(v) In Shahgarh block line sowing was not thought suitable in the prevailing soil conditions, therefore, all the farmers used broadcasting method for all the wheat varieties. In Ambah block line sowing method was practised by all the farmers for all the varieties. It was done with the local method in which a man walked behind the plough more than one meter behind to drop the seed in the harrow. Fertilizer drill was attached with the plough at 10-12 cm. depth while seed was sown 4-5 cm. deep.

(vi) Basal dosesof fertilizers were applied by all the farmers except 5 farmers of Shahgarh block. In Shahgarh block 125 to 150 kg D.A.P. per hectare was applied. In Ambah block farmers used 225 to 250 kg.superphosphate and 100-125 kg urea per hectare as basal dose. For top dressing all the farmers used 100 to 125 kg urea per hectare after the first irrigation.

(vii) Farmers in Ambah block gave 5 irrigations as per the recommendations. In Shahgarh block the farmers were aware of 5 irrigations but they could give only 2 irrigations and a very few of them could give remaining irrigations.

(viii) Plant Protection measures were not adopted. The farmers also did not undertake systematic weeding operations but uprooted the weeds for green fodder from time to time.

(ix) Harvesting of minikit plots and other fields was done in time and after drying the crop for 10 to 15 days threshing was done with the help of threshers. There were 7 farmers who used bullocks for the threshing of minikit produce. For threshing purpose the farmers kept minikit produce separately but not of control plots.

8.3.7 Yields obtained from different varieties

(i) In some cases the control plots were not laid and the produce of control plots was not threshed separately. Therefore the average yield of the variety sown in the same field, was considered for comparison to have an idea about the performance of minikit variety which was cultivated in a better way but sown late than other varieties.

(ii) In Shahgarh block WH-147 was sown as control variety by 29 farmers, UP-308 by 13 farmers, HDM-1593 by 3 farmers and Sonalika-1553 by 5 farmers. In Ambah block 31 farmers used Sonalika-1553 as control variety and remaining farmers did not lay control fields. In these cases Sonalika-1553 sown earlier as well as on other plots was compared. The generalization of performance was done on the average yield of different varieties obtained.

(iii) The average yield of minikit plots of HD-2329 was 1,376 kg/hectare in Shahgarh block and much higher, 2,226 kg in Ambah block. These figures varied with the dates of sowing. In Ambah block highest production of 3,000 kg/hectare was obtained from the plots sown during the first half of December and lowest yield of 1,125 kg/hectare from the plots sown in the 3rd week of January, 87. Highest yield in Shahgarh was obtained from plot sown in first half of December which was 1,525 kg/hectare and lowest 1,226 kg/hectare from the plots sown in the second half of December.

(iv) Minikit variety generally lagged behind the varieties sown as control mainly because of late sowing in both the blocks. In Shahgarh block the average yield of control varieties was 1,745 kg/hectare and individually.UP-308 gave, 1,926 kg, Tawa-267, 1750 kg, WH-147, 1,745 kg, Sonalika-1553, 1435 kg, HDM-1593, 1,296 kg and Lok-1, 671 kg/hectare. In Ambah block the average yield of other varieties was 2,971 kg/hectare and that for WH-147 was 3535 kg, Lok-1 3521 kg, Sonalika 2950kg, UP-308, 285 kg, HD-2236, 2000 kg and HDM-1593 1296 kg/hectare.

(v) Date of sowing played significant role in average yield of all the varieties in both the blocks. The fields sown during the month of November, particularly during the 2nd and 3rd week, gave highest yields in Ambah block. While this position was occupied by the plots sown during the first half of December in Shahgarh block. Plots sown prior or after these periods gave lower yields and yields decreased with the late sowing. However, yields did not vary much for the plots sown from the second half of November to the first half of December.

(vi) The yields of different varieties were much higher in Ambah block as compared to Shahgarh block. Method of sowing, dates of sowing, irrigation facilities and soil conditions were mainly responsible for it. Farmers of Ambah block adopted line sowing method, completed sowing by the end of November and gave five scheduled irrigations. All these augmented their yields significantly as against the farmers of Shahgarh block.

8.3.8 Identification of wheat varieties for Next year

(i) WH-147 was identified by the largest number of 30 farmers in Shahgarh block and Sonalika- 1553 by 39 farmers in Ambah block.

(ii) Sonalika was selected for next year by 42 farmers in both the blocks and 57.14 per cent of them identified it due to its higher yield average, 21.43 per cent due to good taste, and remaining 21.43 per cent due to other reasons like shining of grains, more straw and high price. WH-147 variety was identified by 32 farmers including 2 from Ambah block and 50 per cent of them were attracted by its yield

average, 25 per cent by its good taste and remaining 25 per cent by its shining grains, more straw and higher prices. Minikit variety HD-2329 stood third in the identification and it was selected by 16 farmers for next years sowing and 62.50 per cent opted for it due to good taste, 25 per cent due to yield and 12.50 per cent due to the shine of its grains. UP-308 was liked by 7 farmers due to its good yield. Lok-1 was preferred by 2 farmers due to its good taste and Tawa-267 by one farmer due to higher yield.

(iii) Higher yield average, good taste boldness and shining of grains were major determinants in the selection of varieties. Among the sample farmers a majority of 52 farmers identified variety for next year on the basis of higher yield, 30 on the basis of good taste 13 due to boldness and shining of grains and remaining 5 farmers due to more straw.

8.3.9 Utilization of Minikit Production

Total production of minikit plots was 91.04 qtls. and of this 66.05 per cent was retained for seed purposes, 27.06 per cent was utilized for consumption and remaining 6.89 per cent was sold.

8.3.10 Farmers Opinions and Knowledge

(i) Knowledge and participation

(a) There were 7 farmers who came to know about the minikit demonstration as early as in 1980-81, 11 in 81-82, 25 in 1982-83, 41 in 1983-84, 9 in 1984-85, and 7 in 1985-86. Among them 21 farmers received minikits during previous years including 9 in 1984-85 and 6 in 1985-86. All of them were supplied wheat minikits in 1986-87 and of them 55 farmers

approached Rural Agricultural Extension Officer (RAEO) specifically for this purpose.

(b) For improvement in production technology 10 farmers attended training camps. Under the tour and visit programme 7 farmers were taken to research farms of J.N. Agricultural University and Govt.farms.

(ii) Reasons for the Acceptance of Minikits

A total number of 36 farmers participated in the minikit scheme due to the free supply of 5 kg. seed 34 farmers accepted minikits due to their desire to multiply the seed of a new variety for the next year and 23 farmers took minikits to test the yield of minikit variety on their own fields. Seven farmers did not give any reason.

(iii) Objectives of Minikit Scheme- farmers views

Among the sample farmers 30 thought that the government had given minikits to help them to multiply the seed of a new variety for the next year, 27 the opined that government wanted to identify suitable variety on farmers fields and 16 farmers thought the government was running this scheme to popularise the wheat varieties. The remaining 37 farmers thought that the scheme was started to help the poor farmers.

(iv) Knowledge about Cultivation Technology

The farmers were aware about the fact that there should be sufficient moisture in the soil which should be pulvarised by harrowing, ploughing and using the leveller every time. They knew that fields should be properly levelled, and made clod and weed free before sowing. There were 83 farmers who knew the rate of graded seed and 95 farmers knew about the

correct sowing dates. They were aware of the facts that sowing of irrigated wheat might be started from the first week of November and should be completed by the 30th Nov. late sown varieties might sown upto 15th December but not later. The row to row distance and depth of seed was known to 88 farmers and 69 farmers knew that seed might be treated with monson or theerum @ 2.5 g.per kg.Basal doses of fertilizers were known to 66 farmers and 55 of them were aware about the quantity of urea to be applied at top dressing. Only 2 farmers knew about the foliar spray. Irrigation schedule of 5 irrigations was known to 82 farmers. Their knowledge about plant protection measures was poor as only 23 farmers could tell about diseases and insects. They could tell a few brand names of insecticides and pesticides.

(v) Opinions about the Minikit Programme

(a) Wheat variety supplied under minikit programme was liked by 93 farmers and 68 farmers decided it to try it next year by timely sowing. This year the minikit variety did well even though it was sown late.

(b) About the size of minikit, 32 farmers expressed their satisfaction, 28 farmers considered it too small and 40 farmers offered no comments.

(c) All the farmers favoured the wheat minikit demonstration scheme as a whole. Majority of the farmers expressed that the scheme had exposed new wheat varieties every year and that had helped them in the identification of new varieties to replace the old ones. It kept them informed about the new production technology through the RAEO the

training camps and tour and visit programme. The scheme had benefitted in three ways.

(a) by exposing new varieties to select the most suitable one to replace the old ones

(b) by improving production technology and

(c) finally by allowing the multiplication of seed for next year

(vi) Farmers Suggestions about Minikit Programme

(a) All the farmers suggested that the selection of farmers should be made well in advance and accordingly they should be informed to prepare plot for minikit in the desired manner. This would enable them to select plot in a good field and they would also be able to do soil preparations in a better way in advance.

(b) It would be better if the minikits are supplied in advance of the sowing period. Late supply should be avoided as it goes against the very purpose of the scheme.

(c) A good number of 54 farmers suggested that the present size of minikit should be increased to 10 kg as the plot for 5kg. did not allow them to do operations comfortably being too small in size.

(d) The marginal farmers suggested that they should be given the seed of control variety and fertilizers for both the plots free of cost. It would be helpful if they are supplied a minikit every year.

8.4 Conclusions and Policy Implications

(i) So far the minikit demonstration scheme has exposed about 40 pre-released and newly released varieties of wheat.

Fourteen varieties were used by the sample farmers. It had created an awareness about the incoming varieties in advance to have ready acceptance.

(ii) Minikit programme enabled the farmers in the identification of more promising varieties to replace the inferior ones year after year. Due to this the popularization of wheat varieties became easy and simple. Many varieties which were under trial or were tc be released shortly were made known to the farmers in advance. It helped the farmers in the identification of suitable varieties and provided feed-back to the research workers.

(iii) Dissemination of new production technology also became a regular feature due to this scheme both among the farmers and the extension workers.

(iv) Scheme proved beneficial to the poorer sections including marginal and small farmers, and the farmers belonging to the scheduled castes and scheduled tribes. These persons were largely covered in the scheme.

(v) Scheme needed higher inputs like seed of control variety, fertilizers and scheduled irrigations which the poor farmers were not able to meet from their own resources.

(vi) Selection of farmers was done by the sarpanchas. According to the extension workers, the list supplied to them suffered from factionalism and included such farmers who were not progressive farmers.

(vii) Control plots in the true sense were very rare. In many cases they were not laid and demarcated separately. Farmers did not keep the produce separately to validate the yield.

Sowing dates generally differed as control plots were sown timely while minikits, quite late. This did not allow the comparison of yield differences in the true sense.

(viii) The agencies involved in the minikit demonstration scheme lacked proper coordination which did nct allow the timely supply of minikits.

(ix) Late supply of minikits hampered the promising results. Minikits were usually supplied very late after the sowing period of wheat. It did not allcw demonstration in good fields. The selection of farmers was done quite late. All this affected the yield of minikit plots. In most of the cases yield of minikit variety was lower as compared to the varieties preferred by the farmers and adopted as control varieties. This did not have convincing impact on the farmers for ready acceptance.

The training programmes were organized very late. Between 1982 and 1987, 13 training camps were held at different agricultural colleges and 4 trainings were given in second half of October, another 4 trainings in the month of January. Similarly adoptive trials, farmers trainings and tours were organized after the sowing of wheat crop in the area.

(x) Due to late selection of farmers and late supply of minikits, the yield average of minikit plots failed to compete with the average yield obtained for the popular varieties. Since the minikit variety gave convincing yield even after very late sowing farmers decided to try it next year.

(xi) Due to this scheme, farmers became conversant about the soil preparations, seed rate, dates of sowing, fertilizer applications and fertilizer doses, irrigation schedule and harvesting. They are still not well conversant with seed treatment, weeding and plant protection measures. All these aspects need a fresh deal.

(xii) Higher yield played a dominant role in the identification and ready adoption of wheat varieties. Good taste was another important aspect for the adoption. Thus the higher yielding varieties having good taste were highly preferred. The position of eminence was occupied by Sonalika-1553, WH-147 and UP-308 in the sample districts.

(xiii) The wheat varieties which had sowing period from second half of November to first half of December were largely preferred. It indicated that farmers needed varieties which should have longer sowing span to serve as both timely sown and late sown varieties like Sonalika-1553.

(xiv) Minikit scheme was favoured by the farmers and they treated it beneficial in the identification of higher yielding, varieties adoption of new production technology and in the multiplication of seed for next year.

(xv) It was a general opinion of the farmers that smaller size of minikit plots did not allow the different operations comfortably. Therefore, they desired that the size be increaced to 10 kg.

(xvi) Poor farmers particularly the marginal farmers expressed difficulties in getting the seed for control plots and fertilizers for both the plots. They desired the free

(7) Minikits must be supplied to the farmers in time so that sowing may be done in time. Late supplies do not provide convincing yields from minikit varieties as against the other varieties. Thus late supplies must be avoided. It will be better if the minikits are supplied adequately prior to sowing period.

(8) Both demonstration and control plots should be laid by an extension workers with proper demarcations. He should also pay visits from time to time to guide the farmers. The produce of both the plots must be kept separately and their yields should be obtained separately to indicate the suitability of minikit variety under the given conditions. It will have a convincing impact on the farmers.

(9) Larger number of farmers should be involved under training camps and tour programmes. These should be organized in time.

(10) Number of minikits should be increased to cover larger number of farmers.

(11) Agro-climatic zone should be given due consideration in the development of wheat varieties.

(12) Varieties at the trial stage may not be used for larger distribution but on selective basis only for feed-back purposes.

(13) Vast areas are still unirrigated therefore, the varieties which can do better in the unirrigated or semi-irrigated conditions are greatly needed. Presently varieties suitable for irrigated areas are developed and used for minikits. Thus, when minikits are grown under semi-irrigate

or un-irrigated conditions, these varieties miserably fail to have any impact on the farmers.

(14) Under the production technology more emphasis should be laid on the seed treatment, use of weedicides and plant protetion measures which totally lacked at present.

(15) Specific varieties should be developed which should be successfully grown after the harvest of soybean and paddy crops.

(16) Marginal farmers should be given additional benefits so as to cover the cost of seed for control plots, fertilizers etc.

(17) It is suggested that the scheme should be continued on regular basis so that the farmers may get new varieties in the normal course without any difficulty. This scheme will enable them to maintain their production levels by adopting more promising varieties every year.
