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PREFACE

The state of Madhya Pradesh is endowed with a variety of soils and agro climatic conditions that are conducive to grow various horticultural crops. However, state is far behind many states in terms of area and production of horticultural crops. The total under of horticultural crops contributed only 2.5 per cent to the gross cropped area of the state. Among vegetables, potato alone contributed 24.7 per cent of the total area.

Unfortunately a big quantum of horticultural produce gets perished or spoilt due to absence of adequate post harvest infrastructural facilities, therefore, National Horticultural Board initiated various programmes to control the post harvest losses and ultimately give better remuneration to the farmers.

However, NHB thought that these units did not perform as efficiently as these were expected to perform and desired to analyse these units before deciding further investment in this sector. Therefore, Ministry of Agriculture, Government of India asked this Centre along with AERC, Pune, Ludhiana and Banglore to conduct this study with a objective to analyse the NHB's soft loan scheme for the Development of Post Harvest Infrastructure for Horticultural crops.

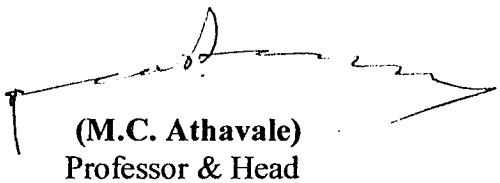
This study was conducted in Indore, Ujjain and Shajapur districts in accordance with the guidance and suggestion provided by the coordinating AERC, Pune and state horticulture department officials.

The post harvest infrastructure facilities generated in the area under soft loan scheme were cold storage for potato crop since the area is predominantly potato growing. These units were started in the year 1996-97 and therefore, it was too early to assess the impact on income, cropping pattern and employment of the member farms. However, these units definitely helped the member farmers to withhold the produce for deferred sale and it is suggested that NHB should finance PHI facilities in other unrepresented area.

I thank the Ministry of Agriculture, Govt. of India for providing this opportunity to the Centre. I also express my deep sense of gratitude to all the state govt. officials for extending cooperation without which this study would not have been possible. The help extended by selected PHI units and farmers is deeply appreciated.

Dr. Ashutosh Shrivastava, Research Officer and Officer-in Charge of the study was associated with the study from the stage of initiation to drafting and its circulation. He did the field work alongwith Shri S.K. Upadhye and Shri C.K. Mishra, Junior Computors of the Centre. Mr. Kamta Prasad did the tabulation and Mr. Sikandar Khan did the computer typing under the guidance of Dr. Ashutosh Shrivastava. All of them worked very hard in the completion of the study.

I thank one and all.



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CHAPTER I

INTRODUCTION

1.1 Horticulture in India

Horticulture including fruits, vegetables, and spices play very vital role in the Indian agriculture. The Indian agriculture sector has been characterised by predominance of field crops with low yields, low prices and with lower employment generation capacity. Moreover, these crops are low in nutritional value and do not provide the required nutrients. These can be supplemented by consumption of various fruits and vegetables. Horticultural crops provide more calories and nutrients required in human diet than the field crops per unit area. Further, the perennial crops namely fruits and plantation crops as components of social forestry help maintaining the ecological balance and the fight against the pollution. Horticultural crops particularly fruit crops have great export potential and can earn foreign exchange in sizeable quantities, if the existing resources are tapped to a greater extent.

Area under horticultural crops in the country is about 145 lakh hectares constituting nearly 7.0 per cent of gross cropped area of the country. The estimated production of horticultural crops is nearly 119 lakh tonnes contributing over 19 per cent of the total crop production of country. The data available on the horticultural crops shows that the aggregate area under these crops increased from 118.97 lakh hectares in 1984-85 to 145.02 lakh hectares in 1994.95. Similarly, the production of these crops also increased from 907.70 lakh tonnes in 1984-85 to 1,92.35 lakh tonnes in 1994-95 (Table 1.1).

Table 1.1 Area and production horticultural crops in India.

(Area in lakh hectares, production in lakh tonnes)

Commodity	1984-85		1994-95		Percentage increase over 1984-85	
	Area	Production	Area	Production	Area	Production
Fruits	25.40	237.60	35.71	238.35	40.60	0.32
Vegetables	58.00	608.80	59.70	686.82	2.93	12.81
Spices	16.78	12.70	24.01	24.66	43.08	94.17
Coconut	11.90	44.57	16.90	85.62	42.00	92.10
Cashew	5.02	2.11	6.35	4.18	26.50	98.10
Arecanut	1.87	1.92	2.35	2.45	25.67	26.60
Total	**118.97**	**907.70**	**145.02**	**1,192.35**	**21.90**	**31.36**

Source : Production year book 1997, National Horticulture Board, Ministry of Agriculture

Today India is the second largest producer of the vegetables with 13 per cent share after China and the largest producer of the fruits with 10 per cent share in the world production. These (fruits and vegetables) together contributed 90.2 per cent of the horticulture production and 65.8 per cent of the horticulture area in India. India is the largest producer of mango, banana, cashew, coconut, chilly, ginger, coriander and cauliflower[1]. Floriculture and mushroom have emerged as fast growing commodities both for home consumption and export. India is also a major flowers growing country with an area of 35,000 hectares.

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1. Kaul, G.L. "Horticulture in India- Production, Marketing & Processing, Indian Journal of Agricultural Economics, Vol.52 (3) 1997, pp.561-573

1.2 Horticulture in Madhya Pradesh

Madhya Pradesh is way behind than other states like Karnataka, Kerala, Uttar Pradesh, Bihar and Punjab in terms of area and production of fruits, vegetables and spices. The total area under fruits, vegetables and spices was 59.7 thousand hectares, 202.9 thousand hectares and 262.1 thousand hectares respectively in 1996-97. The area under flowers was negligible. Horticultural crops contributed about 2.5 per to the gross cropped area in the state.

Among the vegetables, potato alone contributed 24.7 per cent to the total area under vegetables, followed by tomato (13.01 per cent) and onion (11.58 per cent). Among the fruits, mango and banana each contributed 28.24 per cent and 28.12 per cent to the total area under fruits in state, respectively.

As compared to fruits and vegetables, spices found favour with farmers. The area under spices was almost half of the total area under horticultural crops. Coriander (51.12 per cent) was the most popular spice among the horticulture farmers followed by chilly (18.5 per cent) and garlic (12.9 per cent) respectively (Table 1.2).

Table 1.2 Area under horticultural crops in Madhya Pradesh

Crops	1987-88		1996-97		Change from 1987-88 to 1996-97	
	Area (000 ha)	Percentage	Area (000 ha)	Percentage	Area (000 ha)	Percentage
A Fruits						
Mango	20.90	37.73	17.15	28.72	(-) 3.75	(-) 17.95
Guava	7.50	19.53	7.25	12.12	(-) 0.25	(-) 3.35
Banana	12.40	22.39	16.83	28.20	4.43	35.72
Citrus	8.10	14.62	11.10	18.60	3.00	37.03
Other fruits	6.50	11.73	7.38	12.36	0.88	13.54
Total	55.40	100.00	59.70	100.00	4.30	7.76
B Vegetables						
Potato	30.20	21.25	50.10	24.69	19.90	65.90
Onion	17.10	12.03	23.50	11.58	6.40	37.43
Tomato	N/A	N/A	26.40	13.01	----	----
Other vegetables	94.80	66.72	102.90	50.72	8.10	8.54
Total	142.10	100.00	202.90	100.00	60.80	42.78
C Spices						
Chilly	41.40	20.10	48.50	18.50	7.10	17.15
Ginger	2.60	1.26	3.70	1.41	1.10	42.30
Garlic	40.30	19.58	34.00	12.97	6.30	15.63
Turmeric	0.50	0.24	0.70	0.26	0.20	40.00
Coriander	100.10	48.62	134.00	51.14	33.90	33.87
Other spices	21.00	10.20	41.20	15.72	20.20	96.19
Total	205.90	100.00	262.10	100.00	56.20	29.18
D Flowers	-----	----	1.40	100.00	-----	----
Total area	403.4	----	526.10	----	122.70	30.41

Source : Directorate of Horticulture, Government of Madhya Pradesh

1.3 Role in P.H.I. in horticulture development

Despite all the good records in horticulture, India is losing nearly 20 to 30 per cent of the total horticultural commodities produced annually, primarily because of lack of proper infrastructure and cold storage facilities, pre-cooling units, refrigerated transport vehicles, modernised market places, market information, quality control facilities etc.and above all, a well tested post harvest handling system. It is estimated by several researchers that the total spoilage of fruits and vegetables in India due to inadequate post harvest handling, storage, transport etc. is 25-30 per cent of the total production which is worth more than Rs.3,000 crores annually[1].

Looking to all these the Govt. of India allocated Rs.1,000 crores for this sector during the VIII plan and the National Horticulture Board (NHB) started an ambitious programme with an allocation of Rs.200 crores. Based on experience gained during the seventh plan and subsequent annual plans, government substituted old programmes with new programmes, new concepts and increased allocations. Hitech post harvest infrastructure and new concepts in marketing are being promoted. Under these schemes soft loan is provided for integrated project focussing on linkages between producers, processors and marketers, high value addition, export enhancement, introduction of new process technology and product/ market, apart from strengthening infrastructural facilities, particularly for post harvest handling of perishable horticultural produce[2].

Of the various projects, the two projects "Post harvest management of horticultural crops" and "Development of marketing of horticultural produce through participation in soft loan" were implemented from 1993-94 to 1996-97 under these schemes. The NHB provided a loan upto Rs.1.00 crore with 4 per cent (soft interest rate) service/ interest charge per annum to the organisation intending to create "Post Harvest infrastructure" (PHI) facilities to accelerate the development of horticultural industry in general and exports in particular. The soft loans were provided to cooperative societies, public sector organisations and private sector.

The NHB assistance was limited to 50 per cent of actual cost or limit prescribed for each component whichever was less.

Table 1.3 Assistance provided by NHB under soft loan scheme

S.No	Component	50% of actual cost of maximum limit of NHB Loan (Rs.)
1	Mechanised grading and packing Centre	6,10,000
2	Pre cooling unit	5,00,000
3	Cold storage	35,00,000
4	Refrigerated truck / vehicle	5,00,000
5	Specialised transport vehicle	1,70,000
6	a. Retail outlet (ordinary.)	18,000
	b. Retail outlet (A/c)	75,000
7	Auction platform	50,000
8	Ripening/ curing chamber	5,00,000
9	Marketing kits, quality testing equipment	Decided on case to case basis
10	Improved packaging such as plastic crates	subsidy to be decided on case to case basis

1. Manmohan,Attavar : Tool for productive gains The Hindu Survey of Indian Agril. 2000 , pp.149
2. Uppal,D.K. : "A Focus area for diversification" The Hindu Survey of Indian Agril. 2000 , pp.115

1.4 Need for the study

Development or creating an infrastructure for horticulture requires a heavy capital investment. It is estimated that on an average the cost of setting up of a standard infrastructure requires Rs.3,000 per tonne of fruits / vegetables. This means that a total investment of about Rs.3,000 crores would be needed to handle the 30 per cent of the total fruit/ vegetable production which was over 100 lakh tonnes during 1994-95, leaving aside the floriculture and other sectors.

With such a large investment needed for infrastructure development it is impossible for National Horticulture Board to meet out entire demand of the industry by itself. However, NHB is trying its best to develop the industry in a phased manner by providing assistance under "Soft Loan Schemes" since 1993-94. But, after the NHB has been observing that the gloom is looming large over some sectors of the industry. Many of these projects are not doing well and entered into a depressed position some units are on the brink of collapse and urgently needed remedial measures. In this context the imperative need of the hour is to critically evaluate the NHB soft loan schemes implemented during 1993-94 to 1996-97.

In view of this the present study is designed to assess the NHB soft loan scheme for the development of post infrastructure for horticulture crops in Madhya Pradesh before deciding further capital investment for improving the dismal performance of the scheme and Ministry of Agriculture, Government of India asked this Centre along with other AER Centres located at Ludhiana, Pune and Banglore to conduct a coordinated study in Madhya Pradesh, Punjab Maharashtra, and Karnataka states respectively.

1.5 Objectives

The objectives of the study were :

1. To study the growth of PHI for horticultural crops in Madhya Pradesh
2. To analyse the NHB's soft loan schemes with regard to adequacy of loan and infrastructural development.
3. To study the use of created PHI facilities by the farmers and its impact on their cropping pattern, employment and income, and,
4. To study the problems, faced by the selected farms and PHI units.

Of the objectives suggested by the coordinating Centre one on "growth of PHI units for horticulture crops in the state" could not be studied as data on this aspect was not available although NHB Bhopal was requested to furnish it.

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CHAPTER II

METHODOLOGY

2.1 Selection of PHI units/ districts

There were two types of PHI units. In the first type were those which were established with the help of finances obtained under soft loan schemes by individuals. The activities of these individual units included production of fruits, vegetables and flowers and post harvest handling including marketing. These kinds of PHI units were not in operation in Madhya Pradesh. Therefore, our study did not include such PHI units.

The second type of PHI units were those which were established with finances from National Horticultural Board and were established in cooperatives as well as private sector. These units were not engaged in production of fruits, vegetables and flowers but received these commodities of member/individual farmers for storing. In our study, however, we did not come across any farmer storing fruits and flowers. The farmers stores only potato and no other vegetables. Therefore out study is concerned with potato storage.

Three districts selected for this study were – Indore, (2 PHIs), Ujjain (1 PHI) and Shajapur (1 PHI). Thus, total 4 PHI units were studied.

2.2 Selection of farmers

Fifteen farmers who were the members of the organisation and used the facilities of PHI developed by the organisation through NHB soft loan were selected for each PHI unit from its catchment area. Similarly 15 non member farmer were selected from same catchment area who did not avail any PHI facility developed by NHB or any other agency. Both the member and non member farmers were randomly selected to represent three land holding classes i.e. small, medium, and large.

The land holding class wise distribution of sample farmers for a selected PHI unit was 10 respondents (5 members and 5 non members) each in the category of small farmers (2 hectares) medium farmers (2.01 – 4 hectares) and large farmer (>4 hectares). Thus total number of 120 farmers were selected (60 member and 60 non members) (Table 2.1).

Table 2.1 Selected sample, Madhya Pradesh, 1997-98

S. No.	PHI Units	Member			Non Member			Total
		Small	Medium	Large	Small	Medium	Large	
1	Maa Umia Cooperative Cold Storage Ltd., Jamli, Indore	5	5	5	5	5	5	30
	Selected villages	Jamli						
2	Shiv Shankar Patel Cooperative Society Mhowgaon, Indore	5	5	5	5	5	5	30
	Selected villages	1.Mhowgaon (Mhow), 2. Anwlai, 3. Kesherbadi						
3	Maa Harsiddhi Cooperative Society, Ujjain	5	5	5	5	5	5	30
	Selected villages	1. Ujjain, 2. Radhopipliya, 3. Radhopipliya Khurd, 4. Bolasa, Madhopura						
4.	M/s Choudhary Ice and Cold Storage Pvt. Ltd., Shajapur	5	5	5	5	5	5	30
	Selected villages	1. Shajapur, 2. Abhayapur, 3. Panvadi, 4. Jaikheda, 5. Bolaie						
	Total	20	20	20	20	20	20	120

2.3 Data collection

The data pertaining to various aspects like household resources, infrastructure development, cost of production and marketing, losses and problems were collected from farmers through survey method . However, we did not find any export unit in the State. Secondary data relating to area and production of horticultural crops and development of PHI units were obtained from various sources.

2.4 Reference period

The study included only those projects financed by NHB under its soft loan scheme during 1993-94. The secondary data was collected for the period 1993-94 to 1996-97. The primary data data pertained to agriculture year 1997-98.

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CHAPTER III

STATUS OF HORTICULTURAL CROPS IN MADHYA PRADESH

3.1 Horticultural crops:

Horticultural crops occupied an insignificant area in the gross cropped area and situation did not change in the last five years. The percentage of area occupied by the horticultural crops fluctuated between 1.77 in 1992-93 to 2.05 in 1996-97.

Table 3.1 : Area occupied by horticultural crops, Madhya Pradesh, 1992-93 to 1996-97

Year	Area under horticultural crops ('000 ha.)	Percentage to gross cropped area (%)
1992-93	423.80	1.77
9993-94	466.70	1.87
1994.95	538.80	2.17
1995-96	558.40	2.27
1996-97	524.50	2.05

Source : Directorate of Horticulture, Government of Madhya Pradesh

Of the total area under horticultural crops, spices accounted for nearly 50 per cent share, followed by fruit crops (11.31 per cent) that included plantation crops. The share of flower crops in total area under horticultural crops was only to the tune of 0.28 per cent. Corriender and chilly were noticed to be the major spices grown in the state, accounting for 25.49 per cent and 9.21 per cent share in total area under horticultural crops. On the other land, potato, tomato and onion were the important vegetable crops grown in the state, accounting for 9.53 per cent, 5.01 per cent and 4.48 per cent share in total area under horticultural crops. There were spectrum of other vegetables grown in the state that included tubers, suckers, leafy vegetables, beane, etc. These crops put together accounted for about 10.50 per cent share in total area under horticultural crops during 1996-97 (Table 3.2)

Among fruit crops, mango (3.26 per cent), banana (0.05 per cent), citrus including lime, Lemon and oranges (3.20 per cent) and guava (1.38 per cent) were more important. However, in terms of production, picture is quite different. Vegetables with (64.48 per cent of the total production of horticultural crops, topped among all the horticultural groups, whereas, spices contributed only 7.38 per cent (Table 3.3)

As mentioned earlier the percentage of area occupied by horticultural crops in the GCA was 2.05 in 1996-97 in Madhya Pradesh. There were 12 districts, with more than 2.05 per cent area under horticultural crops to GCA.

Table 3.2 Area under horticulture crops, Madhya Pradesh, 1991-92 to 1996-97

(Area in hectares)

S. No	Crops	1991-92		1992-93		1993-94		1994-95		1995-96		1996-97	
		Area	% to total	Area	% to total	Area	% to total	Area	% to total	Area	% to total	Area	% to total
1	Mango	18.871	4.50	18.581		18,231	3.90	17.891	3.73	17.549	3.51	17,148	3.26
2	Orange	7.895	1.88	7.897	1.86	8.132	1.75	8,722	1.82	9.185	1.84	9.373	1.78
3	Lime	1.223	0.29	1.444	0.34	1.479	0.32	1.520	0.32	1.509	0.30	1.408	0.27
4	Banana	289	0.07	250	0.06	343	0.07	287	0.06	296	0.06	283	0.05
5	Lemon	18.136	4.32	15.537	3.66	15,530	3.33	16,420	3.43	16.698	3.34	16.829	3.20
6	Grapes	N.A.	0.02	N.A.	0.02	N.A.	0.03	N.A.	0.03	N.A.	0.03	N.A.	-
7	Guava	7.259	1.73	7.053	1.66	7.030	1.51	6.832	1.43	7.222	1.45	7.241	1.38
8	Papaya	911	0.22	893	0.21	789	0.17	1,433	0.30	978	0.19	989	0.19
9	Other Fruits	6.729	1.60	6.317	1.49	6.707	1.45	7.259	1.51	5.671	1.14	6.198	1.18
Total Fruits		61.313	14.61	57.972	13.65	58.441	12.50	60,364	12.60	59.108	11.83	59.469	11.31
1	Potato	33.117	7.89	33.172	7.81	37.825	8.09	42.365	8.84	44.172	8.84	50.064	9.53
2	S Potato	6.793	1.62	6.282	1.48	6.491	1.38	6.461	1.35	6.720	1.35	6.402	1.22
3	Onion	17.916	4.27	15.348	3.61	19.145	4.09	19,664	4.10	21.050	4.21	23.554	4.48
4	Tomato	22.323	5.32	21.529	5.07	23.389	5.00	23.840	4.98	25.812	5.17	26.348	5.01
5	L. Finger	10.772	2.57	9.974	2.35	11.388	2.44	10.568	2.21	11,514	2.31	12.326	2.34
6	Brinjal	18537	4.42	17.871	4.21	19.478	4.16	18.819	3.93	21.376	4.28	20.827	3.96
7	Cauliflower.	7.069	1.68	6.827	1.61	8.074	1.72	8,379	1.75	7.939	1.59	8.124	1.54
8	Cabbage	2.999	0.71	2.849	0.67	3.426	0.76	3.624	0.75	3.829	0.77	-	-
9	Green Pea	977	0.23	5.572	1.32	1.610	0.33	1,904	0.40	3,917	0.78	-	-
10	Other Vegetables.	38.406	9.15	42.762	10.07	42.782	9.15	45,187	9.43	42.752	8.56	55.229	10.50
Total Vegetables		1,58,909	37.68	1,62,186	38.20	1,73,608	37.12	1,80,811	37.74	1,89,081	37.86	2,02,910	38.58
1	Chilli	45.270	10.79	51.069	12.03	49.329	10.55	41.321	8.63	42.147	8.44	48.450	9.21
2	Ginger	2.689	0.64	2.614	0.62	2.550	0.55	2.680	0.56	3.011	0.60	3.699	0.70
3	Turmeric	581	0.14	757	0.18	708	0.15	691	0.14	637	0.13	685	0.13
4	Garlic	29.628	7.05	21.389	5.03	22.046	4.71	28.892	6.03	41.444	8.30	33.983	6.46
5	Coriander	93.424	22.26	1,03.348	24.34	22.979	26.30	1.04.224	21.76	1,13,382	22.70	1.34.030	25.49
6	Other Spices.	26.946	6.42	24.431	5.75	37.057	7.92	58.824	12.28	49.237	9.86	41.230	7.84
Total Spices		198,538	47.30	2,03,608	47.95	2,34,669	50.18	2,36,634	49.39	2,49,858	50.03	2,62,077	49.83
Total Flowers		964	0.23	826	0.20	915	0.20	1.270	0.27	1.388	0.28	1.435	0.28

Source : Directorate of Horticulture, Government of Madhya Pradesh

Table 3.3 Production of horticultural crops Madhya Pradesh, 1991-92 to 1996-97

(Production in lakh tonnes)

S.No.	Crops	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97
1	Mango	1.69 (5.14)	1.67 (5.20)	1.64 (4.84)	1.61 (4.52)	1.57 (4.25)	1.54 (3.50)
2	Orange	1.26 (3.83)	1.26 (3.93)	1.30 (3.83)	1.39 (3.90)	1.46 (3.95)	1.49 (3.38)
3	Lime	0.19 (0.58)	0.23 (0.72)	0.23 (0.68)	0.24 (0.68)	0.24 (0.65)	0.22 (0.50)
4	Lemon	0.04 (0.12)	0.04 (0.12)	0.05 (0.15)	0.04 (0.12)	0.04 (0.12)	0.04 (0.09)
5	Banana	6.34 (19.29)	5.43 (16.92)	5.43 (16.05)	5.74 (16.09)	5.84 (15.81)	6.80 (15.44)
6	Grape	0.01 (0.03)	0.01 (0.03)	0.03 (0.09)	0.03 (0.09)	0.83 (0.08)	-- --
7	Guava	1.45 (4.41)	1.41 (4.39)	1.40 (4.14)	1.36 (3.82)	1.44 (3.90)	1.44 (3.28)
8	Papaya	0.22 (0.67)	0.22 (0.69)	0.24 (0.71)	0.35 (0.99)	0.24 (0.65)	0.48 (1.09)
9	Others	0.39 (1.19	0.37 (1.16)	0.39 (1.15)	0.42 (1.19)	0.33 (0.89)	0.37 (0.84)
Total Fruits		11.59 (35.26)	10.64 (33.16)	10.71 (31.64)	11.21 (31.40)	11.19 (30.30)	12.38 (28.12)
1	Potato	3.85 (11.71)	3.86 (12.03)	4.40 (13.00)	4.93 (13.81)	5.14 (13.92)	7.51 (17.06)
2	Sweet Potato	0.40 (1.22)	0.37 (1.15)	0.38 (1.12)	0.38 (1.06)	0.39 (1.06)	0.51 (1.16)
3	Onion	2.11 (6.42)	1.81 (5.64)	2.27 (6.71)	2.33 (6.53)	2.50 (6.77)	3.53 (8.02)
4	Tomato	3.34 (10.16)	3.22 (10.03)	3.50 (10.34)	3.57 (10.00)	3.87 (10.48)	3.95 (8.97)
5	Lady finger	0.86 (2.62)	0.79 (2.46)	0.91 (2.69)	0.84 (2.35)	0.92 (2.48)	0.74 (1.68)
6	Brinjal	1.85 (5.63)	1.78 (5.55)	1.94 (5.74)	1.88 (5.27)	2.13 (5.77)	3.12 (7.09)
7	Cauliflower	1.06 (3.22)	1.02 (3.18)	1.21 (3.58)	1.25 (3.50)	1.19 (3.22)	1.30 (2.94)
8	Cabbage	0.59 (1.79)	0.56 (1.75)	0.68 (2.01)	0.72 (2.02)	0.76 (2.06)	-- --
9	Pea	0.09 (0.28)	0.56 (1.75)	0.16 (0.47)	0.19 (0.53)	0.39 (1.06)	-- --
10	Others	5.37 (16.34)	5.98 (18.63)	5.98 (17.67)	6.32 (17.70)	5.98 (16.19)	7.73 (17.56)
Total Vegetables		19.52 (59.39)	19.95 (62.17)	21.43 (63.32)	22.41 (62.77)	23.27 (63.01)	28.39 (64.48)
1	Chilli	0.15 (0,46)	0.17 (0.53)	0.16 (0.48)	0.14 (0.39)	0.14 (0.38)	0.22 (0.50)
2	Ginger	0.03 (0.09)	0.03 (0.09)	0.03 (0.09)	0.03 (0.08)	0.04 (0.11)	0.67 (1.52)
3	Tamarinds	0.01 (0.03)	0.01 (0.03)	0.01 (0.03)	0.01 (0.03)	0.01 (0.03)	0.02 (0.05)
4	Garlic	1.03 (3.13)	0.74 (2.31)	0.77 (2.28)	1.01 (2.83)	1.45 (3.93)	1.39 (3.16)
5	Coriander	0.28 (0.85)	0.31 (0.97)	0.36 (1.06)	0.31 (0.87)	0.34 (0.92)	0.54 (1.23)
6	Others	0.26 (0.79)	0.24 (0.74)	0.37 (1.09)	0.58 (1.63)	0.49 (1.32)	0.41 (0.92)
Total Spices		1.76 (5.35)	1.50 (4.67)	1.70 (5.03)	2.08 (5.83)	2.47 (6.69)	3.25 (7.38)
1	Flower	--	--	--	--	--	0.01 (0.02)
Grand Total – Fruits, Vegetables, Spices and Flowers		32.87 (100.00)	32.09 (100.00)	33.84 (100.00)	35.70 (100.00)	36.93 (100.00)	44.03 (100.00)

(Figures in paranthesis represent percentage to total)

Source : Directorate of Horticulture, Government of Madhya Pradesh

Guna district topped the list with 8.41 per cent share in GCA, followed by Mandsaur (7.17 percent), Khandwa (5.00 per cent) and Indore(4.95 per cent). Other districts such as Ratlam, Shajapur, Chhindwara, Rajgarh, Khargone, Ujjain, Durg and Bilaspur had lesss than 4 per cent share in GCA (Table 3.4).

Table 3.4 Districts with more than average of percentage of area of horticultural crops to gross cropped area, M.P. 1996-97

S.No.	District	Horticultural crop area(ha)	**Gross cropped area(ha)**	Percentage of horticultural crop area to gross cropped area(GCA)
1.	Guna	61,756	7,34,205	8.41
2.	Mandsaur	59,617	8,30,962	7.17
3.	Khandwa	26,153	5,23,445	5.00
4.	Indore	21,931	4,43,352	4.95
5..	Ratlam	18,583	4,76,388	3.90
6.	Shajapur	20,451	6,57,427	3.11
7.	Chhindwara	18,286	5,93,580	3.08
8.	Rajgarh	17,019	5,64,656	3.01
9.	Khargone	20,443	7,41,659	2.76
10.	Ujjain	19,545	7,60,205	2.57
11.	Durg	17,176	8,03,747	2.13
12	Bilaspur	21,995	10,71,609	2.05
State Total		5,24,356	2,55,86,563	2.05

Source : Directorate of Horticulture, Government of Madhya Pradesh

It was observed that a particular fruit or vegetable or spice formed higher percentage of area under fruits, vegetables and spices in a particular district. In other words, a particular district had a concentration of a particular fruit, vegetable or spice. Thus, while papaya had the largest percentage of area in Khargone, banana turned out to be localised in Khandwa district guava showed higher percentage of area in Bilaspur district. Similarly, while Chhindwara district showed higher percentage of area under oranges, the area under mango was higher in Jabalpur district. The area under lemon was found to be highest in Khandwa district.

As for various vegetable crops, while Indore district showed higher percentage of area under potato cultivation, Surguja district had higher percentage of area under sweet potato. Similarly, the bulk of the onion was seen to be cultivated in Khandwa district.

Chilli occupied highest percentage of horticultural cropped area in Khargone and ginger formed such percentage in Tikamgarh district. Garlic, turmeric and coriander formed highest percentages in Mandsaur, Surguja and Guna districts respectively. (Table 3.5)

Table 3.5 District with highest Area under particular Fruits or Vegetable or Spices, Madhya Pradesh

Crop	Related District
Fruits	
Mango	Rewa
Orange	Chhindwara
Lemon	Khandwa
Sweet lime	Khargon
Banana	Khandwa
Grapes	Ratlam
Guava	Bilaspur
Papaya	Khargon
Vegetable	
Sweet Potato	Surguja
Onion	Khandwa
Potato	Indore
Tomato	Khandwa
Lady finger	Durg
Brinjal	Bilaspur
Green pea	Ujjain
Spice	
Chilli	Khargon
Ginger	Tikamgarh
Turmeric	Surguja
Garlic	Mandsour
Coriander	Guna
Methi	Mandsour
Krayal	Bilashpur

Horticultural Crops and Irrigation

Horticultural crops necessarily need irrigation. Among the sources of irrigation all sources except tanks were tapped for horticultural crops. Tank irrigation was used mainly for paddy crop and was localised in Chhattisgarh region- the rice bowl of the state. It was noted that the districts with larger percentage of area under horticultural crops were those with larger percentage of irrigated area under all sources except tanks.

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CHAPTER IV

SOCIO – ECONOMIC PROFILE OF SELECTED FARMERS

4.1 Caste Composition

The study revealed that majority (68.34 per cent) of the selected member farmers represented a very hard working entrepreneurial farming community "Patidar". This community belonged to 'Other Backward Class' (OBC) group. A few farmers (6.66 per cent) belonged to Scheduled Castes (SC) and none of the selected farmers belonged to Scheduled Tribes (ST). Similarly, among non member farmers majority of the farmers either belonged to caste 'Patidars' (51.67 per cent) or 'other' group (38.33 per cent). A few (10.00 per cent) belonged to schedule castes. Among non members also, the representation of scheduled tribes was nil (Table 4.1).

Table 4.1 Caste composition, selected farmers, M.P.

S.No	Category	Member				Non member			
		Small	Medium	Large	Overall	Small	Medium	Large	Overall
1	SC	01 (5.00)	02 (10 .00)	01 (5.00)	04 (6.66)	02 (10.00)	03 (15.00)	01 (05.00)	06 (10.00)
2	OBC	13 (65.00)	12 (60.00)	16 (80.00)	41 (68.34)	11 (55.00)	11 (55.00)	09 (45.00)	31 (51.67)
3	Others	06 (30.00	06 (30.00)	03 (15.00)	15 (25.00)	07 (35.00)	06 (30.00)	10 (50.00)	23 (38.33)
Total		20 (100.00)	20 (100.00)	20 (100.00)	60 (100.00)	20 (100.00)	20 (100.00)	20 (100.00)	60 (100.00)

4.2 Educational standard of sample farmers

Educational attainments also play an important role in the acceptance and adoption of new farm techniques. Contrary to the state literacy rate, the selected farmers were totally literate. Majority of the farmers had schooling up to middle to higher secondary level. This higher education standard was mainly due to their proximity to the urban centre and educational institutions available therein. Moreover, most of the selected farmers belonged to financially and socially strong community. Study further revealed that a significant number of farmers, belonging to member (18.33 per cent) and non member (13.33 per cent) had education upto graduation and post graduation levels (Table 4.2).

There seems to be no relationship between size of land holding and educational standard among the selected farmers.

Table 4.2 Distribution of sample farmers by educational standards

(Percentage)

S.No	Category	Member				Non member			
		Small	Medium	Large	Overall	Small	Medium	Large	Overall
1	Primary	20.00	30.00	35.00	28.34	25.00	30.00	20.00	25.00
2	Middle	25.00	15.00	30.00	23.33	30.00	45.00	35.00	36.67
3	H.S.S.	40.00	30.00	20.00	30.00	20.00	25.00	30.00	25.00
4	Graduate	15.00	25.00	15.00	18.33	15.00	--	15.00	10.00
5	Post Graduate	--	--	--	--	10.00	--	--	3.33
Total		100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

4.3 Family size

The average age of the respondent or head of the family was comparatively lower and ranged between 40.75 to 47.75 years among member farmers and between 39.45 to 47.30 years among non member farmers. The family size was larger on large farms (9.00 and 9.25 among members and non members respectively) as compared to other size groups. Table 4.3 further revealed that number of adult males was higher in the family as compared to females in both the categories in all size groups. (Table 4.3)

Table 4.3 Family size of the selected farmers, M.P.

(Figures-Average per family)

S. No.	Category	Member				Non member			
		Small	Medium	Large	Overall	Small	Medium	Large	Overall
1	Age of family head (in years)	40.75	47.15	47.75	45.21	39.45	47.30	44.20	43.65
2	Average family size (in nos.)	6.30	8.25	9.00	7.84	7.35	6.80	9.25	7.80
3	Adult male members (in nos.)	2.75	3.15	3.80	3.23	2.95	2.40	3.95	3.10
4	Adult Female members (in nos.)	1.95	2.55	3.25	2.58	2.45	2.30	3.50	2.75
5	Children below 15 yrs. (in nos.)	1.60	2.35	1.95	1.97	1.95	2.10	1.80	2.23

4.4 Land holding

The average size of operational holdings of member farmers was 1.56 hectares, 2.80 hectares and5.75 hectares on small, medium and large size groups, respectively. The average operational land holding of non-member small, medium and large size farms was 1.39 hectares, 2.96 hectares and 9.58 hectares, respectively. The entire land was owned and operated by the selected farmers and the practice of leasing out of holding was absent among selected farmers (Table 4.4).

Table 4.4 Average land holding, selected farmers,

(Unit – hectare)

Particulars	Member				Non member			
	Small	Medium	Large	Overall	Small	Medium	Large	Overall
Owned	1.22	2.94	6.19	3.45	1.40	3.03	9.48	4.64
Leased-in	0.37	0.22	--	0.20	0.04	--	0.04	0.03
Operational holding*	1.56	2.80	5.75	3.37	1.39	2.96	9.58	4.62

*Excluding Barren, Permanent fallow and permanent pasture and land under miscellaneous trees

4.5 Farm assets

The average per household value of farm assets possessed by the sample farms was Rs.34,401, Rs. 90,552 and Rs. 1,55,090 for small, medium and large member farms, respectively. It was Rs.32,583, Rs.97,938 and Rs.1,70,220 for small, medium and large non member farms,respectively.

Of the total value of farm assets, highest share (46.59 percent on member farms and38.94 per cent on non member farms) was of tractors on all the farms except small member / non member farm group which did not own any tractor. The value of livestock accounted for 59.56 per cent, 30.08 per cent and 21.98 per cent on small, medium and large members farms and 61.95 per cent, 33.75 per cent and 24.14 per cent on small, medium and large non member farms, respectively. The irrigation equipment also contributed significantly to the total farm assets.

However, it can be seen from the table that as the farm size increase the value of bullock cart decreased. This held especially true on member farms (Table 4.5).

Table 4.5 **Farm assets, selected farmers, Madhya Pradesh, 1997-98**

(Value in Rs.)

Size Group	Member						Non member					
	Livestock	Farm machinery	Irrigation equipments & pumps	Tractors	Bullock carts	**Total**	Livestock	Farm machinery	Irrigation equipments & pumps	Tractors	Bullock carts	**Total**
Small	20,490	1,093	8,880	--	3,938	34,401	20,185	4,668	5,000	---	2,730	32,583
Percentage	59.56	3.18	25.81	--	11.45	100.00	61.95	14.33	15.35	--	8.38	100.00
Medium	27,235	5,725	12,892	42,300	2,400	90,552	33,057	10,880	17,600	33,150	3,251	97,938
Percentage	30.08	6.32	14.24	46.71	2.65	100.00	33.75	11.11	17.97	33.85	3.32	100.00
Large	34,085	9,112	21,445	88,166	2,282	1,55,090	41,095	18,290	25,600	83,960	1,275	1,70,220
Percentage	21.98	5.87	13.83	56.85	1.47	100.00	24.14	10.74	15.04	49.33	0.75	100.00
Overall	27,270	5,310	14,405	43,490	2,873	93,348	31,446	11,279	16,067	39,037	2,418	1,00,246
Percentage	29.21	5.69	15.43	46.59	3.08	100.00	31.37	11.25	16.03	38.94	2.41	100.00

CHAPTER V

EVALUATION OF NHB SOFT LOAN SCHEME

As per the rules of the National Horticultural Board (NHB) the soft loan amount should be 50 per cent of the total cost of all the components of post harvest infrastructure facilities or should limit to prescribed percentage of each component, whichever is less. However, in Madhya Pradesh, the share of the NHB's soft loan in the total cost of project ranged between 12 to 40 per cent. The analysis further revealed that the contribution of NHB's soft loan to the total project cost was much lower or inadequate in the case of cooperative societies' projects as compared to the private sector projects. Thus, the vast gap between the requirement and availability of funds was met out either through State Govt's contribution or by borrowing from other financial institutions including NCDC at the higher rate of interest besides the own contribution (Table 5.1)

Table 5.1 Share of NHB soft loan in the total financial requirement of the projects undertaken by different organisations in M.P.

(Lakh Rs.)

S. No.	Name of Unit	Source of finance				
		Own funds	Soft loan from NHB	Term loan from other financial institutions*	**Total** (column 3 + 4 + 5)	Per cent share of NHB loan in the total finance (column 4 as a % of column 6)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	Shiv Shankar Patel Sah. Samiti, Indore	96.33	35.00	140.00	271.33	12.90
2	Maa Umia S.S. Jamli, Indore	104.23	35.00	34.47	173.70	20.14
3	Maa Har Siddhi Sah. Samiti, Ujjain	157.14	--	--	157.14	--
4	M/s Choudhary Ice Cold Storage, Shajapur	20.70	35.00	35.00	90.70	38.59
	Total	**378.40**	**105.00**	**209.47**	**692.87**	**15.15**

**Mostly through NCDC*

5.1 Capacity utilization of post harvest infrastructure facilities developed withNHB's soft loan scheme

The capacity utilisation of the selected PHI (cold storages) units ranged between 40 to 100 per cent for the 4 PHI units selected for the study. Only one (Maa Umia Cooperative Society Jamli, Indore) reported 100 per cent capacity utilisation since inception i.e. 1994-95. The other private sector unit, M/s Chandhuri Cold storage, Shajapur, reported 90 per cent capacity utilisation since inception i.e. (1996-97).

The remaining two cooperative PHI viz. Shiv Shankar Sahakari Samiti Maryadit, Indore, and Maa Har Siddhi Fal Avam Vipnan Sahkari Samiti, Ujjain reported only 40 per cent capacity utilisation because these units were operationalised in the year 1997-98 (Table 5.2).

Table 5.2 Percentage capicity utilisation of cold storages developed through NHB soft loan, 1993-94

(Figures – Percentages)

S. No.	Name of Unit	Year				
		1993-94	1994-95	1995-96	1996-97	1997-98
1	Shiv Shankar Patel Sah. Samiti, Indore	--	--	--	--	40
2	Maa Umia S.S. Jamli, Indore	--	100	100	100	100
3	Maa Har Sidhi Sah. Samiti, Ujjain	--	--	--	--	40
4	M/s Choudhary Ice Cold Storage, Shajapur	--	--	--	80	90

Since the study area was a predominantly potato growing, and lot of marketable surplus of potato always available around, the selected units as well as other units did not face any threat of under utilisation or non-utilisation of the capacity. Moreover the potato growers and potato traders of Uttar Pradesh and Punjab preferred to store their produce in these units because the rent was comparatively lower than those prevailing in other states.

5.2 Utilisation of PHI facilities by selected vegetable growers

It was observed that farmers have utilised the PHI facilities developed with the soft loan scheme of the NHB for potato crop only and not for other crops. The reason of not utilising cold storage for other crops was that the facilities are developed only for storing potato and not for other vegetables like onion and garlic or fruits or flowers.

The quantity of potato stored in cold storage units was 25.08, 32.33 and 45.70 per cent of the total quantity of potato sold by small, medium and large farms. It was observed that proportion of the quantity of the potato stored in the total sales of potato increased with the increase in farm size because larger farmers had larger holding capacity than the smaller farmers (Table 5.3).

Table 5.3 Utilisation of PHI facilities by sample potato growers, M.P.

(Quantity – quintals)

S. No.	Particulars	Farm size of potato growers		
		Small	Medium	Large
1	Total production per farm (per hectare)	282.00 (243.00)	439.80 (240.00)	860.75 (233.26)
2	Total quantity sold/ farm (per hectare)	239.22 (206.14)	371.19 (202.56)	722.08 (195.68)
3	Total quantity graded with mechanical grader/ farm	--	--	--
4	Total quantity stored/ farm (per hectare)	60.00 (51.70)	120.00 (65.49)	330.00 (89.42)
5	Percentage of cold stored potato to the total potato sold	25.08	32.33	45.70

Figures in parentheses denote quintals per hectare

CHAPTER VI

THE IMPACT OF SOFT LOAN SCHEME

6.1 Change in land utilisation pattern

A comparative analysis of the land use pattern of member and non member farmers during the period between 1992-93 and 1997-98 showed no discernible changed in their average owned land holdings. However, because of cultivation on leased in land, operational holding increased by 0.08 hectare for small category and 0.04 hectare for medium category of member farmers. Similarly the increase in operational holding was found to be 0.04 hectare on small category and 0.01 hectare on large category of non member farms.

The area under vegetable crops increased significantly on all the farms irrespective size over the period mainly because of the increased profitability of vegetable crops. During the given period of time, the cultivation of vegetable crops was seen to have expanded by 8.5, 15,85, and 11.00 per cent on small, medium and large member farms and 24.72, 18.82 and 29.33 per cent on respective categories of non member farms. The establishment of post harvest infrastructure (developed mainly as cold storage) definitely helped the member farmers in getting better prices and reducing post harvest losses.

The area under fruit crops did not show any change during the period and remained same on all the farms of non member category (0.04, 0.15 and 0.25 hectare respectively for the small, medium and large categories).

It is to be noted from the table 6.1 that entire area under flowers on member farms shifted to vegetable crops and decreased marginally (0.08 hectare) on non member farms during the period.

The intensity of cropping of small, medium and large size member farms increased to 262.18, 235.36 and 240.87 per cent during 1997-98 from 235.81, 225.72 and 224.00 per cent, respectively during 1992-93. Similarly, it increased to 234.53, and 223.11 per cent during 1997-98 from 228.89 and 200.21 per cent, respectively during 1992-93 on small and large non member farms during the same period. However, during this period intensity of cropping declined marginally on medium farms of non member category. (Table 6.1).

6.2 Change in cropping pattern

During both the years soybean was the most popular kharif crop. It occupied almost entire kharif area of the selected farmers leaving very marginal area for other crops like maize, groundnut, jowar, etc. Paddy did not find place in the cropping pattern in 1997-98.

Among rabi crops (excluding vegetable crops like potato, garlic and onion) wheat was the most commonly grown crop followed by gram, lentil and pea. It can be seen from the table 6.2 that area of wheat in rabi season increased on small and large size member farms from 0.46 hectare and 1.94 hectares in 1992-93 to 0.68 hectare and 2.22 hectares in

Table 6.1 Land use pattern of selected farmers M.P.

Unit – hectare

S. No	Particulars	1992-93								1997-98							
		Member				Non-member				Member				Non-member			
A.	Land holding	Small	Medium	Large	Total	Small	Medium	Large	Total	Small	Medium	Large	Total	Small	Medium	Large	Tota
1	Own land	1.22	2.94	6.19	3.45	1.40	3.03	9.48	4.64	1.22	2.94	6.19	3.45	1.40	3.03	9.48	4.6
2	Operational holding	1.48	2.76	5.75	3.33	1.35	2.96	9.51	4.60	1.56	2.80	5.75	3.37	1.39	2.96	9.52	4.6
B.	Land use																
1.	Fallow land	0.03	0.22	0.28	0.17	0.03	--	--	0.01	0.03	0.22	0.28	0.17	0.03	--	--	0.0
2.	Barren / Waste land	--	0.14	--	0.06	0.02	0.07	--	0.03	--	0.14	--	0.06	0.02	0.07	--	0.0
3.	Land under miscellaneous tree	--	--	0.16	0.05	--	--	--	--	--	--	0.16	0.05	--	--	--	
4.	Net cultivated area	1.48	2.76	5.75	3.33	1.35	2.96	9.51	4.60	1.56	2.80	5.75	3.37	1.39	2.96	9.52	4.6
5.	Area under kharif	1.42	2.76	5.75	3.31	1.35	2.81	9.23	4.46	1.56	2.80	5.75	3.37	1.35	2.81	9.03	4.3
6.	Area under Rabi	2.04	3.47	6.98	4.16	1.69	3.52	9.56	4.92	2.53	3.73	7.95	4.74	1.87	3.50	11.96	5.7
7.	Area under Summer	0.03	--	0.15	0.06	0.01	--	--	--	--	0.06	0.15	0.07	--	--	--	
8.	Area under perennial	--	--	--	--	0.04	0.15	0.25	0.15	--	--	--	--	0.04	0.15	0.25	0.1
9.	Area under vegetables	1.53	2.46	5.00	3.00	0.89	1.70	4.67	2.42	1.66	2.78	5.55	3.33	1.11	2.02	6.04	3.0
10.	Area under flowers	--	--	0.03	0.01	0.10	--	0.50	0.20	--	--	--	--	0.16	--	0.20	0.1
11.	Gross Cropped Area (5+ 6+ 7 +8)	3.49	6.23	12.88	7.53	3.09	6.48	19.04	9.53	4.09	6.59	13.85	8.18	3.26	6.46	21.24	10.3
12	Cropping intensity (%)	235.81	225.72	224.00	226.13	228.89	218.91	200.21	207.17	262.18	235.36	240.87	242.73	234.53	218.24	223.11	223.3

Table 6.2 Area under different crops, selected farms, Madhya Pradesh

Unit – Hectare/ household

S. No	Particulars of crop	1992-93															
		Member								Non – member							
		Small		Medium		Large		Total		Small		Medium		Large		Total	
		Hect.	%	Hect.	%	Hect.	%	Hect.	%	Hect.	%	Hect.	%	Hect.	%	Hect.	%
1	**Kharif**																
	1. Soybean	1.38	97.18	2.69	97.46	5.57	96.87	3.22	97.28	1.20	88.89	2.77	98.58	8.48	91.87	4.15	93.05
	2. Paddy	--	--	0.03	1.09	--	--	0.01	0.30	--	--	--	--	--	--	--	--
	3. Maize	0.04	02.82	0.04	1.45	0.08	1.39	0.05	1.51	0.05	3.70	0.01	0.35	0.13	1.41	0.06	1.35
	4. Groundnut	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5. Jowar	--	--	--	--	--	--	--	--	--	--	--	--	0.07	0.76	0.02	0.45
	6. Vegetable	--	--	--	--	0.10	1.74	0.03	0.91	--	--	0.03	1.07	0.05	0.54	0.03	0.67
	7. Flowers	--	--	--	--	--	--	--	--	0.10	7.41	--	--	0.50	5.42	0.20	4.48
	Total Kharif	1.42	100.00	2.76	100.00	5.75	100.00	3.31	100.00	1.35	100.00	2.81	100.00	9.23	100.00	4.46	100.00
2	**Rabi**																
	1. Wheat	0.46	22.55	0.83	23.92	1.94	27.79	1.07	25.72	0.73	43.20	1.66	47.16	4.67	48.85	2.35	47.76
	2 Gram	0.05	2.45	0.18	5.19	0.16	2.29	0.13	3.13	0.07	4.14	0.18	5.11	0.16	1.67	0.13	2.40
	3 Pea	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4 Lentil	--	--	--	--	--	--	--	--	--	--	--	--	0.06	0.63	0.02	0.41
	5 Potato	1.05	51.47	1.64	47.26	3.13	44.85	1.94	46.63	0.83	49.11	1.35	38.36	3.60	37.66	1.93	39.23
	6 Onion	0.28	13.73	0.61	17.58	0.76	10.89	0.55	13.22	0.02	1.18	0.13	3.69	0.59	6.17	0.25	5.08
	7 Garlic	0.09	4.41	0.18	5.19	0.71	10.17	0.33	7.93	0.01	0.59	0.20	5.68	0.26	2.72	0.16	3.25
	8 Other Vegetable	0.11	5.39	0.03	0.86	0.25	3.58	0.13	3.13	0.03	1.78	--	--	0.22	2.30	0.08	1.63
	9 Flowers	--	--	--	--	0.03	0.43	0.01	0.24	--	--	--	--	--	--	--	--
	Total Rabi**	2.04	100.00	3.47	100.00	6.98	100.00	4.16	100.00	1.69	100.00	3.52	100.00	9.56	100.00	4.92	100.00
3.	Summer	0.03	100.00	--	--	0.10	66.66	0.04	66.66	0.01	100.00	--	--	--	--	--	--
	Summer Vegetables	--	--	--	--	0.05	33.34	0.02	33.34	--	--	--	--	--	--	--	--
	Total Summer	0.03	100.00	--	--	0.15	100.00	0.06	100.00	0.01	100.00	--	--	--	--	--	--
4.	**Fruits** (Perennial)																
	1 Orange	--	--	--	--	--	--	--	--	--	--	0.10	66.66	0.20	80.00	0.10	66.66
	2 Guava	--	--	--	--	--	--	--	--	0.04	100.00	0.05	33.34	0.05	20.00	0.05	33.34
	Total fruits	--	--	--	--	--	--	--	--	0.04	100.00	0.15	100.00	0.25	100.00	0.15	100.00
5.	**Gross Cropped Area***	3.49	--	6.23	--	12.88	--	7.53	--	3.09	--	6.48	--	19.04	--	9.53	--
	Net Cropped Area	1.48	--	2.76	--	5.75	--	3.33	--	1.35	--	2.96	--	9.51	--	4.60	--
	Intensity of cropping %	235.81		225.72		224.00		226.13		228.89		218.91		200.21		207.17	

* including area under kharif, rabi, summer and perennials.

** area under rabi season exceeded the net operational holding because potato was grown as a double crop in rabi season.

Continued.....

Continued Table 6.2.

Unit – Hectare/ household

S. No	Particulars of crop	1997-98															
		Member								Non – member							
		Small		Medium		Large		Total		Small		Medium		Large		Total	
		Hect.	%	Hect.	%	Hect.	%	Hect.	%	Hect.	%	Hect.	%	Hect.	%	Hect.	%
1	**Kharif**																
	1. Soybean	1.50	96.15	2.68	95.71	5.54	96.34	3.24	96.14	1.27	94.08	2.81	100.00	8.40	93.02	4.16	94.77
	2. Paddy	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3. Maize	0.06	3.85	0.04	1.43	0.10	1.74	0.07	2.08	--	--	--	--	0.33	3.65	0.11	2.50
	4. Groundnut	--	--	0.03	1.07	--	--	0.01	0.30	--	--	--	--	0.10	1.11	0.03	0.68
	5. Jowar	--	--	--	--	0.06	1.05	0.02	0.59	0.03	2.22	--	--	--	--	0.01	0.23
	6. Vegetable	--	--	0.05	1.79	0.05	0.87	0.03	0.89	--	--	--	--	0.10	1.11	0.03	0.68
	7. Flowers	--	--	--	--	--	--	--	--	0.05	3.70	--	--	0.10	1.11	0.05	1.14
	Total Kharif	1.56	100.00	2.80	100.00	5.75	100.00	3.37	100.00	1.35	100.00	2.81	100.00	9.03	100.00	4.39	100.00
2	**Rabi**																
	1. Wheat	0.68	26.88	0.76	20.38	2.22	27.92	1.22	25.74	0.53	28.34	1.30	37.14	5.24	43.81	2.36	40.83
	2 Gram	0.14	5.53	0.20	5.36	0.32	4.03	0.22	4.64	0.10	5.35	0.18	5.14	0.52	4.34	0.27	4.67
	3 Pea	--	--	0.03	0.80	--	--	0.01	0.21	--	--	--	--	--	--	--	--
	4 Lentil	0.05	1.98	0.04	1.07	--	--	0.03	0.63	0.02	1.07	--	--	0.16	1.34	0.06	1.04
	5 Potato	1.16	45.85	1.83	49.06	3.69	46.41	2.22	46.84	0.92	49.20	1.55	44.29	4.37	36.54	2.28	39.45
	6 Onion	0.34	13.44	0.72	19.31	0.90	11.32	0.66	13.92	0.18	9.63	0.24	6.86	0.96	8.03	0.46	7.96
	7 Garlic	0.16	6.32	0.15	4.02	0.82	10.32	0.38	8.02	0.01	0.53	0.23	6.57	0.51	4.26	0.25	4.32
	8 Other Vegetable	--	--	--	--	--	--	--	--	--	--	--	--	0.10	0.84	0.03	0.52
	9 Flowers	--	--	--	--	--	--	--	--	0.11	5.88	--	--	0.10	0.84	0.07	1.21
	Total Rabi**	2.53	100.00	3.73	100.00	7.95	100.00	4.74	100.00	1.87	100.00	3.50	100.00	11.96	100.00	5.78	100.00
3.	Summer	--	--	0.03	50.00	0.06	40.00	0.03	42.86	--	--	--	--	--	--	--	--
	Summer Vegetables	--	--	0.03	50.00	0.09	60.00	0.04	57.14	--	--	--	--	--	--	--	--
	Total Summer	--	--	0.06	100.00	0.15	100.00	0.07	100.00	--	--	--	--	--	--	--	--
4.	**Fruits** (Perennial)																
	1 Orange	--	--	--	--	--	--	--	--	--	--	0.10	66.66	0.20	80.00	0.10	66.66
	2 Guava	--	--	--	--	--	--	--	--	0.04	100.00	0.05	33.34	0.05	20.00	0.05	33.34
	Total fruits	--	--	--	--	--	--	--	--	0.04	100.00	0.15	100.00	0.25	100.00	0.15	100.00
5.	**Gross Cropped Area***	4.09	--	6.59	--	13.85		8.18		3.26		6.46		21.24		10.32	
	Net Cropped Area	1.56	--	2.80	--	5.75		3.37		1.39		2.96		9.52		4.62	
	Intensity of cropping %	262.18		235.36		240.87		242.73		234.53		218.24		223.11		223.38	

* including area under kharif, rabi, summer and perennials.

** area under rabi season exceeded the net operational holding because potato was grown as a double crop in rabi season.

1997-98 respectively. However, area of wheat declined marginally on medium member farms. Table revealed that during the same period the area of wheat registered a decline on small and medium non member farms as some of the area was shifted to vegetable crops. Pea was grown only on medium member farms and occupied only 0.03 hectare area in Rabi season in 1997-98. This crop was grown as a pulse crop and not as a vegetable (Table 6.2).

In the study area, potato was grown as a double crop in rabi season and occupied highest area followed by onion and garlic. The area under potato on member farms increased from 1.05 hectares, 1.64 hectares and 3.13 hectares in 1992-93 to 1.16 hectares, 1.83 hectares and 3.69 hectares in 19997-98 on small, medium and large farms respectively. Thus, increase by 0.11 hectare (10.48 per cent), 0.19 hectare (11.58 per cent) and 0.56 hectare (17.89 per cent) on respective farms. Similarly on non member farms the area of potato increased from 0.83 hectare, 1.35 hectares and 3.60 hectares to 0.92 hectare, 1.55 hectares and 4.37 hectares on small medium and large farms respectively. Thus, increase by 0.09 hectare (10.84 per cent), 0.20 hectare (14.81 per cent) and 0.77 hectare (21.39 per cent) on respective farms. (Table 6.2 & 6.3)

Table revealed that no changes have taken place in the area of fruit crops on farms of non members during the period and fruit crops covered 1.23, 2.32 and 1.18 per cent of gross cropped area on small, medium and large non member farms. Flowers also find some area on non member farms only. The area under flowers increased on small non member farms by 0.06 hectare over the period (0.16 hectare in 1997-98 and 0.10 hectare in 1992-93) but remained unchanged on large size farms (Table 6.3)

Table 6.3 Changed in area under horticultural crops from 1992-93 to 1997-98 on sample farms, Madhya Pradesh

S. No.	Crops	Member				Non member			
		Small	Medium	Large	Total	Small	Medium	Large	Total
A	**Vegetables**								
1	Potato (ha)	0.11	0.19	0.56	0.28	0.09	0.20	0.77	0.36
	(%)	(10.48)	(11.58)	(17.89)	(14.43)	(10.84)	(14.81	(21.39)	(18.75)
2	Onion (ha)	0.06	0.11	0.14	0.10	0.16	0.11	0.37	0.22
	(%)	(21.43)	(18.03)	(18.42)	(18.18)	(800.00)	(84.61)	(62.71)	(92.66)
3	Garlic (ha)	0.07	(-)0.03	0.11	0.05	--	0.03	0.25	0.09
	(%)	(77.77)	(16.67)	(15.49)	(15.15)	--	(15.00)	(96.15)	(56.25)
4	Other veg. (ha)	(-)0.11	0.05	(-)0.26	(-)0.11	(-)0.03	(-)0.03	(-)0.07	(-)0.05
	(%)	(100.00)	(166.66)	(65.00)	(61.11)	(100.00)	(100.00)	(25.92)	(45.45)
5	Total (ha)	0.13	0.32	0.55	0.33	0.22	0.32	1.37	0.64
	(%)	(8.50)	(15.85)	(11.00)	(11.00)	(24.72)	(18.82)	(29.33)	(26.45)
B	**Fruits**								
	(ha)	--	--	--	--	--	--	--	--
	(%)	--	--	--	--	--	--	--	--
C	**Flowers**								
	(ha)	--	--	(-)0.03	(-)0.01	0.06	--	--	0.02
	(%)	--	--	(100.00)	(100.00)	(60.00)	--	--	(10.00)

Figures given in parentheses represent the change in area under particular crop

6.3 Change in assets

The average value of assets of member and a non member farms increased by 41.62 per cent and 33.98 per cent respectively over the period between1992-93 and 1997-98. It was 93,347 in 1992-98 on member and Rs.1,00,246 in 1997-98 on member farm. It was Rs.65,911 on member farm and Rs.74,821 on non member farms in 1992-93 (Table 6.4 and Table 6.5).

Table 6.4 and 6.5 further revealed that there was an increase in average number of milch animals on all the selected farms. This increase was mainly due to increased demand of milk in the region and some farmers residing nearby big towns adopting dairy. However, the number of bullocks registered a decline over the period on all the farms despite increased bovine population. This decline was more prominent on large member farmers (19.44 per cent) and medium non member farms (10.53 per cent).

There was an increase in average number of tractors on all the farms except small farms. Sprayers, irrigation equipments pumps and other equipments of irrigation registered an increase over the years. However, it is interesting to see that despite potato growing area, barring few, most of the farmers did not own potato seed planter and heavily relied on contractual labour for seed planting.

6.4 Varietal shift of potato

Variety of a crop, particularly of horticultural crops, plays very important role. Farmers adopted the best variety for highest yield if available in time.

In the area of the study *Jyoti* variety of potato was the most preferred variety among all the farmers and occupied almost 90 per cent of the area (89.22 per cent, 87.98 per cent and 93.50 per cent on small, medium and large member farms and 100.00 per cent, 90.32 per cent 86.96 per cent on small, medium, and large non- members farms respectively). Moreover, produce of this variety is considered best for potato chips. Therefore, farmers replaced the earlier varieties like *Lavkar* and *Sidnoori* which were largely grown till 1992-93 (Table 6.6 and 6.7)

6.5 Cost of cultivation of potato

The average per hectare cost of cultivation of potato was worked out at Rs.24,990 and Rs.26,519 on member and non member farms, respectively.

Seed was the costliest input and accounted for more than 40 per cent of total cost i.e. 40.59 and 43.03 per cent on member and non member farms, respectively. However, small and large non member farms reported higher proportion of seed as they purchased the seed from the open market at higher rates.

Hired labour charges contributed 27.95 per cent and 26.77 per cent to the total cost of cultivation on member and non member farms, respectively. Most of the operations were done on contract basis.

Table 6.4 Livestock and machinery owned by selected farmers, 1997-98

(Average Number / Household)

Particulars	Member				Non member			
	Small	Medium	Large	Total	Small	Medium	Large	Total
A. Live stock								
1) Cows	1.60	1.35	1.55	1.50	1.10	1.55	1.15	1.35
2) Buffaloes	0.55	1.15	1.45	1.05	0.65	1.45	2.40	1.50
3) Bullocks	1.90	1.50	1.45	1.62	2.10	1.70	1.55	1.78
4) Others	0.70	0.95	1.30	0.98	0.50	1.30	1.15	0.98
Total value	20,490	27,235	34,085	27,270	20,185	33,057	41,095	31,445
Change in number of animals over 1992-93 (%)								
1) Milch animals	16.22	2.04	4.56	7.14	16.66	9.09	10.94	14.92
2) Bullocks	- 9.09	- 9.09	- 19.44	- 12.83	- 6.66	- 10.53	- 6.06	- 7.77
B. Major machinery								
1. Bullock carts	0.85	0.75	0.55	0.72	0.65	0.85	0.40	0.63
2. Tractors	Nil	0.20	0.60	0.23	--	0.15	0.40	0.18
3. Electric pumps	0.75	1.05	1.60	1.13	0.80	1.30	1.75	1.28
4. Diesel pumps	Nil	0.05	0.35	0.13	--	--	0.20	0.07
5. Sprinkler sets	--	0.15	0.10	0.30	0.05	0.10	0.30	0.15
6. Drip irrigation sets	-	--	--	--	--	0.05	0.05	0.03
7. Spryers/Dusters	1.10	1.50	1.85	1.48	1.35	1.55	2.10	1.66
8. Threshers	Nil	0.10	0.30	0.13	0.10	0.25	0.50	0.28
9. Potato planter	--	--	0.05	0.01	--	0.05	--	0.01
10. Other seed planters	-	--	--	--	--	--	0.05	0.01
11. Total values (Rs.)	13,911	63,317	1,21,005	66,077	12,398	64,881	1,29,125	68,801
Total asset value (Rs.) (A + B)	**34,401**	**90,552**	**1,55,090**	**93,347**	**32,583**	**97,938**	**1,70,220**	**1,00,246**

Table 6.5 **Livestock and machinery owned by the selected farmers, 1992-93**

(Average No. / Household)

Particulars	Member				Non member			
	Small	Medium	Large	Total	Small	Medium	Large	Total
A. Live stock								
1) Cows	1.40	1.50	1.55	1.48	1.00	1.45	1.55	1.33
2) Buffaloes	0.45	0.95	1.30	0.90	0.50	1.30	1.65	1.15
3) Bullocks	2.10	1.65	1.80	1.85	2.25	1.90	1.65	1.93
4) Others	0.45	0.95	0.90	0.77	0.90	1.30	2.10	1.43
Total value	14,480	17,110	23,485	18,358	15,478	20,947	28,580	21,668
B. Major machinery								
1. Bullock carts	0.75	0.85	0.65	0.75	0.65	0.85	0.45	0.65
2. Tractors	--	0.10	0.40	0.16	--	0.10	0.30	0.13
3. Electric pumps	0.65	1.05	1.65	1.12	0.60	1.05	1.60	1.08
4. Diesel pumps	0.05	0.05	0.35	0.15	--	0.05	0.20	0.08
5. Sprinkler sets	--	0.05	0.05	0.03	--	--	0.10	0.03
6 Drip irrigation sets	--	--	--	--	--	--	--	--
7 Spryers/Dusters	0.80	1.20	1.80	1.27	1.05	1.40	1.60	1.35
8. Threshers	--	0.10	0.25	0.12	--	0.20	0.40	0.20
9. Potato planter	--	--	--	--	--	0.05	--	0.02
10. Other seed planters	--	--	--	--	--	--	--	--
11. Total values (Rs.)	10,845	40,535	91,280	47,553	9,637	49,406	1,00,417	53,153
Total asset value (Rs.) (A + B)	**25,325**	**57,645**	**1,14,765**	**65,911**	**25,115**	**70,353**	**1,28,997**	**74,821**

Table 6.6 Varietywise area under potato crops during 1992-93 and 1997-98 selected farmers, Madhya Pradesh

S. No	Crops & Variety		1992 - 93								1997 - 98							
			Member				Non – Member				Member				Non - Member			
			Small	Medium	Large	Total	Small	Medium	Large	Total	Small	Medium	Large	Total	Small	Medium	Large	Total
1	Jyoti	(ha.)	4.00	11.00	9.00	24.00	2.00	7.00	17.00	26.00	20.70	32.20	69.00	121.90	18.40	28.00	76.00	122.40
		(%)	19.05	33.54	14.38	20.62	12.05	25.93	23.61	22.49	89.22	87.98	93.50	91.25	100.00	90.32	86.96	89.47
2	Sindori	(ha.)	14.00	17.00	35.00	66.00	10.60	13.00	35.00	58.60	1.25	1.50	2.00	4.75	--	--	2.50	2.50
		(%)	66.66	51.83	55.91	56.70	63.86	48.15	48.61	50.69	5.39	4.10	2.71	3.55	--	--	2.86	1.83
3	Chandramukhi	(ha.)	--	0.80	9.00	9.80	--	7.00	13.00	20.00	1.25	2.90	2.80	6.95	--	3.00	8.90	11.90
		(%)	--	2.44	14.38	8.42	--	25.93	18.06	17.30	5.39	7.92	3.79	5.20	--	9.68	10.18	8.70
4	Lavkar	(ha.)	3.00	4.00	9.60	16.60	4.00	--	7.00	11.00	--	--	--	--	--	--	--	--
		(%)	14.28	12.19	15.33	14.26	24.09	--	9.72	9.52	--	--	--	--	--	--	--	--
	Sub Total	**(ha.)**	21.00	32.8	62.6	116.4	16.60	27.00	72.00	115.60	23.20	36.60	73.80	133.60	18.40	31.00	87.40	136.8
		(%)	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Table 6.7 Major varietal shifts of potatoon sample holdings, Madhya Pradesh, during 1992-93 and 1997-98

(Unit – per cent)

S. No	Variety	Percentage Area covered during the year	1992 – 93				1997 - 98			
			Member				Non – Member			
			Small	Medium	Large	Total	Small	Medium	Large	Total
1	Jyoti	1992-93	19.05	33.54	14.38	20.62	12.05	25.93	23.61	22.49
		1997-98	89.22	87.98	93.50	91.25	100.00	90.32	86.96	89.47
2	Sindori	1992-93	66.66	51.83	55.91	56.70	63.86	48.15	48.61	50.69
		1997-98	5.39	4.10	2.71	3.55	--	--	2.86	1.83
3	Chandramukhi	1992-93	--	2.44	14.38	8.42	--	25.93	18.06	17.30
		1997-98	5.39	7.92	3.79	5.20	--	9.68	10.18	8.70
4	Lavkar	1992-93	14.28	12.19	15.33	14.26	24.09	--	9.72	9.52
		1997-98	--	--	--	--	--	--	--	--

The shares of fertilisers and manures in total cost of cultivation of potato were 19.28 and 18.09 per cent on member and non member farms and insecticides and pesticides had shares of 8.46 and 8.13 per cent, respectively, in the total cost.

Table 6.8 showed that hired bullock and hired machine labour (mainly tractors) contributed 2.77 and 3.25 to the total cost of cultivation of potato on member and non member farms, respectively.

Table 6.8 Per hectare cost of cultivation of potato crop selected farmers M.P., 1997-98

(Unit – Rupees)

Particular	Member				Non – member			
	Small	Medium	Large	Total	Small	Medium	Large	Total
INPUTS								
1. Seed	9,816	10,640	9,980	10,132	11,200	9,800	12,032	11,414
	(41.05)	(41.84)	(39.48)	(40.54)	(44.00)	(39.45)	(44.01)	(43.04)
2. Fertiliser / Manure	4,750	4,860	4,820	4,819	4,930	4,825	4,760	4,798
	(19.86)	(19.11)	(19.07)	(19.28)	(19.37)	(19.42)	(17.41)	(18.09)
3. Insecticide / Pesticide	2,090	2,160	2,100	2,115	1,985	1,910	2,280	2,156
	(8.74)	(8.49)	(8.31)	(8.46)	(7.80)	(7.69)	(8.34)	(8.13)
4. Micro nutrient	74	80	80	79	75	75	95	88
	(0.31)	(0.31)	(0.32)	(0.32)	(0.29)	(0.30)	(0.35)	(0.33)
5. Irrigation charges	--	--	165	91	--	85	--	19
			(0.65)	(0.36)		(0.34)		(0.07)
Labour charges								
1. Human labour	6,560	6,940	7,140	6,985	6,680	7,250	7,135	7,100
	(27.43)	(27.28)	(28.24)	(27.95)	(26.24)	(29.18)	(26.10)	(26.77)
2. Machine / bullock labour	582	690	800	691	535	862	930	861
	(2.43)	(2.71)	(3.16)	(2.77)	(2.10)	(3.47)	(3.40)	(3.25)
3. Other charges	42	165	95	78	52	35	106	83.6
	(0.18)	(0.26)	(0.38)	(0.31)	(0.20)	(0.14)	(0.39)	(0.31)
Total (Rs.)	**23,914**	**25,435**	**25,280**	**24,990**	**25,457**	**24,842**	27,338	26,519
	(100.00)	**(100.00)**	**(100.00)**	**(100.00)**	**(100.00)**	**(100.00)**	**(100.00)**	**(100.00)**

6.6 Net price received

The average total cost of production of potato was worked out at Rs. 167.54 on member farms and Rs. 151.03 on non member farms (Table 6.9).

The member farmers incurred higher cost of potato production mainly due to cold storage charges. At the same time they earned higher receipts because of hoarding of potato with the help of cold storages.

The per quintal net profit margin for potato cultivation on member and non member farms was worked out at Rs. 119.46 and Rs. 111.95, respectively.

On member farms, the net profit per quintal was highest (Rs.135.54) on small size group and declined with the increase in the size of farms. In the case of non member farms, the highest (Rs.130.45) profit per quintal was earned by medium size farms and lowest (Rs.100.85) by large farms. However, no trend was noticed between size of farm and profit per quintal. However on both member and non member farms the profit per quintal was lowest on large size farms.

Thus, it can be concluded that cold storages constructed with the help of NHB's soft loan scheme had definitely increased the net profits of member farmers (Table 6.9).

Table 6.9 Cost of production and net profit per quintal of potato, selected farmers, Madhya Pradesh

(Rs. Per quintal)

Particulars	Members				Non Members			
	Small	Medium	Large	Total	Small	Medium	Large	Total
Cost of cultivation	98.41	105.98	108.38	105.53	102.83	103.72	120.75	114.20
Cold storages charges	17.18	20.76	29.14	24.50	--	--	--	--
Marketing cost	34.87	37.61	40.02	37.51	35.26	37.83	37.40	36.83
Total cost	150.46	164.35	177.54	167.54	138.10	141.55	158.15	151.03
Net price received	286.00	291.00	293.00	287.00	263.00	272.00	259.00	263.00
Net profit	135.54	126.65	115.46	119.46	124.90	130.45	100.85	111.95

6.7 Source(s) of income of selected farmers

Household income from different economic activities in which the sample households were engaged and their relative contribution in the total income have been analysed and presented in this chapter. Along with horticulture and agriculture the sample farmers earned income from other sources like service, dairy, agricultural labour and professions.

The per household average income was worked out at Rs.1,44,570 and Rs.1,54,387 on member and non member farms, respectively. Of the total income, horticultural crops contributed 66.84 per cent on member and 56.31 per cent on non member farms, respectively Out of this, contribution of agriculture to total income was found to be 20.54 per cent on member farms and 27.10 per cent on non member farms. Dairy and other professions like service and business contributed around 6 per cent each to total income on member and non member farms.

The contribution of agricultural wage labour to the total income was very low and it was mainly on the small farms (Table 6.10).

Table 6.10 Per family income from different sources, 1997-98

(Unit – Rupees)

S. No.	Particular	Member				Non – member			
		Small	Medium	Large	Total	Small	Medium	Large	Total
1	Agriculture	14,580	24,995	49,500	29,692	12,425	26,810	86,282	41,839
	(%)	17.42	20.05	21.97	20.54	18.42	23.42	30.68	27.10
2	Horticulture	55,223	81,962	1,52,721	96,635	36,167	66,936	1,57,683	86,929
	(%)	65.97	65.74	67.78	66.84	53.61	58.47	56.07	56.31
	Potato	38,206	55,625	99,380	64,404	28,445	48,426	99,778	58,883
	(%)*	69.18	67.87	65.07	66.65	78.65	72.35	63.28	67.74
3	Dairy	4,910	8,705	12,810	8,808	5,420	10,060	20,500	11,993
	(%)	5.87	6.98	5.68	6.09	8.03	8.79	7.29	7.77
4	Agricultural wages	3,125	1,270	--	1,465	4,750	870	--	1,873
	(%)	3.73	1.02	--	1.01	7.04	0.76	--	1.21
5	Other professions / business	5,875	7,750	10,285	7,970	8,700	9,800	16,760	11,753
	(%)	7.02	6.21	4.57	5.52	12.90	8.56	5.96	7.61
	Total	**83,713**	**1,24,682**	**2,25,316**	**1,44,570**	**67,462**	**1,14,476**	**2,81,225**	**1,54,387**
	(%)	**(100.00)**	**(100.00)**	**(100.00)**	**(100.00)**	**(100.00)**	**(100.00)**	**(100.00)**	**(100.00)**

**** Percentage to horticulture***

6.8 Employment

The impact of facilities provided by NHB financed cold storage has been earlier studied for crop pattern of the selected farmers. It was noted that the area under potato increased marginally (from 1.94 ha to 2.22 ha) on member farms. The farmers opined that their income also increased substantially because of the potato and other horticultural crops.

It may however be cautioned that the changes observed in crop pattern and income could not be solely attributed to financing done by NHB for cold storages. Potato was a well established crop of the region. The farmers benefited due to cold storage are those who's storing capacity and duration of storage have increased. Due to these undoubtedly the profits of the farmers and their capacity to hold stocks for a longer period have increased without storage losses. These have marginally affected the increase in area under potato. The increase in income is not only due to potato but also due to growing of other horticulture crops such as onion, garlic, fruits and other vegetables. However these crops have nothing to do with cold storage. Therefore, beneficiary can not be said to have earned higher profit due only to potato cultivation / storages.

As regards employment it may be mentioned that most of the operation of cultivation and post harvest operations are done on contract basis. Since these are done on per hectare basis the higher cost of operations do not reflect the increase in employment only but also general increase in wages and prices. It is, therefore, not possible to quantify pre and post labour requirement for potato separately. Therefore, it is not possible to pin point the increase in employment days due to post harvest infrastructure developed under NHB's soft loan scheme. Moreover to asses the impact it is probably too early as the cold storages were established only recently.

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CHAPTER VII

MARKETING OF POTATO

In this chapter we have discussed the marketing system, marketable surplus, marketing channels, post harvest losses, and marketing costs of potato. Lastly, various sources of information are also studied.

7.1 Production and marketable surplus

Potato is an important vegetable crop of the region, and command very large area. This crop was grown by all the selected farmers irrespective of size of farms. Since some of the varieties mature early, farmers, grew these between kharif and rabi seasons by adjusting the sowing dates of subsequent rabi crop.

The average area under this crop on small, medium and large member farms was 1.16 hectares, 1.83 hectares and 3.69 hectares respectively. The crop was grown on 0.92 hectare, 1.55 hectares and 4.37 hectares on small, medium and large non member farms respectively. Since the crop is well adjusted in the cropping pattern all the farmers adopted almost similar package of practices, irrespective of size groups. The average yield varies between 226.40 to 247.55 quintals per hectare on the different size of farms. However, study revealed that small farmers of both the groups received higher yields as compared to medium and large farms. Study further revealed that by making use of the PHI facility spoilage of produce was lower on member farms than non member farms i.e. 3.88 per cent, 4.40 per cent and 5.06 per cent of the total production on small medium and large member farms as compared to 5.81 per cent, 5.40 per cent and 6.87 per cent on the respective non member farms. The quantity of potato sold ranged between 82.81 per cent and 85.80 per cent of the total production (Table 7.1).

Table 7.1 Productionand utilisation of potato on sample farms, Madhya Pradesh.

S. No.	Particulars	Member				Non member			
		Small	Medium	Large	Total	Small	Medium	Large	Total
1 a)	Sample size (No.)	20	20	20	60	20	20	20	60
b)	Sample farmers growing the crop %	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
c)	Average area exclusive of the area under contract (hect.)	1.16	1.83	3.69	2.22	0.92	1.55	4.37	2.28
2	Total Production (qtls.)								
a)	Per farm	282.00	439.80	860.75	525.70	227.75	371.25	989.37	529.42
b)	Per hectare	243.00	240.00	233.26	236.80	247.55	239.50	226.40	232.20
3	Per cent utilisation :								
a)	Spoilage	3.88	4.40	5.06	4.67	5.81	5.40	6.87	6.37
b)	Home consumption	0.68	0.66	0.38	0.48	0.87	0.66	0.64	0.68
c)	Fed to animals	--	--	--	--	--	--	--	--
d)	Kept for seed	10.60	10.54	10.72	10.65	7.52	10.00	9.68	9.44
c)	Sold	84.83	84.40	83.84	84.20	85.80	83.94	82.81	83.51

7.2 Marketing channels

Marketing of any commodity involves many functionaries in order to transfer produce from producer to ultimate consumer. Marketing of potato in the state, like most of the states does not come under a regulated marketing system and gives less dividend to producers and high profits to agents and traders.

The farmers disposed of the produce mainly through four channels i.e. 1. Producer – consumer, 2. Producer retailer – consumer 3. Producer - Processing units – consumer, and 4. Producer – Commission agent - Wholesaler – Retailer – Consumer.

Of these, channels, Producer - commission agent – wholesaler –Retailer –consumer was the most commonly used channel. This channel commanded slightly more than 80 per cent of the total potato sold. The commission agent purchased the potato from the farmers either on behalf of wholesale merchant or by acting as wholesale trader. He purchased the produce either at village point or at mandies situated in nearby towns. It can be seen from the table that 79.20 per cent 88.60 per cent and 80.20 per cent on small, medium and large member farms and 81.36, 84.17 and 81.83 per cent of small, medium and large non member farms was sold through this channel.

In the last 2-3 years. some small and big processing units like "Uncle chips" have started purchasing potato from growers by establishing collection centres at village points or at *mofussil* towns. Nearly 14 per cent of total produce sold by member farm and 13 per cent by non member farms was routed through this channel. The remaining produce was directly sold to retailers and consumers (Table 7.2).

Table 7.2 Marketing channels of potato, selected farms, M.P., 1997-98

(Figures in quintals / hectare)

S. No.	Particulars	Member				Non member			
		Small	Medium	Large	Total	Small	Medium	Large	Total
1	Producer-commission agent- Wholesaler- retailer- consumer	163.26	179.47	156.94	164.21	172.81	169.22	153.42	159.61
		(79.20)	(88.60)	(80.20)	(82.36)	(81.36)	(84.17)	(81.83)	(82.32)
2	Producer- retailer- consumer	9.69	7.56	--	3.75	8.28	8.10	9.43	8.97
		(4.70)	(3.73)	--	(1.88)	(3.90)	(4.03)	(5.03)	(4.63)
3	Producer – consumer	4.33	2.02	4.03	3.53	3.42	1.95	--	0.90
		(2.10)	(1.00)	(2.06)	(1.77)	(1.61)	(0.97)	--	(0.46)
4	Producer – processing unit - consumer	28.86	13.51	34.71	27.89	27.89	21.77	24.63	24.42
		(14.00)	(06.67)	(17.74)	(13.99)	(13.13)	(10.83)	(13.14)	(12.59)
	Total sold	206.14	202.56	195.68	199.38	212.40	201.04	187.48	193.90
		(100.00)	(100.00)	(100.00)	(100.00)	(100.0)	(100.00)	(100.0)	(100.0)

Figures in parentheses indicate per cent to total quantity sold

7.3 Marketing costs

In the absence of regulated markets for horticulture produce farmers have to rely on middlemen and commission agents. These commission agents charged 7-8 per cent of the sale price. Apart from this farmers also have to bear other charges like loading / unloading, mandi taxes , transportation charges, etc. The study revealed that the average marketing cost of potato showed a moderate difference across different size of farms and ranged between Rs.34.87 and

9.69/206.14 x 100 = 4.70

Rs.40.02. Among the various costs incurred commission charged by agent as fee, was most important followed by bags, transportation charges and loading / unloading charges (Table 7.3).

Table 7.3 Marketing cost of potato, selected farmers, M.P.

(Figures – Rs. / qtls.)

S. No.	Particulars	Member				Non member			
		Small	Medium	Large	Total	Small	Medium	Large	Total
1.	Transport	6.13	6.97	7.94	7.01	5.92	7.19	8.44	7.18
2.	Loading / unloading	3.36	3.08	3.78	3.41	3.65	3.87	3.12	3.54
3.	Packaging	9.13	9.22	10.56	9.64	10.45	10.58	10.34	10.46
4.	Commission and fee	15.72	17.62	16.60	16.33	14.85	15.37	14.53	14.92
5.	Others	0.53	0.72	1.12	1.14	0.39	0.82	0.97	0.73
	Total	34.87	37.61	40.02	37.51	35.26	37.83	37.40	36.83

7.4 Post harvest losses

Potato farmers generally lost a good part of the produce during the various post harvest operations like assembling, grading, loading / unloading, packing, transportation and storage. Study revealed that the member farmers lost 4.67 per cent and non member farmers lost 6.37 per cent of the total production during post harvest operations which ranged between 3.88 per cent to 5.06 per cent on member and 5.81 to 6.87 per cent on non member farms. All the farmers reported highest losses during the digging of potato. Farmers also lost sizeable part of the production during grading. Study revealed that delay in marketing posted a loss on non member farms. The lower percentage of potato loss on member farms as compared to non member farms clearly indicated that development of post harvest facilities (cold storage) have definitely helped to reduce the losses on member farms (Table 7.4).

Table 7.4 Post harvest losses for potato, selected farmers, M.P., 1997-98

(Figures – qtls. / hectares)

S. No.	Particulars	Member				Non member			
		Small	Medium	Large	Total	Small	Medium	Large	Total
A	a. Harvesting	4.11	5.91	9.71	7.72	5.60	5.22	11.32	9.18
		(43.64)	(55.97)	(82.23)	(69.61)	(38.95)	(40.37)	(72.80)	(62.03)
	b. Grading	2.62	2.52	1.08	1.74	2.76	2.17	1.70	2.31
		(27.81)	(23.46)	(9.14)	(15.69)	(19.19)	(16.78)	(10.93)	(15.61)
	c. Packing	0.80	0.63	0.15	0.40	1.10	1.20	0.44	0.70
		(8.49)	(5.97)	(1.27)	(3.60)	(7.65)	(9.28)	(2.83)	(4.73)
	d. Loading/ unloading	0.44	0.42	0.25	0.33	0.72	0.71	0.45	0.55
		(4.67)	(3.98)	(2.11)	(2.98)	(5.01)	(5.49)	(2.89)	(3.72)
	e. Transportation	0.75	0.56	0.36	0.49	0.91	0.88	0.33	0.53
		(7.96)	(5.30)	(3.05)	(4.42)	(6.33)	(6.81)	(2.12)	(3.58)
	f. Storage	0.70	0.52	0.26	0.41	--	--	--	--
		(7.43)	(4.92)	(2.20)	(3.70)	--	--	--	--
	g. Delay in marketing	--	--	--	--	3.29	2.75	1.31	1.53
		--	--	--	--	(22.88)	(21.27)	(8.43)	(10.33)
	Total losses	9.42	10.56	11.81	11.09	14.38	12.93	15.55	14.80
		(100.00)	(100.00)	(100.00)	(100.00)	(100.0)	(100.00)	(100.0)	(100.0)
B.	**Total production**	243.00	240.00	233.26	236.80	247.55	239.50	226.40	232.20
C.	**Losses (% to total production)**	3.88	4.40	5.06	4.67	5.81	5.40	6.87	6.37

Figures in parentheses indicate per cent to total losses

7. 5 Marketing information

The marketing information about prevailing market prices, taxes, demand of any product, etc. came from various sources and table 7.5 showed that traders and agents were the most important sources of marketing information as 75 per cent of member and 70 per cent of the non member farmers relied on this source. However, it can be seen from the table that cooperative societies played very important role in disseminating vital marketing information among member farmers (75 per cent). Apart from these, 58.33 per cent member farmers and 43 per cent non member farmers reported that they received information directly from the market. Relatives, friends, newspaper, pamphlets and extension agencies also played a good role. However, very low percentage of farmers reported television, radio, exhibition and *kisan melas* as good sources of information.

The exposure to meetings, demonstrations, training classes and educational tour was almost negligible (Table 7.5).

Table 7.5 Sources of marketing information, selected farmers, M.P. 1997-98

S. No.	Source of information	Percentage of sample farmers using the sources*							
		Member				Non member			
		Small	Medium	Large	Total	Small	Medium	Large	Total
1	Meetings	--	--	--	--	--	--	--	--
2	Demonstrations	--	--	10	3.33	--	--	10	3.33
3	Training classes	--	5	5	3.33	--	5	--	1.66
4	Education tour	--	5	--	1.66	--	--	--	--
5	Television.	20	25	45	30.00	15	35	35	28.33
6	Radio	--	--	--	--	--	5	5	3.33
7	News paper	30	85	85	66.67	40	55	50	48.33
8	Pamphlets	15	35	85	38.33	15	10	65	30.00
9	Journal / magazine	--	--	10	3.33	--	--	--	--
10	Exhibition / melas	25	10	30	21.67	10	25	25	20.00
11	Traders / Agents	75	65	85	75.00	53	85	70	70.00
12	Direct contacted with market	30	45	100	58.33	10	25	90	43.00
13	Cooperative society	75	75	75	75.00	--	--	--	--
14	Agricultural University	10	--	10	6.66	--	45	15	10.00
15	Ext. agents / meetings	25	30	30	28.33	25	20	35	26.66
16	Progressive farmers	5	--	--	1.66	--	--	25	8.33
17	Friends /relatives /and neighbors	35	35	55	41.66	--	50	50	33.33

** The total will not be 100 as a farmer got information from multiple sources.*

CHAPTER VIII

PROBLEMS OF FARMERS AND PHI UNITS

This chapter deals with the various problems faced by the farmers. These problems related to cold storage, transportation, marketing and marketing information, packaging material and skilled labour. Apart from this PHI units also faced various problems. The chapter describes

A. Problems faced by selected farmers
B Problems faced by PHI units
C Suggestions

8.1 Problems faced by selected farmers

8.1.1 Cold storage problems

Majority (66.67 per cent) of the member farmers did not experience any problem with cold storage. However, 10 per cent member farmers reported the inadequate capacity. About 10 per cent also complained about the step motherly treatment and favourism, 8.33 per cent farmers reported faulty weighing practices.(Table 8.1)

Table 8.1 Various problems faced by selected member farmers regarding cold storage (PHI unit), 1997-98

(Figures – Percentage)

Particulars	Member farmers			
	Small	Medium	Large	Total
1. Inadequate cold storage facility	-	10	20	10.00
2. Storage facility available far away	-	10	05	05.00
3. Faulty weighing practices	15	10	-	8.33
4. Favoritism	10	15	05	10.00
5. No problem	75	55	70	66.67

Non member farmers did not become members for various reasons and, therefore, had no problem w.r.t. cold storage.

8.1.2. Transportation problems

Transportation of potato was not a major problem and vehicles were available easily. However, 28.33 per cent member and 45 per cent non members said that transportation charges were quite high.

Since most of the villages were well connected with all weather roads only 5 per cent non member farmers complained about lack of all weather roads.

Further, 8.33 member farmers and 11.66 per cent non member farmers reported that their farms were not approachable by road (Table 8.2).

Table 8.2. Various problems faced by selected member farmers regarding transportation and roads 1997-98

Particulars		Member				Non member			
		Small	Medium	Large	Total	Small	Medium	Large	Total
A	**Road Problems**								
	1. No approach road to –								
	a) Village	--	--	--	--	--	--	--	--
	b) Farm	15.00	--	10.00	8.33	10.00	15.00	10.00	11.66
	2. Lack of all weather road	05.00	10.00	--	5.00	05.00	10.00	10.00	8.33
	3. No problem	80.00	90.00	90.00	86.66	85.00	75.00	80.00	80.00
B	**Vehicle Problems**								
	1. Lack of vehicle	--	--	--	--	--	--	--	--
	2. High transportation charges	40.00	25.00	20.00	28.33	65.00	35.00	33.00	45.00
	3. No problem	60.00	75.00	80.00	71.67	35.00	65.00	65.00	55.00

8.1.3 Market information

Information on daily market demand and prices is a must for better prices and 35.00 per cent member and 41.66 per cent non member farmers informed that information on markets was available only for limited markets and 11.66 per cent member and 20.00 per cent of non member farmers reported information was inadequate. However, table revealed that as compared to non member farmers, member farmers were better informed because they were always in touch with their society and got market information (Table 8.3).

Table 8.3 Various problems faced by the selected farmers regarding marketing

(Per cent multiple response)

Particulars		Member				Non member			
		Small	Medium	Large	Total	Small	Medium	Large	Total
A	**Market information**								
	a) Inadequate	20.00	15.00	--	11.66	30.00	15.00	15.00	20.00
	b) Information available for limited markets only	45.00	40.00	20.00	35.00	55.00	35.00	35.00	41.66
	c) No problem	55.00	60.00	80.00	65.00	40.00	60.00	55.00	51.66
B	**Selling problem**								
	a) Deduction charges high	65.00	40.00	55.00	53.33	45.00	60.00	45.00	50.00
	b) Part payment	--	25.00	--	8.33	15.00	15.00	10.00	13.33
	c) Delay in payment	5.00	15.00	--	6.66	--	20.00	--	6.66
	d) Do not take consent while selling.	--	--	--	--	--	--	--	--
	e) Quote lower prices than prevailing	10.00	15.00	5.00	10.00	25.00	10.00	15.00	16.66
	f) Faulty weighing practices in mandis	25.00	35.00	10.00	23.33	30.00	25.00	25.00	26.66
	g) No problem	30.00	25.00	45.00	33.00	15.00	20.00	55.00	30.00

8.1.4 Selling problems

Majority of the farmers (including both member and non member farmers) faced various problems regarding part payment, malpractices during weighing in mandis, high and undue charges deducted by agents, etc. However, more than 50 per cent of the farmers said that commission charges deducted by agents were very high and these should be reasonable. Faulty weighing practice was a major problem and 23.33 per cent member and 26.66 per cent of non member farmers opined that this should be stopped (Table 8.4).

8.1.5 Problems regarding harvesting, grading, packing and packing material and prices received.

Timely availability of labour is a major problem. Therefore, farmers paid higher amount to the contractors for timely digging of potato.

Similarly in grading and packing farmers felt the importance of the mechanised grading facility and therefore 43.33 per cent of member and 46.66 per cent non member farmers reported the shortage of skilled labour. Since grading and packing was a part of harvesting contract only 18.33 per cent of member and 15.00 per cent of the non member farmers reported it as a problem. Packaging material mainly gunny bags were available easily. None of the farmer complained about this. However, some farmers felt that quality of the gunny bags should be improved (Table 8.4).

Table 8.4 Various problems faced by the selected farmers regarding harvesting, grading, packing, packing material and other problems

(Per cent multiple response)

Particulars		Member				Non member			
		Small	Medium	Large	Total	Small	Medium	Large	Total
A	**Picking / Plucking / Harvesting**								
	a) Shortage of labour	-	45.00	45.00	46.66	45.00	65.00	25.00	45.00
	b) High wages	55.00	45.00	50.00	50.00	50.00	55.00	35.00	46.66
	c) No problem	45.00	55.00	35.00	45.00	30.00	30.00	45.00	35.00
B	**Grading / Packing**								
	a) No grading/packing centre with equipments	20.00	25.00	15.00	20.00	25.00	15.00	25.00	21.66
	b) Shortage of skilled labour	20.00	55.00	55.00	43.33	30.00	45.00	65.00	46.66
	c) High wages	25.00	15.00	15.00	18.33	15.00	20.00	10.00	15.00
	d) No problem	45.00	35.00	25.00	35.00	65.00	30.00	35.00	43.33
C	**Packing material**								
	a) Higher prices	30.00	20.00	25.00	25.00	50.00	15.00	25.00	30.00
	b) Shortage of packing material	-	-	-	-	-	-	-	-
	c) Not available on credit	-	-	-	-	20.00	-	-	6.00
	d) Lack of improved packing material	-	30.00	65.00	31.66	-	20.00	45.00	21.66
	e) No problem	70.00	80.00	75.00	75.00	35.00	80.00	65.00	60.00
D	**Other problems**								
	a) Not received fair price	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

All the farmers said that they sometimes received fair prices due to wide variation in the prices and dumping by the farmers of Punjab and U.P.

8.2 Problems faced by PHI units

In Madhya Pradesh National Horticulture Board has financed all the four projects for the development of post harvest infrastructure facilities. However, all these were developed only for potato and some such crops and not for other commodities or crops.

Since it is predominantly a potato growing area, these units did not face the problem of under utilisation of capacity due to non availability of potato despite a large number of cold storages located around.

The major problems faced by these units were power cut, inadequate loan amount. non availability of specialised storage technology for crops like onion, garlic, flowers, fruits, etc. and unhealthy competition.

Of the four units, three reported timely disbursement of loan amount. Only ***Maa Harsiddhi fal avam sag bhaji utpadak sahkari samiti, Ujjain*** reported the non disbursal of loan.

Since no unit was developed for export business or as a production unit or for transportation the problems related to freight, export information, packaging material, inadequate port facilities were of no concern.

8.3 Suggestions

1. Efficient market information network should be evolved for higher returns to the farmers.

2. On the lines of agricultural crop mandis proper regulated markets for horticultural crops especially potato should be established to avoid exploitation of the farmers as well as consumers.

3. Co-operative marketing societies for horticulture crops should be established.

4. Mechanisation of grading / packing should be ensured and good quality packing material should be made available.

5. Potato and other horticulture crops based processing units should be encouraged in private as well as in cooperative sector.

6. NHB should diversify in other sectors like specialised storage for onion, garlic, flowers, fruits, etc. because these storages are in demand from the farmers.

7. The loan component should be enhanced looking to the higher establishment cost of the storage.

8. NHB should take up the export promotion business as well as provide consultancy service.

9. Dry dock should be established at Indore.

10. NHB should finance units in unrepresented areas.

11. On the line of technology missions on oilseeds, pulses and maize (TMOPM) a technology mission on vegetables should be established to cater the multifarious aspects of production, marketing, processing and utilisation of vegetables.

12. The support price of perishable horticulture commodities and establishment of commodity boards and market intervention by state government will bring stability in the horticultural industry.

13. Technology transfer is generally weak in horticulture. Large scale demonstration of technology, vocational training of extension functionaries to upgrade the skill for effective transfer of technology is required.

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CHAPTER IX

SUMMARY AND CONCLUSIONS

9.1 India is the second largest producer of vegetables with 13 per cent share after China and largest producer of fruits with 10 per cent share in the world production. These (vegetables and fruit) together contributed 90.2 per cent of production and 65.8 per cent of the horticulture area in country. India is also a major flower growing country with total area of 35,000 hectares.

In Madhya Pradesh, the total area under fruits, vegetables and spices was 59.7 thousand hectares, 202.9 thousand hectares and 262.1 thousand hectares respectively in 1996-97. The area under flowers was negligible.

Among the vegetable potato alone contributed 24.7 per cent to the total area under vegetables.

But unfortunately a big quantum of the produce gets perished or spoilt due to mishandling and inadequate post harvest infrastructure facilities and therefore, National Horticulture Board initiated various projects/programmes to control the losses by strengthening PHI infrastructure system in the country. Two such schemes were- (1) Post harvest management of horticultural crops (2) Development of marketing of horticultural produce through soft loan scheme. The main thrust of these schemes was to create efficient post harvest infrastructure that would reduce losses improve quality, facilitate export and internal trading and ultimately give a better remuneration to the farmers.

However, lately due to some problems and mismanagement these units did not perform as efficiently as these were expected to perform. Therefore, NHB desired to analyse these units with the objectives of –

1. To analyse the NHB soft loan scheme with regard to adequacy of loan and infrastructural development.
2. To study the use of created facilities by farmers and its impact on their cropping pattern, income and employment, and,
3. To study the problems faced by the selected farmers and PHI units.

9.2 The study was carried out in those areas of the state where the post harvest infrastructure facilities (i.e. cold storages) were developed with the help of NHB's soft loan scheme. Data was also collected from 60 member farms (using PHI facilities developed through NHB loan) and 60 non member farms (who did not use any PHI facilities developed either by NHBs loan or by any anyother agencies including private sector spread over different farm size to asses the utilisation of various PHI facilities created by NHB. Since we did not find any export oriented unit we have not studied such units.

9.3 Horticultural crops occupied an insignificant area in Madhya Pradesh and the situation did not change in the last five years. The percentage of area occupied by the horticultural crops fluctuated between 1.77 in 1992-93 to 2.22 in 1996-97.

Among horticultural crops spices occupied about half (49.83 per cent) fruit crops including plantation crops 11.1 per cent and flower occupied only 0.28 per cent area of the total horticultural area of the state.

The total area increased to 5.25 lakh hectares in 1996-97 from 4.19 lakh hectares in 1991-92. The total production increased to 44.03 lakh tonnes in 1996-97 from 32.87 lakh tonnes in 1991-92.

9.4 The majority (68.34 per cent of member and 51.67 per cent of non member) of the selected farmers represented a very hard working entrepreneurial community *Patidar*. A few of the selected farmers belonged to scheduled caste and other community and none of the selected farmer belonged to scheduled tribes community. Almost all the farmers had formal education. The family size was larger on the large farms as compared to other farm size groups. The proportion of males was higher as compared to females in all the farms. The size of operational holding was 1.56, 2.80 and 5.75 hectares on small, medium and large member farms respectively whereas, it was 1.39, 2.96 and 9.52 hectares on the respective non member farms.

The farm assets per household valued Rs.34,401, Rs.90,552 and Rs.1.55.090 for small , medium and large member farms. Similarly it was Rs.32,583 Rs.97,936 and Rs.1,00,246 for small, medium and large non member farms.

9.5 The share of NHB soft loans in the total financial requirements of the project undertaken by various organisations in Madhya Pradesh ranged between 12 to 40 per cent with total amount to the tune of 1.05 crores. The facilities developed (mainly cold storages) through NHB soft loan was 100 per cent utilised by *Maa Unia Sahkar Samiti, Jamali, Indore.* The other unit (a private sector PHI) *M/s Chandhuri Cold Storage Shajapur,* reported 90 per cent capacity utilisation since inception i.e.1996-97.

The remaining two cooperative sector PHI units viz. *Shiv Shankar Sahkari Samiti, Indore* and *Ma Har Siddhi Sahkari Samiti, Ujjain* reported only 40 per cent capacity utilisation because these units operationalised in the year 1997-98. The cold storage facility developed through NHB soft loan was utilised by only potato growers. In the study area potato stored was 25.08, 32.33 and 45.70 per cent of the total quantity of potato sold by small, medium and large farms respectively.

9.6 No change was found in the average owned land holding. However, because of the cultivation on leased in land taken by small and medium member farmers operational holdings changed marginally over the period (0.08 and 0.04 ha. respectively). Similarly on non member farms operational holdings changed on small and large farms by 0.04 and 0.01 ha. respectively.

The area under fruit crops remained the same over the years. The area under vegetables increased by 11.00 per cent and 26.45 per cent on member and non member farms respectively. While flowers registered a decline in area on member farms its area increased by 10 per cent on non member farms during the period. Other agricultural crops also registered significant increase in area and due to this increase in area the cropping intensity also increased.

Soybean was the most popular kharif crop and occupied almost entire area leaving very marginal area for other crops.

Among rabi crops (excluding vegetables) wheat was the most commonly grown crop followed by gram and lentil.

Among horticulture crops, potato occupied highest area followed by onion and garlic. The area under potato increased by 0.11. 0.19, and 0.56 hectare on member farms respectively, whereas, it increased by 0.09, 0.20 and 0.77 hectare on respective non member farms during the same period.

Fruit crops were not popular among the member farms and only non member farms had some orchards of guava and orange. The average value of assets of member as well a non member farms increased by 41.62 per cent and 33.98 per cent respectively over the period.

There was an increase in average number of milch animals on all the selected farms due to increased demand of the milk in the area. However bullocks registered a decline over the period. This decline was more prominent on large member (19.44%) and medium non member (10.53 per cent) farms respectively. Tractors, sprayers, irrigation equipments and electric pumps registered an increase over the period.

Farmers adopted new high yielding varieties very quickly if available in time and *Jyoti* variety was very popular among all the farmers.

The average per hectare cost of cultivation was Rs.24,990 and Rs.26,519 on members and non member farms respectively. Seed was the costliest input and accounted for more than 40 per cent of total cost. Since potato is a highly labour intensive crop labour charge contributed 27.95 and 26.77 per cent on member and non member farms. Fertilisers / manures and pesticides / insecticides also contributed significantly in the total cost.

Cold storages constructed with the help of NHB's soft loan scheme had definitly increased the net profits of member farmers. The per quintal net profit on member non member farms was Rs.119.46 and Rs. 111.95 respectively.

An average member and non member farm earned Rs.1,44,570 and Rs.1,54,387 respectively. Of the total income, horticulture crops contributed 66.84 per cent and 56.31 per cent on member and non member farms respectively. Out of this, potato alone contributed 66.65 per cent and 67.74 per cent on respective farms. Agriculture contributed 20.54 per cent and 27.10 per cent respectively on member and non member farms. Dairy and other professions also contributed around 6 per cent each to total income.

9.7 More than 80 per cent of the total production of potato was available for sale in the market after keeping for seed, home consumption and spoilage.

Almost 80 per cent of total potato production was sold through commission agents in the nearby primary markets. Freight, commission charges and packaging cost were the prominent items of marketing cost. The post harvest facilities definitely reduced the losses of potato during post harvest operations specially to member farmers occuring due to delay in marketing and enhanced hoarding capacity of the member farmers for better prices. Traders, agents, cooperative societies, markets, news papers, pamphlets and friends and relatives were the major sources for providing marketing information.

9.8 Potato is a well established crop since long lime therefore, the farmers did not face many problems regarding market information, packaging, grading, transportation etc. However, some farmers reported high freight charges, high labour charges, deduction of more and undue charges by middleman or agents, part payment, less prices quoted for their produce. Some farmers desired that new packaging material should be made available to check the damages during the stocking inside the cold storage. Some farmers reported the poor condition of all weather roads. The units developed under NHB Soft Loan Scheme reported problem regarding non availability of specialised technology for other crops like union, garlic, fruits, flowers, etc.

There is an urgent need to further strengthen PHI facilities in the unrepresented areas of the state and introduction of new storages for other important horticulture crops as well. Regulation of markets, price policy and development of efficient market information system should be established to ensure higher returns to the farmer. Technology mission on vegetables should be established. Export promotion scheme, dry dock and processing unit be established with the help of NHB in the state.

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Annexure –I

COMMENTS ON DRAFT REPORT BY DESIGNATED AERC UNIT PUNE

TITLE OF THE STUDY REPORT : EVALUATION OF SOFT LOAN SCHEME FOR THE DEVELOPMENT OF POST HARVEST INFRASTRUCTURE FOR HORTICULTURAL CROPS IN MADHYA PRADESH

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ORGANISATION : AGRO- ECONOMIC RESEARCH CENTRE FOR MADHYA PRADESH AND CHHATTISGARH, JN KRISHI VISHWA VIDYALAYA, JABALPUR

4. DETAILED COMMENTS ON METHODOLOGY ADOPTED FOR THE STUDY :

The methodology has been adopted as per the guidelines supplied to the centre. However, the author may please indicate the names of the villages/catchment area selected for the study.

5. COMMENTS ON THE ADEQUACY AND QUALITY OF COVERAGE ON EACH OBJECTIVES OF THE STUDY

Could be considered adequate in the light of the constraints faced by the author to acquire data on various aspects from various sources.

6. COMMENTS ON THE PRESENTATION AND GET-UP, ETC. OF THE REPORT

a. The first objective, to study the growth of PHI facilities for horticultural crops in Madhya Pradesh has not been included in the study as indicated by the Coordinating Centre. The objective along with other suggestions made in the text may be incorporated in the Chapter I.

b. It is difficult to make out the meaning from many statements made in chapter III. Some statements are rewritten and suggestions are made to rewrite other statements. The Chapter may please be revised considering the suggestions made in the text.

c. The sources of data/ information may be provided for Tables 1.1, 1.2, 3.1, 3.2, 3.3 and 3.4.

d. The information on the performance of horticultural export units in Madhya Pradesh needs to be added in the report.

e. A chapter on "growth profile of post-harvest infrastructure for horticultural crops in M.P." needs to be added in the report.

f. In Table 6.1, the author has excluded horticultural crops from the area under *kharif, rabi and summer* seasons. There is nothing wrong to provide this information separately. However, it is to be noted that most of the horticultural crops included in this study are field crops like vegetables and flower crops and, therefore, these crops should also have been included in the total net cultivated area under *kharif, rabi and summer* seasons. It is better if the author provides these information in the following sequence.

A. Landholding – (I) Owned land, (ii) Operational Holding; B. Land Use-1. Fallow land, 2. Barren/Waste land, 3. Land under Misc. Tree, etc. 4. Net cultivated Area, 5. Area under Kharif (including vegetable and flower crops), 6. Area under Rabi (including vegetable and flower crops), 7. Area under Summer (including vegetable and flower crops), 8. Area under Perennial – of which under fruits, 9. Area under Vegetables (K+R+S), 10. Area under Flower (K+R+S), 11. Gross Cropped Area (5+6+7+8), 12. Cropping Intensity (%).

g. Table 6.2 should provide information regarding actual area under *kharif, rabi, summer* and fruit crops. Proportions of acreages under each crop should be provided within brackets. However, these percentages should be worked out separately from the total net cultivated area under *kharif, rabi and summer* seasons.

7. OVERALL VIEWS ON ACCEPTABILITY OF THE REPORT

The report may be accepted after the necessary revisions are made on the suggested lines. The substantial comments made in the report should be useful in finalizing the report.

Date : July 11, 2001