Ad-hoc Study No. 32

REASONS FOR SLOW GROWTH RATES OF PRODUCTION AND YIELDS OF WHEAT IN MADHYA PRADESH

AGRO-ECONOMIC RESEARCH CENTRE
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CHAPTER I

INTRODUCTION

Wheat is one of the important crops of Madhya Pradesh. It occupied 33,75,000 hectares out of the total cropped area of 2,12,12,000 hectares in 1973-74. Thus it accounted for 15.91 per cent of the cropped area. The total production of this crop was 26,01,000 tonnes or 24.98 per cent of the total food grain production of the state in 1973-74. The average yield per hectare in that year was 771 kilogrammes.

The planners and policy makers had expressed that in past years the production of wheat had not been satisfactory and the growth rates of area and yield had slowed down. The Government had also expressed the anxiety to know the factors responsible for the situation. It was, therefore, decided that a study on "Reasons for stagnation or slow rate of growth of production and yields of Wheat" be taken up by various Agro-Economic Research Centres in the States of Punjab, Haryana, Madhya Pradesh and Uttar Pradesh. This Centre initiated the study for Madhya Pradesh in September 1974 with 1966-67 to 1973-74 as reference period.

1.1 Objectives

The specific objectives of the study are:

1. To study the pace of increase in the production of wheat, and
2. To know the factors responsible for the situation.

1.2 Methodology

For studying the pace of increase in the production of wheat for the state as a whole, secondary data published by the Directorate of Economics and Statistics, Govt. of M.P. were used. For the study at the farmers level, data collected from 50 sample households over a period a years through Comprehensive Survey of Cost of Production of Principal Crops were used.

1.3 Sampling Design

For drawing the sample of 50 farmers 5 clusters, each comprising 10 farmers were chosen. The details of the selected villages are given in Table 1.1 .

Table 1.1 Selected villages of wheat clusters

District	Tehsil	Villages in the cluster
Vidisha	Vidisha	Semara, Khari
Sagar	Sagar	Naryawali,Maraimaliya,Basya
Sagar	Sagar	Bindwas,Chaturbhata, Mahuakheda
Tikamgarh	Niwari	Ladwari,Rajapur,Majra
Narsinghpur	Narsinghpur	Kanjai,Baglai,Murdai

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CHAPTER II

TRENDS IN WHEAT PRODUCTION & PRODUCTIVITY

To know the pace of wheat production and productivity in recent years, data for the past 8 years viz. 1966-67 to 1973-74 were analysed. The year 1966-67 being the year of introduction of high yielding varieties was used as a base year.

2.1 Production of Wheat

The total production of wheat during 1966-67 was 10,31,000 tonnes. It increased to 18,81,000 tonnes in 1967-68 or an increase of 82.44 per cent over 1966-67. In the succeeding years the production increased steadily and was 31,89,000 tonnes in 1971-72. In 1972-73, however, it dropped to 22,85,000 tonnes. It was a big set back for the wheat production programme. In the year 1973-74 the production again increased to 26,01,000 tonnes. (Table 2.1) The average production during the 8 year period was 22,29,500 tonnes.

Table 2.1 Production of Wheat in Madhya Pradesh

Year	Production (Thousand tonnes)	Fixed Base Index 1966-67=100		Chain Base Index	
		Index Number	Increase(+) decrease(-)	Index Number	Increase(+) decrease(-)
1966-67	1,031	100.00	-	100.00	-
1967-68	1,881	182.44	82.44	182.44	82.44
1968-69	1,964	190.49	8.05	104.41	4.41
1969-70	2,293	222.41	31.92	116.75	16.75
1970-71	2,592	251.41	29.00	113.04	13.04
1971-72	3,189	309.31	57.90	123.03	23.03
1972-73	2,285	221.63	-87.68	71.65	-28.35
1973-74	2,601	252.28	30.65	113.83	13.83

In terms of index numbers (1966-67 =100) the wheat production was 209.31 per cent higher in 1971-72 as compared to that in 1966-67. In 1972-73

the index was 221.63. At the end of the reference period the production was 152.28 per cent higher than the base year.

The study of trend of wheat production was made by fitting a curve to the index numbers. The equation used was:

$$y = a + bx$$

where y stood for the expected value of the production index corresponding to given year x. The regression equation fitted to the data is given below.

$$y = 128 + 19.61\ x$$

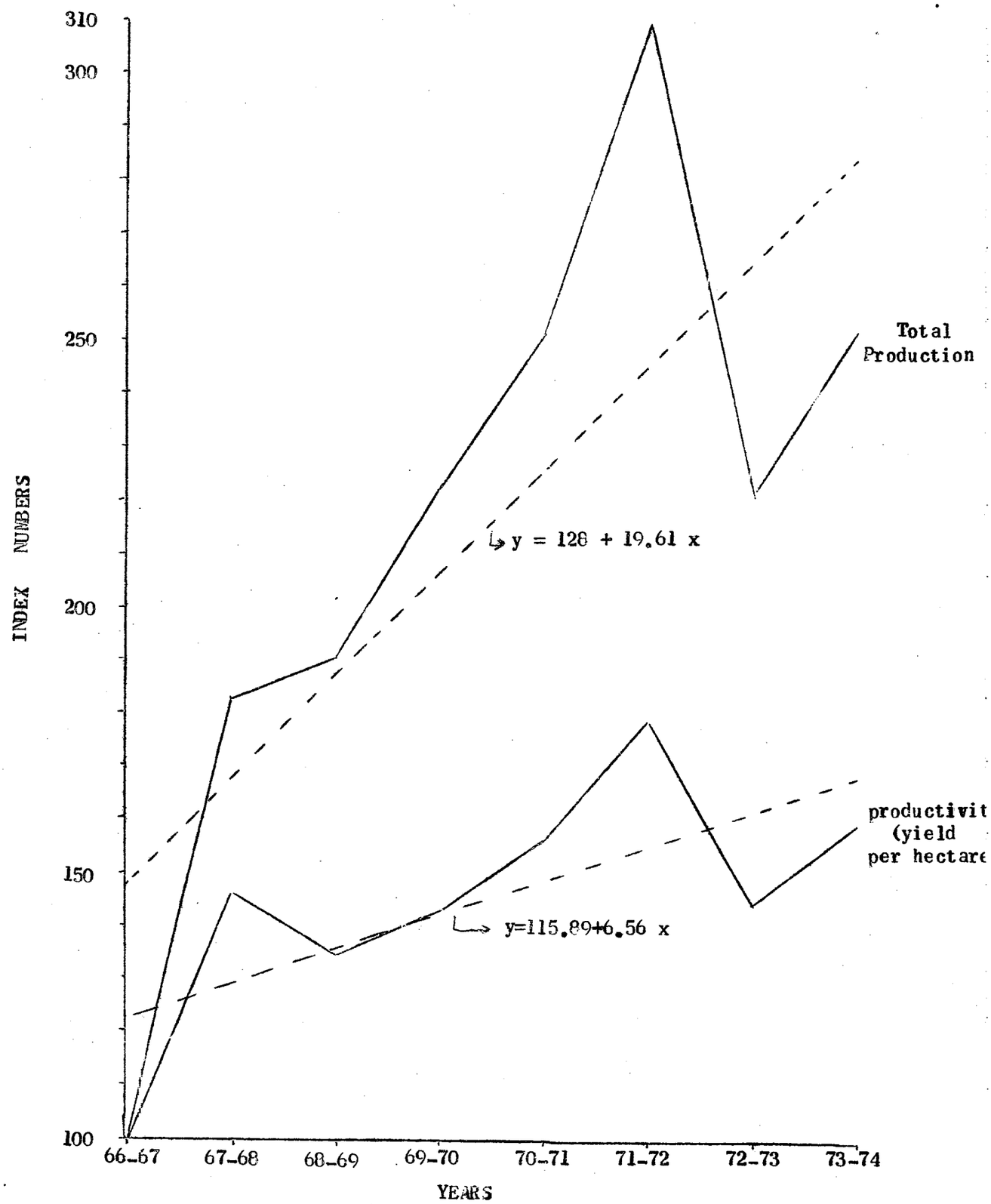
Thus the average rate of increase was 19.61. The expected values of the production were calculated with the help of the above equation and the regression line was drawn (Fig.1)

Another important point to be studied was the rate of growth from year to year. This is explained by chain base index numbers as given in Table 2.1 It would be observed that the rate was as high as 82.44 in 1967-68. In 1968-69 it was only 4.41. During the next three years it was 16.75, 13.04 and 23.03 respectively. In 1972-73 as the production was less than that in the preceding year, the rate was - 28.35. In the year 1973-74 it increased to 13.83. (Table 2.1)

It may be inferred that although the total production of wheat increased from year to year from 1966-67 to 1971-72, the rate of growth was very slow. The year 1972-73 was a positively bad year when the rate of growth was - 28.35.

Fig 1

Production and productivity of wheat in M.P.
(Base year - 1966-67)



2.2 Productivity (Yield per hectare) of wheat

Productivity is measured in terms of yield (kilogrammes) per hectare.

The average yield for the eight year period was 705 kilogrammes. The yield in the year 1966-67 was 485 kg. and increased to 708 kg. in 1967-68. In the next year (1968-69) however, it decreased to 652 kg. In the subsequent three years the yield maintained an upward trend and was 870 kg. in 1971-72. In 1972-73 it suddenly dropped to 697 kg. but again increased to 771 kg. in 1973-74. (Table 2.2.)

Table 2.2 Yield per hectare of wheat in Madhya Pradesh

Year	Yield (kg.per hectare)	Fixed Base Index (1966-67=100)		Chain Base Index	
		Index Number	Increase(+) decrease(-)	Index Number	Increase(+) decrease (-)
1966-67	485	100.00	-	-	-
1967-68	708	145.98	45.98	145.98	45.98
1968-69	652	134.43	-11.55	92.09	(-)7.91
1969-70	695	143.30	8.87	106.59	6.59
1970-71	762	157.11	13.81	109.64	9.64
1971-72	870	179.80	22.69	114.17	14.17
1972-73	697	143.71	-36.09	80.11	(-)19.89
1973-74	771	158.97	15.26	110.62	10.62

The study of trend of productivity was made by fitting a curve to the index numbers. The regression equation fitted to the data was $y=115.89 + 6.56x$

Thus the average rate of increase was 6.56. The expected values of the yield were calculated with the help of the above equation and the regression line was drawn. (Fig.1)

To study the rate of growth from year to year, chain base index numbers were calculated. It was noticed that the rate was 45.98 in 1967-68. In the year 1968-69 it was (-) 7.91 since the yield was lower in that year than the preceding year. The rate was 6.59, 9.64 and 14.17 in thesubsequent three years but was (-) 19.89 in 1972-73. It again increased to 10.62 in 1973-74. Thus it is observed that the rate of growth was increasing during the years 1969-70 to 1971-72 only.

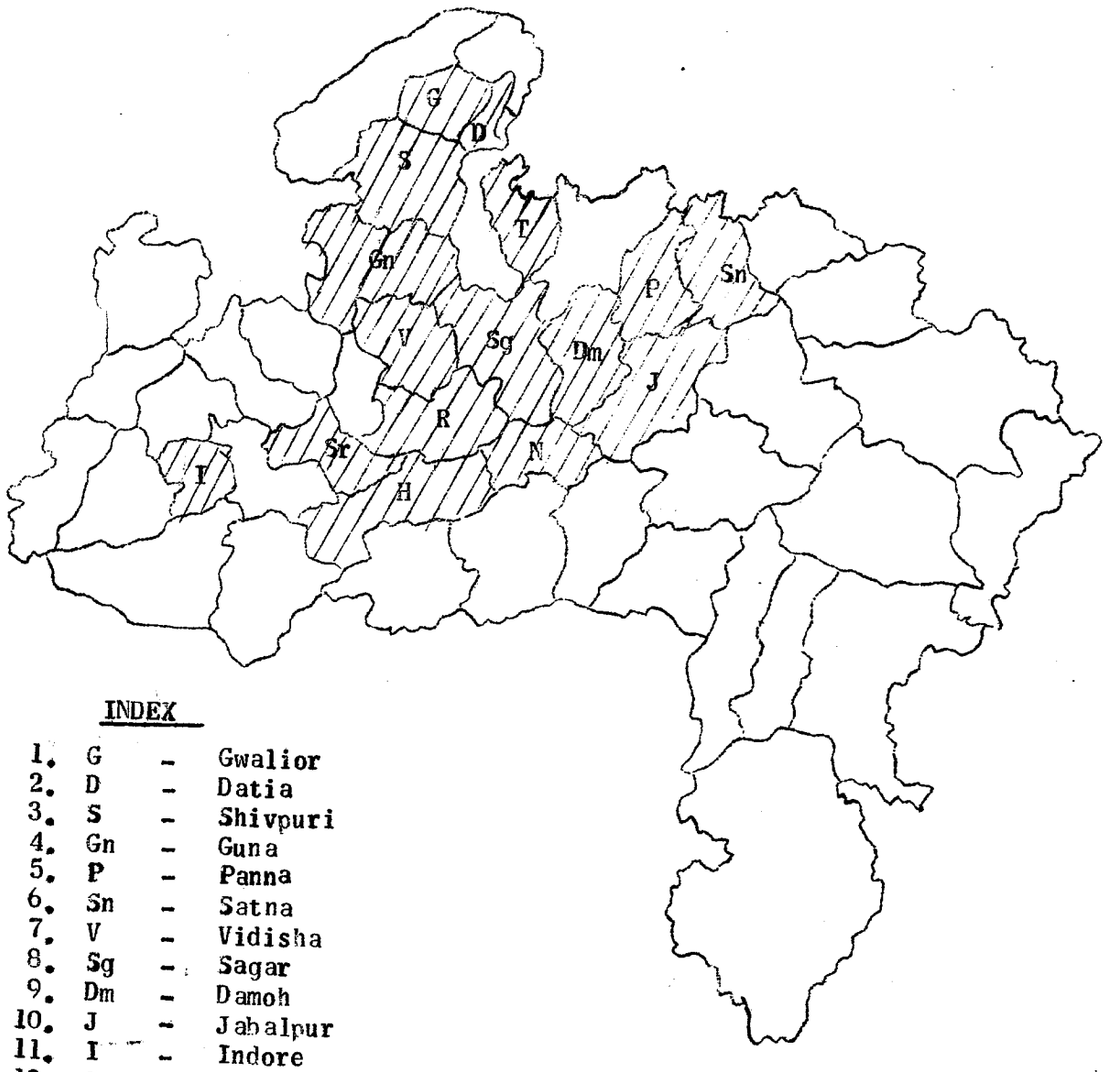
The trend of yield, like that of the total production, was increasing till 1971-72, except for the year 1968-69 when it was lower than the preceding year. In 1972-73, the total production and yield both dropped suddenly and again increased in the year 1973-74.

2.3 Wheat Districts

Wheat districts were identified as those having more than 20.0 per cent of the cropped area under wheat. There were 15 wheat districts. They were:Gwalior, Datia, Shivpuri, Guna, Panna, Satna, Vidisha, Sagar,Damoh, Jabalpur,Indore, Sehore, Raisen, Hoshangabad, and Narsinghpur. In addition, Tikamgarh district was included due to its importance in the H.Y.V. programme of the state. (see the map)

The production and productivity of wheat for these 16 districts were studied. As regards total

Wheat Districts of Madhya Pradesh



INDEX

1.	G	–	Gwalior
2.	D	–	Datia
3.	S	–	Shivpuri
4.	Gn	–	Guna
5.	P	–	Panna
6.	Sn	–	Satna
7.	V	–	Vidisha
8.	Sg	–	Sagar
9.	Dm	–	Damoh
10.	J	–	Jabalpur
11.	I	–	Indore
12.	Sr	–	Sehore
13.	R	–	Raisen
14.	H	–	Hoshangabad
15.	N	–	Narsinhpur
16.	T	–	Tikamgarh

production of wheat it was observed that in all the districts it generally increased from 1966-67 to 1971-72. The years in which the production declined during this period varied from district to district. Thus in Guna, Satna and Jabalpur production decreased in 1968-69 than the preceding year. In Gwalior, Datia, and Sagar the year of lower production was 1969-70. In Shivpuri, Damoh and Indore, on the other hand, theproduction declined in 1970-71. In Panna district production dropped in two years viz 1968-69 and 1970-71 whereas in Vidisha the production lowered in two successive years viz. 1969-70 and 70-71. Narsinghpur and Tikamgarh were the districts in which the production decreased in 1971-72. The remaining three districts of Sehore, Raisen and Hoshangabad showed an uninterrupted increasing trend during 1966-67 to 1971-72.

The year 1972-73 was a bad year and wheat production decreased in all the districts except Tikamgarh.

In 1973-74 wheat production again increased in 10 districts. The districts were: Gwalior, Shivpuri, Guna, Vidisha, Sagar, Jabalpur, Indore, Sehore, Hoshangabad and Narsinghpur. In five other districts the production further declined in 1973-74. The districts were Datia, Panna, Satna, Damoh and Raisen. In Tikamgarh, however, the production declined in 1973-74 as compared to 1972-73. (Table 2.3)

As regards yield per hectare it was observed that yield was higher in 1967-68 as compared to the base year 1966-67 in all the districts. But in 1968-69 yield

went down in 12 out of 16 districts. In Hoshangabad and Shivpuri districts the yields were lower in two consecutive years viz. 1969-70 and 1970-71. In Indore yield was lower in 70-71 and that in Narsinghpur in 71-72.

Yield continued to be lower in 1969-70 in seven out 12 districts in which it had dropped in 1968-69. As in the case of total production, yield was lower in 1972-73 in all the districts except two districts viz. Narsinghpur and Raisen. In both the districts yields continued to increase since 1971-72. After the year 1972-73 the yields again increased in 10 districts but continued to decline in other 4 districts. As mentioned above, in Narsinghpur and Raisen the yields picked up ever since 1971-72. (Table 2.4)

To sum up, the total production of wheat increased from year to year during the period 1966-67 to 1971-72. In 1972-73 it dropped down considerably but again increased in the year 1973-74. The rate of growth from year to year was very slow and was negative in the year 1972-73. The yield followed a similar trend except that it was lower in 1968-69 than the preceding year. In 1972-73 both the total production and yield lowered suddenly but increased in 1973-74. The total production and yield in different districts followed the similar trends with minor variations.

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Table 2.3 Index numbers of total wheat production in different districts

Year/ Districts	Sagar	Damoh	Jabalpur	Hoshangabad	Narsinghpur	Gwalior	Shivpuri	Guna	Vidisha
1966-67	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1967-68	232.04	276.09	182.00	133.15	180.85	189.09	237.03	232.23	159.19
1968-69	239.34	291.05	164.68	150.86	273.63	194.97	294.83	221.33	179.94
1969-70	235.88	333.22	197.27	158.85	287.61	135.25	313.02	232.64	162.29
1970-71	254.63	254.68	265.26	160.40	374.83	206.18	290.22	306.78	158.20
1971-72	327.15	319.52	265,52	239.92	289.77	220.86	540.07	370.13	210.67
1972-73	273.39	275.40	242.08	172.85	286.89	114.46	275.50	318.43	170.17
1973-74	298.21	262.37	262.17	193.26	333.74	178.55	322.04	399.67	240.63

(Contd..... Table 2.3)

Indore	Satna	Datia	Tikamgarh	Panna	Sehore	Raisen
100.00	100.00	100.00	100.00	100.00	100.00	100.00
143.24	652.92	349.99	192.18	225.51	125.74	148.17
177.39	255.58	450.73	208.61	139.47	135.51	161.90
323.26	659.83	326.94	263.41	315.38	167.68	166.98
317.25	730.55	496.09	326.45	287.89	182.57	172.80
350.61	868.89	511.73	320.61	355.92	190.88	409.54
96.41	680.03	473.35	348.62	311.94	88.06	203.32
154.79	434.44	362.47	199.21	267.28	137.42	160.30

Table 2.4 Index numbers of yield of wheat in different districts

Year/ Districts	Sagar	Damoh	Jabalpur	Hoshangabad	Narsimhpur	Gwalior	Shivpuri	Guna	Vidisha
1966-67	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
1967-68	221.89	206.81	115.00	126.62	116.36	133.72	158.04	218.18	160.19
1968-69	196.15	184.43	107.71	136.36	145.45	127.37	175.36	151.03	146.54
1969-70	180.18	197.08	118.54	128.35	148.93	86.77	160.13	140.47	123.46
1970-71	196.45	146.47	145.00	118.61	174.38	127.24	149.06	197.36	123.46
1971-72	248.22	181.02	136.24	168.40	155.70	125.55	234.86	231.08	166.73
1972-73	203.55	159.37	122.50	141.56	160.66	83.53	143.42	224.05	136.54
1973-74	235.21	191.24	159.58	163.20	193.55	119.20	150.94	238.12	196.73

(Contd.....Table 2.4)

Indore	Satna	Datia	Tikamgarh	Panna	Sehore	Raisen
100.00	100.00	100.00	100.00	100.00	100.00	100.00
118.41	372.07	211.17	131.75	139.48	102.74	138.46
130.87	173.42	201.96	119.45	81.56	85.62	122.91
220.04	278.38	142.74	118.82	143.13	98.21	120.23
212.64	376.13	214.53	143.53	131.48	100.14	120.74
230.14	287.84	210.61	132.60	131.83	100.68	126.25
93.14	259.01	205.59	133.23	124.70	91.23	131.10
146.21	213.96	198.32	110.30	110.61	118.63	145.82

CHAPTER III

REASONS FOR THE SLOW RATE OF PRODUCTION

From the foregoing chapter it becomes evident that there was no stagnation as such in wheat production in M.P. The production increased from year to year from 1966-67 to 1971-72. However, the rate of growth was very slow. Another disturbing fact was the sudden drop in both production and productivity in 1972-73. In this chapter an attempt has been made to find out the reasons for these phenomena.

Various factors such as rainfall, area under wheat, coverage of high yielding varieties, irrigation and fertilizer consumption were visualised to be affecting the production of wheat and were tested to know the extent to which these could be responsible for the phenomena.

3.1 Rainfall

Although wheat is a rabi crop its germination and growth depend on the moisture in the soil which in turn depends on the rainfall received during kharif and also in rabi. In the absence of a good rainfall the area under wheat gets reduced and the production and productivity decrease. A significant proportion of wheat area in Madhya Pradesh is under haveli cultivation. In this type of cultivation, rain water is stored by constructing small bunds across the slopes during kharif season. Land is kept fallow in kharif and wheat is sown in rabi. Thus the germination and growth of wheat in these areas totally depend on the quantum of rainfall received in kharif.

Only in regions having high proportion of area irrigated by assured sources; the area under wheat, the production and productivity remain unaffected despite insufficient rains. Unfortunately, irrigated area forms only 19.99 per cent of the total wheat area in this state. Naturally, insufficient rains in a particular year affect the wheat production in that year.

In 1972-73 the rainfall was very low in most of the areas of the state and drought conditions prevailed. This affected wheat production adversely (Table 3.1) The relationships between rainfall and production, and rainfall and yield were tested by calculating the coefficients of correlation. It was noticed that the coefficient of correlation between the total rainfall and wheat production was 0.77 and was significant and 5% level of significance and that between rainfall and yield was 0.84 and was significant at 1% level of significance.

Table 3.1 Rainfall, production and productivity

Year	Rainfall (mm.)	Production ('000 tonnes)	Yield (kg. per hect)
1966-67	798	1031	485
67-68	1181	1881	708
68-69	897	1964	652
69-70	1210	2293	695
70-71	1164	2592	762
71-72	1282	3189	870
72-73	934	2285	697
73-74	1312	2601	771

This explains the importance of rainfall as a factor influencing wheat production and productivity.

3.2 Area Under wheat

The area under wheat in 1966-67 was 21,26,000 hectares. It increased from year to year and was 36,65,000 hectares in 1971-72. In 1972-73, however, it decreased to 32,77,000 hectares. Again, in 1973-74 it increased to 33,75,000 hectares. (Table 3.2) It clearly shows that the production of wheat followed the trend of area.

Table 3.2 Area and production of wheat

Year	Area (thousand hectares)	Production (thousand tonnes)
1966-67	2126	1031
1967-68	2658	1881
1968-69	3011	1964
1969-70	3348	2293
1970-71	3403	2592
1971-72	3665	3189
1972-73	3277	2285
1973-74	3375	2601

The relationship was tested by calculating the coefficient of correlation which was 0.96. It shows that production varied with the area and that one of the reasons for the lower production in 1972-73 was lower area under the crop. The shrinkage in area was in turn, due to low rainfall in that year. (see Table 3.1)

It follows that extension of area under wheat would be one of the ways of increasing production.

3.3 Coverage of High Yielding Varieties

The area under high yielding varieties in 1966-67 was only 8,000 hectares. It increased from year to year and was 2,90,000 hectares in 1971-72. Even with this increase in area the percentage of area under high yielding varieties to total wheat area was only 7.91 1971-72. The percentage increased to 13.32 in 1972-73 and 18.73 in 1973-74 (Table 3.3)

Table 3.3 Coverage of high yielding varieties of wheat

(Area-Thousand hectares)

Year	Total area under wheat	Area under H.Y.Varieties	Percentage of H.Y.Varieties area to total wheat area
1966-67	2,126	8	0.38
1967-68	2,658	46	1.72
1968-69	3,011	82	2.73
1969-70	3,348	149	4.46
1970-71	3,403	201	5.91
1971-72	3,665	290	7.91
1972-73	3,277	437	13.32
1973-74	3,375	632	18.73

Thus it is observed that for the most of the part of the reference period the proportion of area under high yielding varieties was quite low and this can be identified as a reason for slow growth rate. It may be added that although there was an increase in the percentage of H.Y.V. area in 1973-74 bad weather conditions nullified its effect on production of wheat.

For an increased rate of growth the area under high yielding varieties must enlarge at a faster rate.

3.4 Irrigation

Irrigation is the only way to forestall the effects of vagaries of monsoon and for the success of high yielding varieties of wheat timely, adequate and assured irrigation is a must. This is one of the limiting factors for the spread of area under high yielding varieties and consequently, the production. In Madhya Pradesh the percentage of irrigated area under wheat was 10.39 in 1966-67. It increased from year to year; still it was only 19.99 per cent in 1973-74 (Table 3.4)

Table 3.4 Irrigated area under wheat

(Area-thousand hectares)

Year	Total area under wheat	Irrigated area	Percentage of irrigated area to total wheat area
1966-67	2126	221	10.39
1967-68	2658	282	10.60
1968-69	3011	340	11.30
1969-70	3348	420	12.55
1970-71	3403	521	15.30
1971-72	3665	652	17.80
1972-73	3277	687	20.97
1973-74	3375	675	19.99

It clearly indicates that low percentage of irrigated area and its slow expansion have been the important reasons for the slow growth rate.

3.5 Fertilizer Consumption

Fertilizer consumption in M.P. is very low. Against the average all India consumption of 17.4 kg. per hectare that for M.P. was only 6.7 kg. in 1973-74.

The consumption per hectare for the wheat growing states of Punjab, Haryana and U.P. was 58.2, 22.8 and 20.3 respectively. (Table 3.5)

Table 3.5 Consumption of fertilizers per hectare 1973-74

(Figures-Kilogrammes)

State	N	P	K	Total
Punjab	41.4	12.8	4.0	58.2
Haryana	18.6	3.3	0.9	22.8
Uttar Pradesh	14.3	3.8	2.2	20.3
Madhya Pradesh	4.2	2.1	0.4	6.7
All India	11.2	4.0	2.2	17.4

Thus the fertilizer consumption in this state was lowest among the wheat growing states. In the year 1966-67 the fertilizer consumption was only 1.1 kg. per hectare. It increased at a very slow rate of 0.9 kg. per hectare during the reference period. (Table 3.6)

Table 3.6 Consumption of fertilizers per hectare, M.P.

(Figures-Kilogrammes)

Year	N	P	K	Total
1966-67	0.8	0.3	*	1.1
1967-68	0.7	0.3	0.1	1.1
1968-69	1.1	0.5	0.1	1.7
1969-70	1.6	0.7	0.1	2.4
1970-71	2.5	1.2	0.2	3.9
1971-72	3.9	1.7	0.3	5.9
1972-73	4.4	1.8	0.4	6.6
1973-74	4.2	2.1	0.4	6.7

* Negligible

Data on fertilizer consumption was not available for wheat crop separately but for all the rabi crops taken together. Even assuming that the entire quantity in the rabi season was applied to wheat crop alone the rate of application came to a mere 17,21 and 22 kg. per hectare during the years 1971-72, 1972-73 and 1973-74 respectively. (Table 3.7)

Table 3.7 Consumption of fertilizers, rabi season

Particulars	1971-72	1972-73	1973-74
Quantity consumed (Tonnes)	62,948	70,100	76,372
Area under wheat (Hectares)	36,65,000	32,77,000	33,75,000
Quantity per hectare (Kilogrammes)	17	21	22

Obviously, low rate of fertilizer application and its slow rate of increase during the reference period are the factors responsible, to a very great extent, for the slow rate of growth of wheat production. These factors are of critical importance in the case of high yielding varieties which respond to the heavy doses of fertilizers.

3.6 Conclusion

The slow rate of growth of wheat production can be attributed mainly to the slow rates of growth of area under wheat, coverage of high yielding varieties, irrigated area and fertilizer consumption. Production and productivity in a particular year depend to a large extent on the rainfall.

The sudden drop in production during 1972-73 was mainly due to low rainfall and drought conditions during that year. This resulted in the reduction of area under wheat and consequently, the low production. Thus, for an accelerated rate of growth of wheat production it is very essential to bring more area under wheat, increase the coverage of high yielding varieties and irrigation, and increase the use of fertilizers.

Planning Commission, while fixing the target for food grain production for the fifth plan period has also laid stress on these points.

3.7 Fifth Five Year Plan Strategy

"The Planning Commission is believed to have fixed a target of 124.50 million tonnes for food grain production for the fifth plan period..."

"The Commission has worked out a seven point strategy for achieving this revised production target. The major thrust of the strategy is to step up the gross cropped area under food grains by about 4.5 million hectares in the plan period raising the area under food grain cultivation to about 130 million hectares by 1978-79-the final year of the fifth plan.

The second approach is to increase the area under minor irrigation by six million hectares and of major and medium irrigation by over five million hectares"

"Increased stress would be given for use of chemical fertilizers.

Another major plank in the strategy worked out is that the area under high yielding verieties of cereals will be increased from 25 million hectares at the beginning to 40 million hectares at the end of the fifth plan period....."

Other measures are: Command Area Development Programmes in 60 major irrigation commands for intensive crop production, expansion in the institutional credit, etc.[1]

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[1] A news paper report dated August 8, 1976

CHAPTER IV

PERFORMANCE OF SELECTED FARMS

As a part of the study data of 50 sample households over a period of years collected through 'Comprehensive survey of Cost of Production of principal crops' were analysed. In this chapter results of this exercise are presented.

It may, however, be mentioned that the results have a limited applicability due to the following reasons:

1. The scheme on the Cost of Production was initiated only in 1970-71. Therefore we do not have the data for the years 1966-67 to 1969-70 for the selected farms.

2. The data in the scheme were not collected with the objective of probing into the reasons for slow rates of growth on the selected farms.

A fresh survey of the sample farms was therefore conducted at the beginning of this year.to ascertain the reasons for constant or low yields. It was like an opinion survey and could not bring about the farmers' appraisal about the slow rates of growth during particular years of the reference period as this survey was conducted two years after the end of the last reference year.

4.1 Size of farms

As already mentioned, the sample contained 50 farms. The area of these farms varied from 346.34 hectares to 368.84 hectares in different years. The average size of farms was 7.03 hectares in the year 1970-71

and increased to 7.37 hactares in 1971-72. It decreased to 6.92 hectares in 1972-73 but again increased to 7.34 hectares in 1973-74.

The irrigated area on the selected farms increased steadily from 22.93 hectares in 1970-71 to 65.11 hectares in 1973-74. Consequently the percentage of irrigated area to total area also increased from year to year. It was 6.52 per cent in the year 1970-71. It increased to 9.33, 15.19 and 17.73 per cent in the subsequent years respectively.(Table 4.1)

Table 4.1 Size of farms and irrigation

Year	No. of farms	Net operated area (Hect.)	Average size (Hect.)	Total irrigated area (Hect.)	Percentage of irrigated area to net operated area
1970-71	50	351.60	7.03	22.93	6.52
1971-72	50	368.84	7.37	34.44	9.33
1972-73	50	346.34	6.92	52.64	15.19
1973-74	50	367.23	7.34	65.11	17.73

4.2 Area Under Wheat

It is interesting to note that the area under wheat decreased year after year. It was 260.08 hectares in 1970-71 and scaled down to 205.26 in 1973-74. This resulted in the fall of percentage of wheat area to gross cropped area from 73.73 in 1970-71 to 55.21 in 1973-74. Of the total area under wheat only 2.67 per cent was covered by high yielding varieties in 1970-71. The percentage increased to 4.87 in 1971-72 and 28.88

in 1972-73. It decreased to 7.60 per cent in 1973-74. (Table 4.2) Thus the percentage of area under high yielding varieties was not only low but also less than the state average (Table 3.3) in all the years except in 1972-73.

Table 4.2 Area Under wheat

Year	Area under wheat (hect.)	Gross cropped area (Hect.)	Percentage of wheat area to gross cropped area	Area under H.Y.V. of wheat	Percentage of H.Y.V. to total area of wheat
1970-71	260.08	352.72	73.73	6.95	2.67
1971-72	244.53	373.84	65.41	11.90	4.87
1972-73	233.76	387.33	60.35	67.51	28.88
1973-74	205.26	371.78	55.21	15.59	7.60

4.3 Irrigation

Although the total wheat area declined the area under irrigation enlarged continuously from 21.25 hectares in 1970-71 to 53.59 hectares in 1973-74. Therefore the percentage of irrigated wheat area increased from 8.17 in 1970-71 to 26.10 in 1973-74. (Table 4.3) However, it was lower than the state average in the first three years and higher in the last reference year. (see table 3.4 also)

Table 4.3 Irrigation in wheat crop

Year	Area under wheat (Hectares)	Irrigated wheat area (Hectares)	Percentage of irrigated area to total wheat area
1970-71	260.08	21.25	8.17
1971-72	244.53	30.49	12.46
1972-73	233.76	47.25	20.21
1973-74	205.26	53.59	26.10

4.4 Wheat Production and Productivity

The total production of wheat on the selected farms was 2,210.02 quintals in 1970-71. It increased to 2,289.12 quintals in 1971-72 and 2,321.90 quintals in 1972-73. However, it dropped to 1,836.75 quintals in 1973-74. The average rate of growth was (-) 4.93 per cent per year.

It was also seen that the production of high yielding varities was more than the proportionate area occupied by them (Table 4.4) See table 4.3 also.

Table 4.4 Production of wheat

(Production-quintals)

Year	Total wheat production	H.Y.V.		Local Varieties	
		Production	% to total	Production	% to Total
1970-71	2,210.02	130.50	5.90	2,079.52	94.10
1971-72	2,289.12	253.45	11.07	2,035.67	88.93
1972-73	2,321.90	971.27	41.83	1,350.63	58.17
1973-74	1,836.75	186.25	10.14	1,650.50	89.86

The yield of wheat was 8.49 quintals per hectare in 1970-71. It increased to to 9.36 quintals and 9.93 quintals in the subsequent two years respectively. In 1973-74 the yield dropped to 8.94 quintals. Thus the average rate of growth was 2.32 per cent only. The yields of high yielding varieties were higher than the local varieties by 45.43 to 159.32 per cent in different years. (Table 4.5)

Table 4.5 Yield of wheat

(Quintals per hectare)

Year	Total wheat	H.Y. Varieties	Local Verieties	Percentage of H.Y.V. over local varieties
1970-71	8.49	18.77	8.21	128.62
1971-72	9.36	21.29	8.75	159.32
1972-73	9.93	14.38	8.12	75.15
1973-74	8.94	11.94	8.70	45.43

4.5 Consumption of Fertilizers

In the first year of the study (1970-71) no fertilizer was reported to have been used on the selected farms. In the succeeding years the consumption was 1.0, 13.3 and 9.7 kilogrammes per hectare respectively (Table 4.6)

Table 4.6 Consumption of fertilizers

(kg. per hectare)

Year	N	P	K	Total
1970-71	-	-	-	-
1971-72	0.2	0.6	0.2	1.0
1972-73	8.2	4.2	0.9	13.3
1973-74	6.0	3.1	0.6	9.7

Thus the level of consumption for 1973-74 was lower than all the wheat growing states as well as that for the average of the country. It was lower than even the state average in 1971-72 (see tables 3.5 and 3.6).

4.6 Reasons for slow Rate of Production

It is observed that the average rate of growth of total production was negative and that of productivity was only 2.32 per cent per annum on the selected farms.

In the previous chapter it has been noted that in M.P., the slow rate of growth of wheat production was due to slow rates of growth of area under wheat, coverage of high yielding varieties, irrigated area and fertilizer consumption.

Foregoing discussion indicates that these reasons hold good for the selected farms also.

The sample survey conducted at the beginning of this year put forward following reasons in addition to those mentioned above.

1. Failure of rains during kharif (Less of moisture at the time of sowing)
2. Incidence of pests and diseases
3. Frost
4. Late sowing
5. Inferior quality of seed
6. Untimely rains during later stages of growth

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