

# **IMPACT OF MACRO MANAGEMENT OF AGRICULTURE SCHEME IN PUNJAB**

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## **Preface**

Macro management of agriculture scheme was initiated during 2000 by the integrating various centrally sponsored schemes to accord greater flexibility to State Governments to develop and pursue activities on the basis of regional priorities. It was, thus, a major step towards achieving decentralization in pursuance of restoring primacy of States in agricultural development planning. Ever since the implementation of Macro Management of Agriculture Scheme in the state, study on the impact of its Seed Plan and Integrated Pest and Weed Management Sub Schemes has not been carried out. Hence, the present study tried to examine these aspects with the following specific objectives

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Authors

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# CHAPTER 1

## INTRODUCTION

### **Backdrop:**

Macro management of agriculture scheme was launched on November 2000 to move away from schematic approach to macro management mode by the integrating 27 centrally sponsored schemes. The previous pattern of rigid uniformity structured centrally sponsored schemes, permitting little or no flexibility, which resulted in large unutilized balances with states, was dispensed with. Integration of Centrally Sponsored Schemes under Macro Management approach enhanced the productivity of support programmes and accord greater flexibility to State Governments to develop and pursue activities on the basis of regional priorities. It is, thus, a major step towards achieving decentralization in pursuance of restoring primacy of States in agricultural development planning. The Central Government supplements the state Governments' efforts through regionally differentiated work plans comprising crop/area/target group specific interventions, formulated in an interactive mode and implemented in spirit of partnership with the states. Central Government provides 90 per cent of the outlay to states and 10 per cent is the share of the State.

### **Aims of Macro Management Scheme include:**

- Reflection of local needs/crop/regions specific/priorities, etc.;
- Providing flexibility and autonomy to states;
- Optimum utilization of scarce financial resource;
- Maximization of returns;
- Removal of regional imbalances.

Budgetary allocation of central Government has increased significantly from Rs. 381.88 crore in 2000-01 to Rs. 910.00 crore in 2006-07 for the proper implementation of the scheme. Out of this amount, about 44 per cent of the outlay has been spent on natural resource management activities, 15 per cent for the promotion of agricultural mechanization, 17 per cent on the crop production programme, 9 per cent on integrated nutrient and pest management activities, 5 per cent on the seed development programme, and around 10 per cent on innovation.

### **Macro Management of agriculture scheme in Punjab**

The scheme entitled “macro-management of agriculture scheme for supplementation /complementation of states efforts to work plans”, was approved in October 2000 by integrating the various identified Central Sponsored Schemes (Box 1).

Under this scheme, the state of Punjab had Rs. 27.50 crore (Rs. 25.00 crore GOI + Rs. 2.50 crore state share) during 2000-01 for the specific purposes i.e. development of agriculture and horticulture, improving infrastructure for agricultural marketing and for better soil conservation and water management in the state. Since then, the state Government has been receiving funds under this scheme on regular basis for the thrust areas. During 2004-05, Rs. 16.67 crore (Rs. 15.00 crore GOI + Rs. 1.67 crore state share) was available with the state Government for the improvements in prioritized areas such as agriculture including agricultural marketing, horticulture, soil conservation and water management, and cooperation. Similarly, an amount of Rs. 22.22 crore (Rs. 20.00 crore GOI + Rs. 2.22 crore state share) was funded for agriculture including agricultural marketing and soil conservation and water management purposes for the year 2007-08. The major portion of funding (60% or more) under macro management scheme was sanctioned under the head

agriculture including agricultural marketing in Punjab during all the years. The funding under this head accounted for as high as 69 per cent in 2000-01, 61 per cent in 2004-05 and 60 per cent during 2007-08 (Table 1.1.1). The proposed state action plan included seed plan and better pest/weed management for yield enhancement and cost optimization. The seed plan action was aimed at boosting agriculture production through providing certified seed/adoption of better seed replacement for wheat and paddy, seed multiplication and seed treatment for major crops.

<b>Box 1</b>	
<b>Centrally sponsored schemes merged under Macro Management Component</b>	
1	Assistance to Cooperative Weaker Section
2	Assistance to Women Cooperative
3	Non-overdue Cover Scheme
4	Agricultural Credit. Stabilization Fund
5	Special Scheme for SC/ST
6	Integrated Cereal Development Programmes in Rice Based Cropping System Areas
7	Integrated Cereal Development Programmes in Wheat Based Cropping System Areas
8	Integrated Cereal Development Programmes in Coarse Cereals Based Cropping System Areas
9	Sustainable Development of Sugarcane Based Cropping System Areas
10	Balanced and Integrated Use of Fertilizers
11	Promotion of Agricultural Mechanization among Small Farmers
12	Integrated Development of Tropical, Arid and Temperate Zone Fruits
13	Production and Supply of Vegetable Seeds
14	Development of Commercial Floriculture
15	Development of Medicinal and Aromatic Plants
16	Development of Roots and Tuber Crops
17	Development of Cocoa and Cashew
18	Integrated Development for Development of species
19	Development of Mushrooms
20	Use of Plastic in Agriculture
21	Bee-Keeping
22	National Watershed Development Project for rainfed Areas
23	Schemes for Foundation and Certified seed Production of Vegetable crops
24	Soil Conservation In Catchment Of River Valley Projects and Flood Prone Rivers
25	Reclamation and Development of Alkali Soils State Land Use Boards

To follow the recommendation for seed replacement, wheat and paddy was provided to the farmers on 25% subsidy during the years 2001-02 onwards. In order to save the grains in stores from insect/pests, from rats in field/stores, good quality plant protection equipments and plant protection material was needed. The pest/weed management scheme was therefore targeted to weed control, rat control, providing plant protection equipments, setting up of Bio-Control Laboratory and strengthening of Pesticides Testing Laboratories. To promote Integrated Pest Management approach, demonstrations-cum training was conducted in those areas where occurrence of diseases and pests were frequent on cotton crop. During 2005-06, insecticides/pesticides and plant protection equipments were provided to the farmers at 25 per cent subsidized rates. The summary of funds spent on seed plan and pest/weed management scheme in Punjab under macro management during 2000/01-2007/08 has been depicted in Table 1.1.2 and 1.1.3 respectively.

Macro-management of agriculture scheme for supplementation/complementation of states efforts to work plans with regards to seed plan and scheme for pest/weed management have been in place for the last about six years with concretely defined physical and financial targets to be achieved in each year. Monitoring and evaluation of various objectives/mandates of this scheme was therefore necessary to study the level of its implementation in the state along with its overall impact on state agricultural development in general and farming community in particular. Therefore, it becomes pertinent to undertake a comprehensive study of this scheme. Under the macro management scheme, a variety of interventions were made in agriculture, horticulture, soil conservation and cooperation, etc. the impact study will be restricted to seed plan and pest/weed

management components only in Punjab. The present study would cover these mentioned components for impact assessment study in Punjab.

**Table 1.1.1: Summary of funds sanctioned to Punjab state under macro management scheme, 2000-01-2007/08**

(Rs. lakh)					
Year	Agriculture including Agricultural marketing	Horticulture	Soil Conservation/Water Management	Co-operation	Grand Total
2000-01					
GOI Share	1715	220	565	-	2500
State Share	171.50	22	56.50		815
Total	1886.50	242	621.50		2749.50
2001-02					
GOI Share	1461	237	602	-	2300
State Share	162.30	26.30	66.90		255.50
Total	1623.30	263.30	668.90		2555.50
2002-03					
GOI Share	1115	145	440	-	1700
State Share	123.89	16.10	48.90		188.89
Total	1238.89	161.10	488.90		1888.89
2003-04					
GOI Share	918	162	402	96	1578
State Share	102	18	44.46	10.66	175.12
Total	1020	180	446.46	106.66	1756.12
2004-05					
GOI Share	918	162	324	96	1500
State Share	102	18	36	10.66	166.66
Total	1020	180	360	106.66	1666.66
2005-06					
GOI Share	1009.80	178.20	356.40	105.60	1650
State Share	112.20	19.80	39.60	11.73	183.33
Total	1122	198	396	117.33	1833.33
2006-07					
GOI Share	1182.45	-	916.60	-	2099.05
State Share	131.38		101.84		233.22
Total	1313.83		1018.44		2332.27
2007-08					
GOI Share	1200	-	800	-	2000
State Share	133.33		88.89		222.22
Total	1333.33		888.89		2222.22

Source: Directorate of Agriculture, Government of Punjab, Chandigarh: Annual Reports

**Table 1.1.2: Summary of funds spent on seed plan\* in Punjab under macro management 2000-01-2007/08**

(Rs. lakh)			
Year	GOI Share	State Share	Total
2000-01	430.50 (17.22)	43.00	473.00 (17.21)
2001-02	395.40 (17.19)	44.00	395.40 (15.47)
2002-03	288.35 (16.96)	32.04	320.39 (16.96)
2003-04	162.00 (10.27)	18.00	180.00 (10.25)
2004-05	186.12 (12.41)	20.68	206.80 (12.41)
2005-06	100.80 (6.11)	11.20	112.00 (6.11)
2006-07	144.90 (6.90)	16.10	161.00 (6.90)
2007-08	193.53 (9.68)	21.50	215.03 (9.68)

\*Seed Plan includes various interventions like production of certified seeds for wheat/paddy, seed multiplication, seed replacement of wheat/paddy, seed treatment of wheat/paddy and strengthening of seed testing laboratories.  
Source: Directorate of Agriculture, Government of Punjab, Chandigarh: Annual Reports

Figures in parentheses show per cent fund spent on seed plan

**Table 1.1.3: Summary of funds spent on scheme for the pest and weed management\* in Punjab under macro management, 2000/01-2007/08**

(Rs. lakh)			
Year/Share	GOI Share	State Share	Total
2000-01	220.00 (8.8)	22.00	242.00 (8.8)
2001-02	180.00 (7.83)	20.00	200.00 (7.83)
2002-03	135.00 (7.94)	15.00	150.00 (7.94)
2003-04	72.00 (4.56)	8.00	80.00 (4.56)
2004-05	114.30 (7.62)	12.70	127.00 (7.62)
2005-06	90.00 (5.45)	10.00	100.00 (5.45)
2006-07	117.00 (5.57)	10.00	130.00 (5.57)
2007-08	148.50 (7.43)	16.50	165.00 (7.43)

\* Pest and weed management scheme includes various interventions like rat control, weed control, control of storage grains pests (25% subsidy), supply of plant protection equipments/pesticides (25% subsidy), strengthening of existing pesticides testing laboratories and setting up of bio control laboratory.

Source: Directorate of Agriculture, Government of Punjab, Chandigarh: Annual Reports

Figures in parentheses show per cent fund spent on pest and weed management.

## **Need for the study**

Ever since the implementation of Macro Management of Agriculture Scheme, study on the impact of its Seed Plan and Integrated Pest and Weed Management Sub Schemes has not been carried out. Hence, the present study tried to examine these aspects with the following specific objectives

## **Objectives**

- 1 To assess the impact of the interventions made under the sub schemes of ICDP and Balanced Integrated Use of Fertilizers submitted under the Macro Management of Agriculture scheme on the production and productivity of various crops with minimum cost.
- 2 To analyze the impact of efforts made by Punjab in increasing the seed replacement rates (crop-wise), in terms of ensuring timely availability of sufficient quality of good quality seeds, and
- 3 To analyze the impact of the activities to promote Balance Integrated Nutrient Management to maintain soil fertility and environment.

## **Methodology**

The study has been based on both secondary as well as primary data to accomplish the various specified objectives of the study.

### ***Secondary information/data and sources:***

The secondary information such as share of agriculture in State Gross Domestic Product and total work force, dynamics in state cropping pattern, area under high yielding varieties, demographic profile of the state, area, yield and production of various crops etc. has been collected from secondary sources such as various publications of Ministry of Agriculture

and Statistical Abstracts of Punjab. Funds sanctioned to Punjab state under Macro Management Scheme during 2000-01 to 2007-08 for various components such as development of major crops, soil reclamation and improvement of soil health, extension and promotion of agricultural machinery, pest and weed management/integrated nutrient management and soil conservation etc. have been extracted from macro management annual work plan reports prepared by Directorate of Agriculture, Government of Punjab. The information related to district wise infrastructure in terms of soil/fertilizer testing laboratories etc. have been obtained from unpublished sources of Government of Punjab.

***Primary information/data and sources:***

In Punjab, macro management of agriculture schemes have been implemented since 2000-01 in all the districts of the state. The major components of these macro management schemes were integrated cereal development programme (seed replacement/treatment of paddy and wheat) and pest and weed management/integrated nutrient management implemented concurrently all over the districts of the state. Keeping in view the intensity of efforts towards seed replacement/treatment under ICDP and other pest and weed management/INM related activities, the present study has been conducted in three districts of Punjab namely, Ludhiana, Patiala and Sangrur. The farmer beneficiaries covered under ICDP as well as pest and weed management/INM were identified with the help of list of such farmer beneficiaries in these districts, obtained from the officials of Department of Agriculture, Punjab. Efforts were made to take samples of farmers benefitted both under ICDP as well as pest and weed management/INM under macro management of agriculture scheme. A sample of 45 such farmer beneficiaries spreading over 10 villages falling in 4-6 blocks from each district has been chosen randomly, making a total sample size of 135



beneficiaries of these schemes from three sample districts of Punjab. The sample households were categorized as marginal (< 2.5 acres), small (2.5-5.0 acres), semi-medium (5-10 acres), medium (10-25 acres) and large (>25 acres) farm size groups. The sample included 14 small, 49 semi-medium, 47 medium and 25 large sample households. Just due to chance factor, no marginal holding sized household appeared in the sample. The detailed study design has been demonstrated in Box 2. To assess the impact of ICDP and pest and weed management/INM, the required information was collected from these 135 sample farmers with the help of an especially designed schedule for the purpose during the year 2007-08. Though, the macro management of agriculture scheme has been in operation in the state from 2001-02 onwards, the sample households took advantage of such schemes during 2005-06 and 2006-07. Therefore, in order to assess the impact of integrated cereal development and pest and weed management / integrated nutrient management scheme under macro management on agriculture scheme, the year 2004-05 was taken as the base year i.e. before macro management of agriculture scheme and 2007-08 as the current year i.e. after macro management of agriculture scheme.

***Statistical analysis:***

The simple statistical techniques like averages, percentages, tabular analysis, frequency distribution etc. have been applied for better explanation and interpretation of the results.

<b>Box 2 Study Design</b>		
<b>District</b>	<b>Block</b>	<b>Village cluster</b>
Ludhiana	1- Khanna 2- Pakhowal 3- Sidhwan Bet 4- Ludhiana 5- Jagraon 6- Samrala	1- Bhundri 2- Daherka 3- Maroli 4- Bharowal 5- Khandoor 6- Abuwal 7- Khanna 8- Mohi 9- Ratowal 10- Ranke
Patiala	1- Patiala 2- Patran 3- Rajpura 4- Ghanaur	1- Sidhuwal 2- Bhanoheri 3- Samana 4- Biwipur 5- Lang 6- Anandpur kesu 7- Ablowal 8- Sunarheri 9- Patiala 10- Kherki
Sangrur	1- Ahmedgarh 2- Malerkotla 3- Dhuri 4- Sherpur 5- Barnala	1- Kheri jattan 2- Sandaur 3- Kup lalan 4- Bhadaur 5- Bhotna 6- Chananwal 7- Kalla bulla 8- Palason 9- Kup kalan 10- Kuthala

## CHAPTER 2

### PROFILE OF THE STATE / SELECTED DISTRICTS AND PERFORMANCE OF MACRO MANAGEMENT SCHEME

The profile of the state and selected districts as well as the performance of various components under macro management scheme has been presented in this chapter under two sections:

Section 2.1: Profile of the state / selected districts

Section 2.2: Performance of macro management scheme

#### **Section 2.1: Profile of the state / selected districts:**

The profile of the state and selected districts in terms of share of agriculture in state gross domestic product, dynamics in cropping pattern and acreage under High Yielding Varieties (HYV) of selected crops, demographic indicators, educational status of population, area, production and productivity of selected crops, soil and fertilizer testing facilities etc. have been studied in Tables 2.1.1 through 2.1.9.

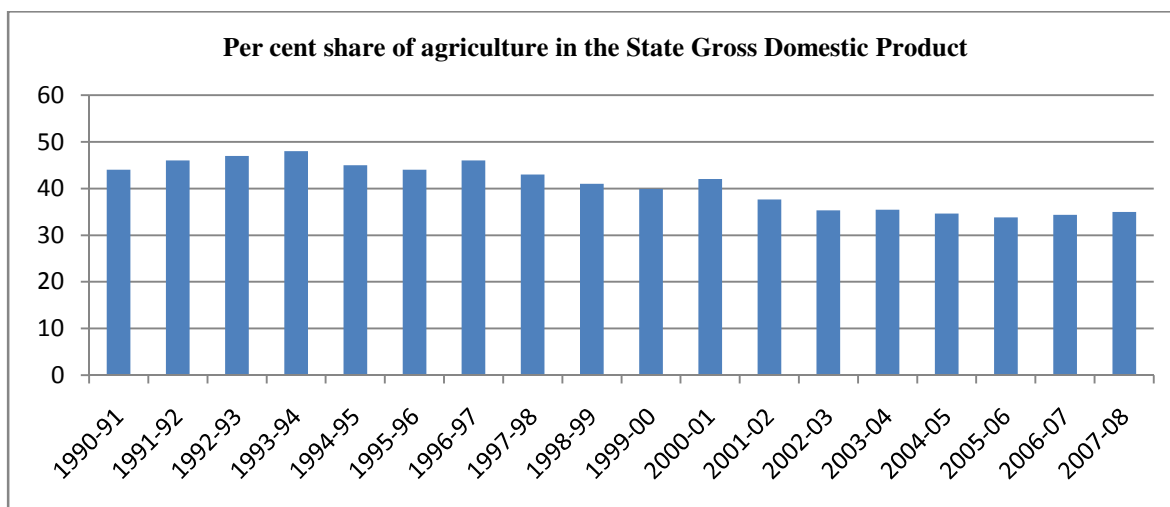
#### ***Share of agriculture in state gross domestic product:***

The share of agriculture in the state gross domestic product in Punjab varied between 48 per cent during 1993-94 and 33.78 per cent during 2005-06. On the whole, contribution of agriculture sector in state gross domestic product showed declining trend from 44 per cent in 1990-91 to around 35 per cent during 2007-08, reflecting the increasing contribution of manufacturing and service sector in the state over the years which is of course a good sign of overall economic development of the state (Table 2.1.1).

**Table 2.1.1: Share of agriculture in the State Gross Domestic Product, 1990/91-2007-08**  
(Percentage)

Year	Agriculture & Allied Activities	Total Work force
1990-91	44.00	-
1991-92	46.00	55.26
1992-93	47.00	-
1993-94	48.00	-
1994-95	45.00	-
1995-96	44.00	-
1996-97	46.00	-
1997-98	43.00	-
1998-99	41.00	-
1999-00	39.91	-
2000-01	42.00	-
2001-02	37.66	38.95
2002-03	35.33	-
2003-04	35.45	-
2004-05	34.63	-
2005-06	33.78	-
2006-07	34.32	-
2007-08	34.95	-

Source: Statistical Abstracts of Punjab: Various issues



Similarly total work force engaged in agricultural sector also declined from 55.26 per cent in 1991-92 to 38.95 per cent in 2001-02. Partly due to limited labour absorption capacity of agriculture and allied activities in the state, highly mechanized various farm operations in the state as well as due to increasing employment avenues in the various economic sectors such as manufacturing and tertiary activities, the dependence of people in the state on agriculture sector has declined over the years.

***Dynamics in cropping pattern:***

The various crops grown as per cent to gross cropped area over the years 1990-91 to 2006-07 along with changes in cropping pattern took place 1990-91 to 1994-95, 1996-97 to 2000-01 and 2001-02 to 2006-07 have been calculated and presented in Table 2.1.2. The total cereals (paddy, wheat maize and bajra) which were grown on 72.6 per cent of gross cropped area during 1990-91 have occupied around 80 per cent of the gross cropped area during 2006-07 in the state. The per cent area under paddy cultivation has increased from 25.58 per cent to 33.43 per cent and of wheat from 43.44 per cent to 44.02 per cent during the study period. Contrary to it the area under maize and bajra got squeezed from 2.89 per cent and 0.16 per cent to 1.93 per cent and 0.08 per cent respectively during the

corresponding period. Similarly, the other crops disappearing from the state crop map were found to be gram (0.83 per cent to 0.05 per cent) and groundnut (0.20 per cent to 0.05 per cent). The area under cotton has also declined from 8.74 per cent to 6.09 per cent in the state over the years. On the whole one can safely conclude that the monoculture of paddy and wheat has been strengthened in the state at the cost of other crops like maize, bajra, gram, groundnut, other oilseeds and sugarcane etc. This crop transformation has mainly taken place during the period 1996-97 to 2000-01 when total gross cropped area under total cereals changed by 4.49 per cent (3.77 per cent in paddy and 0.83 per cent in wheat) as compared to 2.43 per cent during 1990-91 to 1994-95 and 1.67 per cent during 2001-02 to 2006-07. Area under HYV for the selected crops such as paddy, wheat and maize in the state as well as in the sample districts as indicted in Table 2.1.3 brought out that paddy and wheat acreage sown with HYV seeds increased from around 18.27 lakh hectares in 1991-91 to 26.37 lakh hectares and 32.12 lakh hectares to 34.72 lakh hectares respectively. The major change took place during the period 1996-97 to 2000-01 with 20 per cent paddy and 3 per cent wheat area shift from traditional to HYV seeds in the state. The maize area under HYV seeds has rather declined from around 1.6 lakh hectares in 1990-91 to 1.44 lakh hectares during 2006-07.

## Changes in Cropping Pattern

**Table 2.1.2: Changes in the Cropping Pattern (Percent to Gross Cropped Area),  
1990/91-  
2007/08**

Crop	(Triennium Ending Average, lakh hectares)								
	1990-91	1994-95	Per cent change	1996-97	2000-01	Per cent change	2001-02	2006-07	Per cent change
Paddy	25.58	28.49	<b>2.91</b>	28.59	32.36	<b>3.77</b>	31.94	33.43	<b>1.49</b>
Wheat	43.44	43.42	<b>-0.02</b>	42.26	43.09	<b>0.83</b>	43.06	44.02	<b>0.96</b>
Maize	2.89	2.44	<b>-0.45</b>	2.18	2.05	<b>-0.13</b>	2.07	1.93	<b>-0.14</b>
Bajra	0.16	0.14	<b>-0.02</b>	0.10	0.06	<b>-0.04</b>	0.08	0.08	<b>0</b>
Total cereals	72.65	75.08	<b>2.43</b>	73.75	78.24	<b>4.49</b>	78.06	79.73	<b>1.67</b>
Gram	0.83	0.29	<b>-0.54</b>	0.22	0.11	<b>-0.11</b>	0.09	0.05	<b>-0.04</b>
Total pulses	1.98	1.27	<b>-0.71</b>	1.24	0.80	<b>-0.44</b>	0.70	0.41	<b>-0.29</b>
Total food grains	74.63	76.27	<b>1.64</b>	74.99	79.03	<b>4.04</b>	78.76	80.13	<b>1.37</b>
Groundnut	0.20	0.13	<b>-0.07</b>	0.12	0.06	<b>-0.06</b>	0.05	0.05	<b>0</b>
Total oil seeds	1.68	2.19	<b>0.51</b>	2.57	1.47	<b>-1.10</b>	1.13	1.03	<b>-0.1</b>
Cotton	8.74	7.48	<b>-1.26</b>	7.51	5.08	<b>-2.43</b>	5.25	6.09	<b>0.84</b>
Sugarcane	1.35	1.18	<b>-0.17</b>	1.64	1.42	<b>-0.22</b>	1.57	1.14	<b>-0.43</b>
Chilies	0.05	0.05	<b>0</b>	0.05	0.04	<b>-0.01</b>	0.04	0.02	<b>-0.02</b>

Source: Statistical Abstract of Punjab: Various issues

**Table 2.1.3: Area under HYV in Punjab for the selected crops and its sample districts, 1990/91-2007/08**

(Triennium Ending Average, lakh hectares)									
<b>Crop</b>	<b>1990-91</b>	<b>1994-95</b>	<b>Per cent change</b>	<b>1996-97</b>	<b>2000-01</b>	<b>Per cent change</b>	<b>2001-02</b>	<b>2006-07</b>	<b>Per cent change</b>
<b>Punjab</b>									
Paddy	18.27	20.11	<b>10.07</b>	20.78	25.01	<b>20.37</b>	25.05	26.37	<b>5.24</b>
Wheat	32.12	33.05	<b>2.88</b>	32.70	33.78	<b>3.30</b>	34.05	34.72	<b>1.96</b>
Maize	1.69	1.61	<b>-4.53</b>	1.46	1.46	<b>0.45</b>	1.51	1.43	<b>-5.27</b>
<b>Ludhiana</b>									
Paddy	2.06	2.23	<b>8.25</b>	2.24	2.39	<b>6.70</b>	2.35	2.48	<b>5.53</b>
Wheat	2.66	2.65	<b>-0.38</b>	2.583	2.58	<b>-0.12</b>	2.58	2.57	<b>-0.39</b>
Maize	0.09	0.04	<b>-55.56</b>	0.04	0.04	<b>0</b>	0.04	0.02	<b>-50.00</b>
<b>Patiala</b>									
Paddy	2.59	2.14	<b>-17.37</b>	2.11	2.42	<b>14.69</b>	2.47	2.46	<b>-0.40</b>
Wheat	3.17	2.78	<b>-12.30</b>	2.66	2.61	<b>-1.88</b>	2.63	2.57	<b>-2.28</b>
Maize	0.08	0.07	<b>-12.50</b>	0.08	0.04	<b>-50.00</b>	0.05	0.03	<b>-40.00</b>
<b>Sangrur</b>									
Paddy	2.50	3.11	<b>24.40</b>	3.09	3.55	<b>14.89</b>	3.40	3.32	<b>-2.35</b>
Wheat	3.65	3.87	<b>6.03</b>	3.91	3.93	<b>0.51</b>	3.93	3.58	<b>-8.91</b>
Maize	0.05	0.01	<b>-80.00</b>	0.01	0.01	<b>0</b>	0.01	0.01	<b>0</b>

Source: Statistical Abstract of Punjab: Various issues



***Demographic profile:***

The demographic profile of Punjab along with the sample districts viz: Sangrur, Ludhiana and Patiala districts, encompassing rural and urban population, gender, caste/religion wise population, literacy level, agricultural laborers and other workers as per 2001 census have been demonstrated in Table 2.1.4. Of the total population of 24358999, male constituted about 53.31 per cent in the state varying between 53.34 per cent in Patiala and 54.82 per cent in Ludhiana. The rural-urban split brought out that around 52.91 per cent people in the state still live in rural area varying between 53.21 per cent in Ludhiana and 53.54 per cent in Sangrur district. The number of female per 1000 males was found alarmingly low at 876 in the state (824 in Ludhiana, 870 in Sangrur and 875 in Patiala). The density of population was found to be 484 person per sq. km in the state with as high as 805 person per sq.km in Ludhiana and 408 in Sangrur. The Table further revealed that 64.7 per cent people in the state were found to be literate varied between 55.7 per cent in Sangrur and 72.6 per cent in Ludhiana. The scheduled caste constituted about 28.85 per cent of the total population in the state and the 56.22 per cent were literate. The Sikhs and the Hindus were the two dominating communities in the state constituting 59.91 per cent and 36.94 per cent of the population in the state. The main workers as per cent to the total population were found to be 34.2 per cent in Sangrur, 34.3 per cent in Ludhiana, 31.8 per cent in Patiala with an overall per cent of 32.2 per cent in the state.

**Table 2.1.4: Demographic profile of selected districts according to the 2001 Census**

<b>Profile</b>	<b>Sangrur</b>	<b>Ludhiana</b>	<b>Patiala</b>	<b>Punjab</b>
Total Population M F	1473242 (100) 787795 (53.47) 685447 (46.53)	3032831(100) 1662716 (54.82) 1370115 (45.18)	1633879 (100) 871490 (53.34) 762389 (46.66)	24358999 (100) 12985045 (53.31) 11373954 (46.69)
Rural Population T M F	1048990 (100) 561666 (53.54) 487324 (46.46)	1339178 (100) 712593 (53.21) 626585 (46.79)	1039248 (100) 554440 (53.35) 484808 (46.65)	16096488 (100) 8516596 (52.96) 7579892 (47.09)
Urban Population T M F	424252 (100) 226129 (53.30) 198123 (46.70)	1693653 (100) 950123 (56.10) 743530 (43.90)	594631 (100) 317050 (53.32) 277581 (46.68)	8262511 (100) 4468449 (54.08) 3794062 (45.92)
Sex ratio (No. of females per 1000 males)	870	824	875	876
%age increase in Population(1991-2001)	18.67	24.89	21.95	20.10
Ranking of population(based on 2001 census)	8	1	6	-
Density per sq. km	408	805	505	484
Child population (0-6) Total Rural Urban	193913 (100) 139517 (71.95) 54396 (28.05)	371010 (100) 165705 (44.66) 205305 (55.34)	209393 (100) 142833 (68.21) 66560 (31.79)	3171829 (100) 2176726 (68.63) 995103 (31.37)

Child sex ratio				
Total	784	717	776	798
Rural	776	815	770	799
Urban	803	819	790	796
Literacy rate				
Rural-M	62.0	77.9	69.0	71.0
F	48.5	66.7	54.1	57.7
Person	55.7	72.6	61.9	64.7
Urban-M	75.8	82.0	86.2	83.0
F	63.8	76.4	77.0	74.5
Person	70.2	79.5	81.9	79.1
Total-M	66.0	80.3	75.4	75.2
F	53.0	71.9	62.6	63.4
Person	59.9	76.5	69.3	69.7
S.C Population				
Total	392983 (100)	757962 (100)	298981 (100)	7028723 (100)
Rural	319577 (81.32)	490502 (64.71)	298981 (79.31)	5318254 (75.66)
Urban	73406 (18.68)	267460 (35.29)	78008 (20.69)	1710469 (24.34)
%age	26.67	24.99	23.07	28.85
S.C. %age Literacy				
M	57.36	72.25	60.39	63.38
F	40.00	56.91	43.15	48.25
person	49.78	65.07	52.26	56.22
Population by religion				
Hindu	318101	1205128	688264	8997942
(%)	(21.59)	(39.74)	(42.12)	(36.94)
Sikh	1034064	1744446	907092	14592387
(%)	(70.19)	(57.52)	(55.52)	(59.91)
Muslim	115639	52220	31358	382047
(%)	(7.85)	(1.72)	(1.92)	(1.57)
Christian	1521	11656	4078	292800
(%)	(0.11)	(0.38)	(0.25)	(1.20)
Others	3822	19381	3104	93825
(%)	(0.26)	(0.64)	(0.19)	(0.38)

Agricultural labourer				
Total	97141 (100)	96396 (100)	106801 (100)	1489861 (100)
M	77378 (79.66)	81608 (84.66)	77263 (72.34)	1104140 (74.11)
F	19763 (20.34)	14788 (15.34)	29538 (27.66)	385721 (25.89)
Total main & marginal workers				
Total	579914 (100)	1149638 (100)	601698 (100)	9127474 (100)
M	426830 (73.60)	923641 (80.34)	464616 (77.22)	6960213 (76.26)
F	153084 (26.40)	225997 (19.66)	137082 (22.78)	2167261 (23.74)
Total	579914 (100)	1149638 (100)	601698 (100)	9127474 (100)
Main workers	504568 (87.00)	1041517 (90.60)	519129 (86.28)	7835732 (85.85)
Marginal workers	73346 (13.00)	108121 (9.40)	82569 (13.72)	1291742 (14.15)
Main workers as %age to total population	34.2	34.3	31.8	32.2

Source: Statistical abstracts of Punjab: Various issues

The demographic profile of the sample households by farm size category has been presented in Table 2.1.5. Across the farm size category, of the total male population, about 89 per cent, 57 per cent, 64 per cent and 55 per cent were found to be in the most productive age group (18-60 years) in small, semi-medium, medium and large farm size categories respectively. The corresponding figures were observed as 75 per cent, 67 per cent, 68 per cent and 65 per cent in case of female population of the sample households.

**Table 2.1.5: Demographic profile of the sample households by farm size category in Punjab, 2007-08**

Farm size category	< 18 Years		18-60 Years		>60 Years		Total	
	M	F	M	F	M	F	M	F
Marginal	-	-	-	-	-	-	-	-
Small	3 (10.71)	7 (25.00)	25 (89.29)	21 (75.00)	-	-	28 (100)	28 (100)
Semi-medium	54 (40.60)	28 (28.87)	76 (57.14)	65 (67.01)	3 (2.26)	4 (4.12)	133 (100)	97 (100)
Medium	45 (30.20)	32 (30.19)	95 (63.76)	72 (67.92)	9 (6.04)	2 (1.89)	149 (100)	106 (100)
Large	43 (36.14)	20 (25.65)	66 (55.46)	51 (65.38)	10 (8.40)	7 (8.97)	119 (100)	78 (100)

**Note: Figures in parentheses shows per cent to the total**

**M denotes Male**

**F denotes Female**

Table 2.1.6 presents the distribution of total population according to the educational status of sample households by gender and farm size category in the state. Around 17 per cent to 29 per cent male population of sample households was found to be educated up to primary level across various farm size categories. Similarly, 27 per cent to 53 per cent of the male population of sample households was educated to SSLC level. The female population of sample households up to the level of SSLC was found to be 53 per cent, 58 per cent, 58 per cent and 56 per cent on small, semi-medium, medium and large farm size categories respectively. Illiterate population on the sample households was found between 3 per cent to 16 per cent in case of male population and 9 per cent to 25 per cent female population across various farm size categories in the state.

**Table 2.1.6: Distribution of population according to the educational status of beneficiary sample households by gender and farm size category in Punjab, 2007-08**

Particulars	Marginal		Small		Semi-medium		Medium		Large	
	M	F	M	F	M	F	M	F	M	F
Primary education	-	-	8 (28.57)	3 (10.71)	23 (17.29)	13 (13.40)	29 (19.46)	23 (21.70)	33 (27.73)	15 (19.23)
SSLC	-	-	15 (53.37)	12 (42.86)	52 (39.10)	43 (44.33)	87 (58.39)	28 (35.85)	32 (26.89)	28 (35.90)
PU	-	-	3 (10.71)	5 (17.86)	39 (29.32)	22 (22.68)	23 (15.44)	28 (26.42)	28 (23.53)	17 (21.80)
Degree	-	-	2 (7.14)	1 (3.57)	2 (1.50)	1 (1.03)	6 (4.03)	7 (6.60)	7 (5.88)	6 (7.69)
Illiterate	-	-	-	7 (25.00)	17 (12.78)	18 (18.56)	4 (2.68)	10 (9.43)	19 (15.97)	12 (15.38)
Total	-	-	28 (100)	28 (100)	133 (100)	97 (100)	149 (100)	106 (100)	119 (100)	78 (100)

Figures in parentheses shows per cent to the total

M denotes Male

F denotes Female

***Area, production and productivity of selected crops:***

The area production and productivity of the selected crops in Punjab and its sample districts has been shown in Table 2.1.7. The average yield of paddy in the state during 2006-07 was 3915 kg/ha (4475 kg/ha in Ludhiana, 4132 kg/ha in Patiala and 4519 kg/ha in Sangrur district). Similarly the acreage yield of wheat during the year was 4299 kg/ha with 4695 kg/ha in Ludhiana, 4522 kg/ha in Patiala and 4452 kg/ha in Sangrur district. The yield of sugarcane varied between 6670 kg/ha in Ludhiana and 7504 kg/ha in Sangrur district with an overall yield of 5984 kg/ha in the state.

**Table 2.1.7: Area production and productivity of the selected crops in Punjab and its sample districts, 2006-07**

<i>CROP</i>	Ludhiana			Patiala			Sangrur			Punjab		
	A	P	Y	A	P	Y	A	P	Y	A	P	Y
<i>Paddy</i>	249	1104	4475	236	976	4132	297	1339	4519	2624	10273	3915
Wheat	257	1208	4695	243	1100	4522	320	1416	4452	3474	14936	4299
Maize	2	8	3648	2	6	2768	1.3	4	2582	152	468	3086
Sugarcane	2	16	6870	2	14	7137	3	20	7504	98	586	5984
Gram	0.1	0.1	864	0.1	0.1	937	0.3	0.3	1005	4	4	973
Ground nut	0.1	0.1	861	-	-	-	0.1	0.1	900	4	3	-
Sunflower	1.7	3.2	1882	0.85	1.5	1810	-	-	-	18	31	1709
Sesamum	-	-	-	-	-	-	-	-	-	10	3	-

Cotton	2	1.42	726	1	0.57	576	13	6	679	589	2476	726
Chilies	0.1	0.1	-	0.6	0.9	-	0.3	0.6	-	1.7	2.8	-
Fruits	1843	28261	-	2352	33870	-	2805	43254	-	56855	877439	-
Vegetables	10589	-	-	9197	-	-	3225	-	-	113776	-	-

Source: Statistical abstracts of Punjab: Various issues

1) A-Area –thousand hectares

2) P-Production –thousand metric tonnes

3) Y-Yield- kg/hectare



***Soil testing infrastructure:***

In order to examine the level of soil testing infrastructure the number of soil testing laboratories located in different districts of the state with their respective annual capacities along with the number of sample analyzed (soil, water and kaler/orchard) during 2007-08, 2006-07, 2005-06 and 2004-05 have been collected and the same has been shown in Table 2.1.8(a), 2.1.8(b), 2.1.8(c) and 2.1.8(d) respectively. It has been observed that the total number of soil testing laboratories along with their annual capacities in various districts of the state has been remain the same (66 soil testing laboratories with total capacity of 595000 sample testing capacity) although these four years i.e.2004-05 to 2007-08, meaning thereby that no efforts has been made by the concerned authorities to further strengthen the soil testing related infrastructure in terms of number of laboratories as well as their annual capacities has been made. Of the total installed annual capacity of soil testing laboratories in the state the utilization was found to be 27.39 per cent during 2004-05. In the succeeding years the capacity utilization increased to 38.46 per cent (2005-06) and 56.17 per cent (2006-07). During 2007-08 total number of sample analyzed were 283369 against the installed capacity of 595000 registering capacity utilization at 47.63 per cent. The capacity utilization in this regard has been found quite satisfactorily in districts such as Barnala, Faridkot, Mansa and Moga where as serious efforts need to be made to improve the capacity utilization in districts namely Gurdaspur, Kapurthala and Muktsar by creating awareness among the farmers about the significance of soil testing.

**Table 2.1.8 (a): District wise soil testing laboratories and sample analyzed in Punjab, 2007-08**

Districts	No. of lab.	Annual Capacity	Number of samples analyzed			
			Soil	Water	Kaler/Orchard	Total
Amritsar	4	35000	23031	19	0	23050 (65.86)
Barnala	1	10000	8625	921	249	9795 (97.95)
Bathinda	3	25000	11067	2679	378	14124 (56.50)
Fateh garh Sahib	1	10000	5492	21	117	5630 (56.30)
Faridkot	1	10000	8956	1403	561	10920 (109.20)
Ferozpur	6	55000	24285	970	1641	26896 (48.90)
Gurdaspur	5	45000	0	0	0	0
Hoshiarpur	5	45000	22488	0	1761	24249 (53.89)
Jalandhar	5	45000	18506	17	39	18562 (41.25)
Kapurthala	3	25000	8287	1	0	8288 (33.15)
Ludhiana	5	50000	29767	20	39	29826 (59.65)
Mansa	1	5000	4911	1738	0	6649 (132.98)
Moga	1	5000	4647	328	430	5405 (108.10)
Mohali	1	10000	6301	0	0	6301 (63.01)
Muktsar	2	15000	1560	1191	48	2799 (18.66)
Nawanshahar	5	50000	18558	0	683	19241 (38.48)
Patiala	6	55000	19060	1328	2662	23050 (41.91)
Ropar	3	25000	14797	0	171	14968 (59.87)
Sangrur	4	35000	8583	1997	1302	11882 (33.95)
Tarantarn	4	40000	20970	764	0	21734 (54.33)
Total	66	595000	259891	13397	10081	283369 (47.63)

Figures in parentheses shows per cent to annual capacity  
Source: State Agricultural Department, Punjab. Chandigarh

**Table 2.1.8 (b): District wise soil testing laboratories and sample analyzed in Punjab, 2006-07**

Districts	No. of lab.	Annual Capacity	Number of samples analyzed			
			Soil	Water	Kaler/Orchard	Total
Amritsar	4	35000	16897	42	16939	33878 (96.79)
Barnala	1	10000	9153	862	8916	18931 (189.31)
Bathinda	3	25000	9753	2444	1017	13214 (52.86)
Fateh garh Sahib	1	10000	5705	32	237	5974 (59.74)
Faridkot	1	10000	10147	1311	177	11635 (116.35)
Ferozpur	6	55000	24342	1505	3402	29249 (53.18)
Gurdaspur	5	45000	19423	0	0	19423 (43.16)
Hoshiarpur	5	45000	15155	0	5760	20915 (46.48)
Jalandhar	5	45000	18744	18	3	18765 (41.70)
Kapurthala	3	25000	12424	0	0	12424 (49.70)
Ludhiana	5	50000	31521	81	20580	52182 (104.36)
Mansa	1	5000	5636	2828	0	8464 (169.28)
Moga	1	5000	2027	246	0	2273 (45.46)
Mohali	1	10000	156	0	0	156 (1.56)
Muktsar	2	15000	571	567	78	1216 (8.11)
Nawanshahar	5	50000	11372	2	2630	14004 (28.00)
Patiala	6	55000	17782	1890	632	20304 (36.92)
Ropar	3	25000	11790	2	1039	12831 (51.32)
Sangrur	4	35000	9478	1746	8964	20188 (57.68)
Tarantarn	4	40000	17183	1019	0	18202 (45.51)
Total	66	595000	249259	14595	70374	334228 (56.17)

Figures in parentheses shows per cent to annual capacity  
Source: State Agricultural Department, Punjab. Chandigarh

**Table 2.1.8 (c): District wise soil testing laboratories and sample analyzed in Punjab, 2005-06**

District	No. of lab.	Annual Capacity	Number of samples analyzed			
			Soil	Water	Kaler/Orchard	Total
Amritsar	4	35000	14132	59	0	14191 (40.55)
Barnala	1	10000	7655	1204	0	8859 (88.59)
Bathinda	3	25000	8157	3413	0	11570 (46.28)
Fateh garh Sahib	1	10000	4771	45	0	4816 (48.16)
Faridkot	1	10000	8486	1831	0	10317 (103.17)
Ferozpur	6	55000	20358	2103	0	22461 (40.84)
Gurdaspur	5	45000	16244	0	0	16244 (36.10)
Hoshiarpur	5	45000	12674	0	0	12674 (28.16)
Jalandhar	5	45000	15676	25	0	15701 (34.89)
Kapurthala	3	25000	10391	0	0	10391 (41.56)
Ludhiana	5	50000	26362	113	0	26475 (52.95)
Mansa	1	5000	4713	3951	0	8664 (173.28)
Moga	1	5000	1695	344	0	2039 (40.78)
Mohali	1	10000	130	0	0	130 (1.30)
Muktsar	2	15000	478	792	0	1270 (8.47)
Nawanshahar	5	50000	9511	3	0	9514 (19.03)
Patiala	6	55000	14871	2641	0	17512 (31.84)
Ropar	3	25000	9860	3	0	9863 (39.45)
Sangrur	4	35000	7927	2439	0	10366 (29.62)
Tarantarn	4	40000	14371	1422	0	15793 (39.48)
Total	66	595000	208462	20388	0	228850 (38.46)

Figures in parentheses shows per cent to annual capacity  
Source: State Agricultural Department, Punjab. Chandigarh

**Table 2.1.8 (d): District wise soil testing laboratories and sample analyzed in Punjab, 2004-05**

District	No.of lab.	Annual Capacity	Number of samples analyzed			
			Soil	Water	Kaler/Orchard	Total
Amritsar	4	35000	6990	65	0	7055 (20.16)
Barnala	1	10000	485	1521	0	2006 (20.06)
Bathinda	3	25000	3515	5011	0	8526 (34.10)
Fateh garh Sahib	1	10000	5058	48	0	5106 (51.06)
Faridkot	1	10000	10714	2186	0	12900 (129.00)
Ferozpur	6	55000	12847	2186	0	15033 (27.33)
Gurdaspur	5	45000	10950	0	0	10950 (24.33)
Hoshiarpur	5	45000	9977	0	0	9977 (22.17)
Jalandhar	5	45000	10268	26	0	10294 (22.88)
Kapurthala	3	25000	8041	0	0	8041 (32.16)
Ludhiana	5	50000	18607	0	0	18607 (37.21)
Mansa	1	5000	2333	2573	0	4906 (98.12)
Moga	1	5000	1243	596	0	1839 (36.78)
Mohali	1	10000	2331	151	0	2482 (24.82)
Muktsar	2	15000	1537	1594	0	3131 (20.87)
Nawanshahar	5	50000	7999	0	0	7999 (16.00)
Patiala	6	55000	12632	1639	0	14271 (25.95)
Ropar	3	25000	3754	0	0	3754 (15.02)
Sangrur	4	35000	4287	3692	0	7979 (22.80)
Tarantarn	4	40000	6108	1984	0	8092 (20.23)
Total	66	595000	139676	23272	0	162948 (27.39)

Figures in parentheses shows per cent to annual capacity  
Source: State Agricultural Department, Punjab. Chandigarh

**Table 2.1.9: District wise fertilizer testing facilities and sample analyzed in Punjab, 2007-08**

(Number)

Districts	Faridkot		Ludhiana		Total	
	Targets fixed	Targets achieved	Targets fixed	Targets achieved	Targets fixed	Targets achieved
Amritsar	82	93 (113.41)	108	105 (97.22)	190	198 (104.21)
Barnala	44	37 (84.09)	56	63 (112.50)	100	100 (100)
Bathinda	101	137 (135.64)	129	99 (76.74)	230	236 (102.61)
Faridkot	46	46 (100)	64	64 (100)	110	110 (100)
Fateh garh Sahib	30	35 (116.67)	45	40 (88.89)	75	75 (100)
Ferozpur	150	157 (104.67)	200	205 (102.50)	350	362 (103.43)
Gurdaspur	114	111 (97.37)	146	153 (104.80)	260	264 (101.54)
Hoshiarpur	44	30 (68.18)	66	91 (137.88)	110	121 (110.00)
Jalandhar	118	83 (70.34)	152	186 (122.37)	270	269 (99.63)
Kapurthala	54	49 (90.74)	76	68 (89.47)	130	117 (90.00)
Ludhiana	134	135 (100.75)	176	177 (100.57)	310	312 (100.65)
Mansa	49	78 (159.18)	71	42 (59.15)	120	120 (100)
Moga	59	79 (133.90)	81	61 (75.31)	140	140 (100)
Mohali	29	27 (93.10)	31	31 (100)	60	58 (96.67)
Muktsar	77	110 (142.86)	108	65 (60.19)	185	175 (94.59)
Nawanshahar	44	34 (77.27)	66	80 (121.21)	110	114 (103.64)
Patiala	112	85 (75.89)	148	169 (114.19)	260	254 (97.69)
Ropar	28	27 (96.43)	32	33 (103.13)	60	60 (100)
Sangrur	112	99 (88.39)	148	162 (109.46)	260	261 (100.38)
Taran Tarn	73	72 (98.63)	97	106 (109.28)	170	178 (104.71)
Total	1500	1524 (101.60)	2000	2000 (100)	3500	3524 (100.69)

Figures in parentheses shows per cent change to targets achieved

Source: State Agricultural Department, Punjab. Chandigarh

### ***Fertilizer testing infrastructure:***

The utilization performance of fertilizer testing infrastructure installed in Faridkot and Ludhiana districts has been shown in Table 2.1.9. Fertilizer testing facilities established in Faridkot and Ludhiana districts has been providing the required facilities to all the districts of the state. The targets fixed and the targets achieved for Faridkot fertilizer testing laboratory has brought out that it has been using to its fullest extent as the targets achieved has been even more (1524) than the target fixed (1500). Similarly, the working performance of Ludhiana fertilizer testing laboratory was found to be utilized at the desired level. The overall target achieved was found to be cent per cent with some over and under achievements across the districts

### **Section 2.2: Performance of macro management scheme**

The performance of macro management of agriculture scheme in Punjab has been overviewed and discussed in this section. Physical / financial targets and achievements of major interventions under various macro management of agriculture schemes such as development of major crops (wheat and paddy), development of sugarcane based cropping system, soil reclamation and improvement of soil health, extension and promotion of agricultural machinery, development of bee-keeping, pest and weed management and soil conservation has been presented in Table 2.2.1 through 2.2.7.

#### ***Development of major crops (Wheat and paddy):***

The physical / financial targets and achievements of major interventions under various macro management of agriculture schemes for the development of major crops (wheat and paddy) in terms of distribution of certified seeds/seed replacement, seed treatment and demonstrations/training camps etc. in Punjab during 2001-02, 2002-03 and 2007-08 has been presented in Table 2.2.1. During 2002-03, under macro management of agriculture

scheme, 0.91 lakh quintals of certified seed of wheat were distributed against the target of 1.31 lakh quintals. During 2007-08 the target fixed for replacement of wheat seed was of 47500 quintals of which 23717 quintals could actually be replaced, achieving around 50 per cent of the target fixed. Similarly, seed treatment was promoted on 47257 ha as against the target of 200000 ha during 2007-08. The per cent achieved target were found to be around 24 per cent in this regard in the state.

***Development of sugarcane based cropping system:***

Table 2.2.2 presents the physical / financial targets and achievements of major interventions under various macro management of agriculture schemes for the development of sugarcane based cropping system in terms of heat treatment plants, seed multiplication, sugarcane plantlets, water saving devices and demonstrations for single bud plantation and intercropping in the state during 2001-02, 2002-03 and 2007-08. The target of seed multiplication (1500 ha) has well been achieved by spending Rs.29.59 lakh against the targeted amount of Rs.30 lakh (Rs.3 lakh state Government and Rs.27 lakh by Government of India contribution) during 2002-03. The target of providing 250 water saving devices has also been fully achieved with expenditure of Rs. 13.50 lakh against the total targeted outlay of Rs.15 lakh for the purpose. The targeted number of demonstrations for single bud plantations and intercropping has been cent per cent achieved during 2007-08.



**Table 2.2.1: Physical / financial targets and achievements of major interventions under macro management of agriculture schemes for the development of major crops (Wheat & Paddy), Punjab**

(Rs.

lakh)

Scheme	2001-02			2002-03				2007-08			
	Physical	Financial		Physical		Financial		Physical		Financial	
	Tar	State	GOI	Tar	Ach	State	GOI	Tar	Ach	State	GOI
<b>Certified Seed</b>											
Wheat (in lakh qtls)	1.90	41.86	376.74	1.31	0.91	30.18	271.62	-	-	-	-
Paddy (in lakh qtls)	0.20	-	-	0.20	-	-	-	-	-	-	-
<b>Replacement of Wheat seed (qtls)</b>	-	-	-	-	-	-	-	47500	23717	9.58	86.25
<b>Seed Treatment</b>											
Cholorophyriphos (lakh litres)	0.51	1.71	15.39	0.46	-	1.43	12.87	-	-	-	-
Seed treatment <sup>1</sup> (ha)	-	-	-	-	-	-	-	200000	47257	7.00	63.00
<b>Demonstrations/training camps</b>											
IPM Demonstration <sup>2</sup>	-	-	-	-	-	-	-	248	-	4.20	37.80
Farmers training camp <sup>3</sup>	-	-	-	-	-	-	-	42	-	0.72	6.48

1 Seed treatment of Wheat & Paddy @ 25% subsidy

2 IPM Demonstration @ Rs. 17000/- per Farmers Field School (FFS)

3 Farmers training camp @ Rs. 17000/- per Farmers Field School (FFS)

Source: Directorate of Agriculture, Government of Punjab, Chandigarh: Annual Reports

**Table 2.2.2: Physical / financial targets and achievements of major interventions under macro management of agriculture schemes for development of sugarcane based cropping system, Punjab.**

(Rs. lakh)

Scheme	2001-02			2002-03					2007-08				
	Physical	Financial		Physical		Financial			Physical		Financial		
	Tar	State	GOI	Tar	Ach	State	GOI	Exp.	Tar	Ach	State	GOI	Exp.
Heat treatment plants (No)	7	1.00	13.00	2	-	0.40	3.60	-	-	-	-	-	-
Seed multiplication (ha)	1000	2.00	18.00	1500	1649	3.00	27.00	29.69	-	-	-	-	-
Sugarcane Plantlets (No. in lakhs) <sup>1</sup>	-	-	-	-	-	-	-	-	10	-	2.00	18.00	-
Water saving device (No) <sup>2</sup>	-	-	-	-	-	-	-	-	250	250	1.50	13.50	13.50
<b>Demonstrations (No)</b>													
Single bud plantation <sup>3</sup>	-	-	-	-	-	-	-	-	1000	1000	2.00	18.00	18.00
Intercropping <sup>4</sup>	-	-	-	-	-	-	-	-	1000	1000	2.00	18.00	18.00

1 Sugarcane Plantlets produced with tissue culture technique Rs. 2 per plantlet (No.)

2 To promote water saving device Ridgers for bed plantation @ Rs. 6000/- per ridger (No.)

3 Single bud plantation @ Rs. 2000/- per demonstration (ha)

4 Intercropping @ Rs. 2000/- per demonstration (ha)

Source: Directorate of Agriculture, Government of Punjab, Chandigarh: Annual Reports

***Soil reclamation and improvement of soil health:***

The various physical / financial targets and achievements of major interventions under various macro management of agriculture schemes for soil reclamation and improvement of soil health in terms of green manuring, promotion of vermiculture, promotion of FYM preparation, soil testing/micro nutrient/ fertilizer testing laboratories and establishment of compost plants in the state during 2001-02, 2002-03 and 2007-08 has been shown in Table 2.2.3. Of the total money (282.20 lakh) earmarked for soil reclamation, only Rs.12.49 lakh actually could be utilized, achieving just about 15 per cent of the total physical target fixed in the state during 2002-03. This component of soil reclamation has been found very well addressed during 2007-08 achieving as high as 98 per cent of the physical targets. During 2002-03 the targets of soil improvement by green manuring were fixed at 17000 ha where as target achieved in this regard was 6108 ha. The vermiculture has been promoted in 26 villages against the target of 34 villages during 2002-03 under macro management scheme. The financial provisions earmarked under macro management of agriculture scheme for various interventions such as soil testing laboratories, micronutrient laboratories, fertilizer testing laboratories and establishment of compost plant were found to be utilized to the tune of 88-90 per cent during 2007-08 in the state.

***Extension and promotion of agricultural machinery:***

Table 2.2.4 presents the physical / financial targets and achievements of major interventions under various macro management of agriculture schemes for the extension by training camps/demonstrations and promotion of agricultural machinery such as aero-blast sprayers, strip-trip drill, sugarcane cutter-cum-planter, straw reaper, power thresher, sprinkler irrigation equipments and zero till drill, potato planter/digger and happy seeder etc. during 2001-02,

2002-03 and 2007-08 in Punjab. During 2002-03, 22 aero blast sprayers as against the target of only 10 were provided to the farmers. Similarly, the physical target achieved in case of vertical conveyer reaper, rotavaters, straw reapers, potato planter and potato digger were found to be even more than target fixed during 2002-03 and 2007-08. Similar situation was also found in case of potato planter and digger during 2007-08.

***Development of bee-keeping:***

The physical / financial targets and achievements of major interventions under various macro management of agriculture schemes for the development of bee-keeping in Punjab has been indicated in Table 2.2.5. Around 25 per cent of the financial provisions planned under macro management of agricultural scheme for subsidy on bee-colonies as well as various equipments were utilized during 2002-03. The physical targets achieved were also in the range of 27 per cent to 29 per cent of the target fixed during 2002-03.

***Pest and weed management:***

The physical / financial targets and achievements of major interventions under various macro management of agriculture schemes for pest and weed management in Punjab as indicated in Table 2.2.6 brought out that rat control, plant protection equipment and strengthening of pesticides were some of the important activities undertaken under this scheme. For plant protection equipments Rs.33.29 lakh was spent against the total target of Rs.20 lakh (2 lakh state+18 GOI contribution) for this component during the year 2002-03. During 2007-08, provision of Rs.65 lakh were kept for strengthening of pesticides, of which Rs.50 lakh was actually spent to achieve the physical target cent per cent.

**Table 2.2.3: Physical / financial targets and achievements of major interventions under macro management of agriculture schemes for soil reclamation and improvement of soil health, Punjab**

(Rs. lakh)

Scheme	2001-02			2002-03					2007-08				
	Physical	Financial		Physical		Financial			Physical		Financial		
	Tar	State	GOI	Tar	Ach	State	GOI	Exp.	Tar	Ach	State	GOI	Exp.
<b>Soil Reclamation (ha)</b>	18800	28.20	254.00	5502	841	28.20	254.00	12.49	12750	12491	30.00	270.00	267.30
<b>Soil Improvement</b>													
Green Manuring (ha)	12360	12.36	111.24	17000	6108	7.30	65.70	-	7500	7731	1.50	13.50	13.92
Promotion of vermi-culture (No of villages)	34	0.85	7.65	34	26	0.85	7.65	7.99	-	-	-	-	-
Promotion of FYM preparation (No of villages)	34	1.04	9.36	34	26	0.85	7.65	8.19	-	-	-	-	-
Soil Testing labs	-	-	-	-	-	-	-	-	-	-	6.60	59.40	57.99
Micro Nutrient labs	-	-	-	-	-	-	-	-	-	-	4.00	36.00	36.00
Fertilizer Testing labs (No)	-	-	-	-	-	-	-	-	2	1	2.00	18.00	18.00
Establishment of Compost Plant <sup>4</sup> (No)	-	-	-	-	-	-	-	-	1	1	5.00	45.00	45.00

Source: Directorate of Agriculture, Government of Punjab, Chandigarh: Annual Reports

**Table 2.2.4: Physical / financial targets and achievements of major interventions under macro management of agriculture schemes for the extension and promotion of agricultural machinery, Punjab**

(Rs. lakh)

Scheme	2001-02			2002-03					2007-08				
	Physical	Financial		Physical		Financial			Physical		Financial		
	Tar	State	GOI	Tar	Ach	State	GOI	Exp.	Tar	Ach	State	GOI	Exp.
<b>Extension of Improved Agri. Machinery</b>													
Training camps <sup>1</sup>	154	0.23	2.07	154	-	0.23	2.07	-	-	-	-	-	-
Machinery for demonstration <sup>2</sup>	2	0.50	4.50	2	-	0.50	4.50	-	-	-	-	-	-
<b>Promotion of Agricultural Machinery</b>													
Aero-Blast sprayers(No)	5	0.15	1.35	10	22	0.30	2.70	7.43	30	-	0.90	8.10	-
Strip-Trip-Drill(No)	21	0.42	3.78	30	11	0.60	5.40	0.99	40	-	0.60	5.40	-
Sugarcane cutter cum planter(No)	5	0.10	0.90	10	5	0.20	1.80	0.68	-	-	-	-	-
Vertical conveyer Reaper(No)	38	0.38	3.42	100	119	1.00	9.00	6.84	80	18	0.64	5.76	-
Rotavater (No)	5	0.15	1.35	30	68	0.90	8.10	8.57	100	393	1.50	13.50	-
Straw reaper(No)	6	0.15	1.35	20	178	0.60	5.40	30.03	45	448	0.90	8.10	-
Power Threshers (No)	380	1.90	17.10	200		1.00	9.00	-	30	5	0.34	3.07	-
Sprinkler	75	1.86	16.99	100	26	1.50	13.50	1.64	-	-	-	-	-

Irrigation Equipments(No)														
Zero Till Drill	-	-	-	-	-	-	-	-	300	183	1.50	13.50	-	
Raised bed planter	-	-	-	-	-	-	-	-	80	1	0.80	7.20	-	
Happy Seeder	-	-	-	-	-	-	-	-	50	2	0.75	6.75	-	
Potato Planter	-	-	-	-	-	-	-	-	101	120	0.61	5.45	-	
Forage Chopper Cum Loader	-	-	-	-	-	-	-	-	30	12	0.35	3.10	-	
Forage Reaper	-	-	-	-	-	-	-	-	50	13	0.18	1.57	-	
Potato digger	-	-	-	-	-	-	-	-	65	216	0.52	4.68	-	

**1 Training camps @ Rs. 1500/-**

**2 Machinery for Demonstration (Paddy transplanter, Aero-based sprayer & Rotavater)**

Source: Directorate of Agriculture, Government of Punjab, Chandigarh: Annual Reports

**Table 2.2.5: Physical / financial targets and achievements of major interventions under macro management of agriculture schemes for development of BEE-KEEPING, Punjab**

(Rs. lakh)

Scheme	2001-02			2002-03					2007-08				
	Physical	Financial		Physical		Financial			Physical		Financial		
	Tar	State	GOI	Tar	Ach	State	GOI	Exp.	Tar	Ach	State	GOI	Exp.
Subsidy on Bee-colonies <sup>1</sup>	4268	1.08	9.59	4320	1188	1.08	9.72	2.67	-	-	-	-	-
Subsidy on equipment <sup>2</sup>	4468	1.57	14.07	3942	1170	1.38	12.42	3.68	-	-	-	-	-

**1 Subsidy (@ 250/- per colony) on Bee Colonies (No)**

**2 Subsidy (@ 350/- per hive) on equipments (No)**

**Source: Directorate of Agriculture, Government of Punjab, Chandigarh: Annual Reports**



**Table 2.2.6: Physical / financial targets and achievements of major interventions under macro management of agriculture schemes for pest & weed management, Punjab**

(Rs. lakh)

Scheme	2001-02			2002-03					2007-08				
	Physical	Financial		Physical		Financial			Physical		Financial		
	Tar	State	GOI	Tar	Ach	State	GOI	Exp.	Tar	Ach	State	GOI	Exp.
Rat control (lakh ha)	78	2.60	23.40	3.60	-	4.00	36.00	-	40	-	5.00	45.00	-
Plant protection equipments	4240	2.97	26.73	4000	-	2.00	18.00	33.29	-	-	-	-	-
Strengthening of Pesticides (No)	3	4.60	41.40	3	-	2.00	18.00	-	3	3	6.50	58.50	50.01

Source: Directorate of Agriculture, Government of Punjab, Chandigarh: Annual Reports

***Soil conservation:***

Table 2.2.7 demonstrates the physical / financial targets and achievements of major interventions under various macro management of agriculture schemes for soil conservation in Punjab during 2001-02, 2002-03 and 2007-08. On water shed development programmes, rain water harvesting, reclamation of ravenous areas and efficient use of irrigation. Huge amount of Rs.700 lakh (70 lakh by state Government and 630 lakh by GOI) had been earmarked for water shed development programmes for rainfed area and about Rs.64 lakh for efficient use of irrigation in the state during 2007-08.

**Table 2.2.7: Physical / financial targets and achievements of major interventions under macro management of agriculture schemes for soil conservation, Punjab**

(Rs. lakh)

Scheme	2001-02			2002-03				2007-08			
	Physical	Financial		Physical		Financial		Physical		Financial	
	Tar	State	GOI	Tar	Ach	State	GOI	Tar	Ach	State	GOI
Watershed Development Programme for rainfed area	3300	16.67	150.00	2900	-	16.00	144.00	11700	-	70.00	630.00
Rainwater Harvesting	1100	11.11	100.00	450	-	5.55	50.00	-	-	-	-
Reclamation of Ravenous Areas (ha)	1060	7.78	70.00	290	-	2.22	20.00	-	-	-	-
Efficient use of Irrigation	2650	16.89	152.00	2150	-	14.00	126.00	1400	-	6.39	57.50

Source: Directorate of Agriculture, Government of Punjab, Chandigarh: Annual Reports

## **CHAPTER 3**

### **SOCIO ECONOMIC CHARACTERISTICS OF SAMPLE HOUSEHOLDS**

The various socio economic characteristics of sample households by farm size category have been discussed in this chapter. The average family size was found to be increased with the increase in farm size. The average number of family members was 4.00 on small, 4.69 on semi-medium, 5.42 on medium and 7.88 on large farm size households with an overall family size of 5.47 in the sample area (Table 3.1). The Table further revealed that all heads of the families were literate. The caste-wise distribution of sample households by farm size category highlighted that 93 per cent to 100 per cent of the sample households were from general caste across the various farm size categories. Only 7 per cent small farmers belonged to schedule caste and 2 per cent semi-medium households were from OBC in the sample. On the whole 98.51 per cent sample households were from general caste and 0.74 per cent each from SC and OBC. Hence, it can be inferred that the farm activities are majorly performed by people belonging to general caste in the sample pockets of the state.

**Table 3.1: Socio – economic profile of the sample households by farm size category in Punjab, 2007-08**

Particulars	(Number)					
	Marginal	Small	Semi-medium	Medium	Large	Total
SC	-	1 (7.14)	-	-	-	1 (0.74)
ST	-	-	-	-	-	-
OBC	-	-	1 (2.04)	-	-	1 (0.74)
General	-	13 (92.86)	48 (97.95)	47 (100)	25 (100)	133 (98.51)
Literate	-	14 (100)	49 (100)	47 (100)	25 (100)	135 (100)
Avg. family size (No)	-	4.00	4.69	5.42	7.88	5.47

Figures in parentheses shows per cent households

The demographic profile of the sample households by farm size category has been presented in Table 3.2. Across the farm size category of the total male population, about 89 per cent, 57 per cent, 64 per cent and 55 per cent were found to be in the most productive age group (18-60 years) in small, semi-medium, medium and large farm size categories respectively. The corresponding figures were observed as 75 per cent, 67 per cent, 68 per cent and 65 per cent in case of female population of the sample households.

**Table 3.2: Demographic profile of the sample households by farm size category in Punjab, 2007-08**

Farm size category	< 18 Years		18-60 Years		>60 Years		Total	
	M	F	M	F	M	F	M	F
Marginal	-	-	-	-	-	-	-	-
Small	3 (10.71)	7 (25.00)	25 (89.29)	21 (75.00)	-	-	28 (100)	28 (100)
Semi-medium	54 (40.60)	28 (28.87)	76 (57.14)	65 (67.01)	3 (2.26)	4 (4.12)	133 (100)	97 (100)
Medium	45 (30.20)	32 (30.19)	95 (63.76)	72 (67.92)	9 (6.04)	2 (1.89)	149 (100)	106 (100)
Large	43 (36.14)	20 (25.65)	66 (55.46)	51 (65.38)	10 (8.40)	7 (8.97)	119 (100)	78 (100)

Figures in parentheses shows per cent households

M denotes Male

F denotes Female

Table 3.3 presents the distribution of total population according to the educational status of sample households by gender and farm size category in the state. Around 17 per cent to 29 per cent male population of sample households was found to be educated up to primary level across various farm size categories. Similarly, 27 per cent to 53 per cent of the male population of sample households was educated to SSLC level. The female population of sample households up to the level of SSLC was found to be 53 per cent, 58 per cent, 58 per cent and 56 per cent on small, semi-medium, medium and large farm size categories respectively. Illiterate population on the sample households was found between 3 per cent to 16 per cent in case of male population and 9 per cent to 25 per cent female population across various farm size categories in the state.

**Table 3.3: Distribution of population according to the educational status of beneficiary sample households by gender and farm size category in Punjab, 2007-08**

(Number)

Particulars	Marginal		Small		Semi-medium		Medium		Large	
	M	F	M	F	M	F	M	F	M	F
Primary education	-	-	8 (28.57)	3 (10.71)	23 (17.29)	13 (13.40)	29 (19.46)	23 (21.70)	33 (27.73)	15 (19.23)
SSLC	-	-	15 (53.37)	12 (42.86)	52 (39.10)	43 (44.33)	87 (58.39)	28 (35.85)	32 (26.89)	28 (35.90)
PU	-	-	3 (10.71)	5 (17.86)	39 (29.32)	22 (22.68)	23 (15.44)	28 (26.42)	28 (23.53)	17 (21.80)
Degree	-	-	2 (7.14)	1 (3.57)	2 (1.50)	1 (1.03)	6 (4.03)	7 (6.60)	7 (5.88)	6 (7.69)
Illiterate	-	-	-	7 (25.00)	17 (12.78)	18 (18.56)	4 (2.68)	10 (9.43)	19 (15.97)	12 (15.38)
Total	-	-	28 (100)	28 (100)	133 (100)	97 (100)	149 (100)	106 (100)	119 (100)	78 (100)

Figures in parentheses shows per cent to the total

M denotes Male

F denotes Female

The details of land holdings of sample households farmers by farm size category has been presented in Table 3.4. The total operational holding size was found to be 3.64 acres (small), 6.59 acres (semi-medium), 15.46 acres (medium) and 44.78 acres for the large holdings in the sample area. The Table further brought out that whole of the area was irrigated in the region.

**Table 3.4: Details of land holdings of sample households farmers by farm size category in Punjab, 2007-08**

Farm size Category	Owned Land			Leased in			Leased Out			(Acre) Total operational		
	I	U	T	I	U	T	I	U	T	I	U	T
Marginal	-	-	-	-	-	-	-	-	-	-	-	-
Small	3.64	-	3.64	-	-	-	-	-	-	3.64	-	3.64
Semi Medium	6.46	-	6.46	0.37	-	0.37	0.24	-	0.24	6.58	-	6.59
Medium	14.09	-	14.09	1.37	-	1.37	-	-	-	15.46	-	15.46
Large	33.22	-	33.22	13.16	-	13.16	1.60	-	1.60	44.78	-	44.78

**Note: I Denotes irrigated  
U Denotes un irrigated  
T Denotes Total**

The occupation of sample households by farm size category has been given in Table 3.5. In addition to agriculture, 92 per cent sample households were engaged in animal husbandry, 4 per cent in business and 6 per cent in regular jobs. A negligible proportion of sample households (0.74 per cent) adopted horticulture as major or subsidiary occupation in the sample districts.



**Table 3.5: Occupation of the sample households by farm size category in Punjab, 2007-08**

(Multiple response)

<b>Particulars</b>	<b>Marginal</b>	<b>Small</b>	<b>Semi-medium</b>	<b>Medium</b>	<b>Large</b>	<b>Total</b>
Agriculture	-	14 (100)	49 (100)	47 (100)	25 (100)	135 (100)
Agricultural labour	-	-	-	-	-	-
Animal husbandry	-	12 (85.71)	45 (91.83)	44 (93.61)	23 (92.00)	124 (91.85)
Business	-	1 (7.14)	3 (6.12)	-	1 (4.00)	5 (3.70)
Regular job	-	1 (7.14)	4 (8.16)	3 (6.38)	-	8 (5.92)
Horticulture	-	-	-	-	1 (4.00)	1 (0.74)

Figures in parentheses shows per cent households

Use of fertilizers by sample households and farm size categories during 2004-05, 2005-06 and 2006-07 as indicated in Table 3.6 brought out that all sample households irrespective of their farm size category used Urea and DAP in all these years. During 2005-06 and 2006-07, 50 per cent small, 28.57 per cent semi-medium, 38.30 per cent medium and 56 per cent large sample households were found using Zn in their fields. The potash was used by 44 per cent large farmers, 10.64 per cent medium farmers, 8.16 per cent semi-medium and 14.29 per cent small farmers during 2005-06 and 2006-07.

Source of information about integrated cereal development programme and pest and weed management/integrated nutrient management under macro management of agriculture scheme by farm size category was studied and presented in Table 3.7. The

major source of information about these schemes with sample households were found to be newspaper/pamphlets (71.11 per cent) followed by TV (65.93 per cent), Government officials (43.70 per cent) and radio (25.93 per cent). Across the farm size category TV was the common and most important source of information among large, medium and semi-medium farmers. In case of small farmers, newspaper/pamphlets was the major source of such information in the sample districts of Punjab.

It was found that around 17 per cent of the sample households did not know the specific schemes under macro management of agriculture, though they were taking advantages under these schemes (Table 3.8). The various reasons advanced by the sample households for not knowing the schemes were non-availability of TV/radio and newspaper/ pamphlets with them.

Table 3.9 provides information of assistance on the irrigation devices received by sample households by farm size categories in the sample districts. Owing to the popular policy of the state Government, all the farmers irrespective to their farm size category was benefitted in terms of free irrigation (canal water) and free power (electricity) in the state.

**Table 3.6: Use of fertilizers by sample households by farm size category in Punjab, 2004/05-2006/07**

(Percent households)

Farm size category	2004-05					2005-06					2006-07				
	Urea	DAP	Zn	Potash	Others	Urea	DAP	Zn	Potash	Others	Urea	DAP	Zn	Potash	Others
Marginal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Small	100	100	-	-	-	100	100	50.00	14.29	64.29	100	100	50.00	14.29	64.29
Semi-medium	100	100	-	-	-	100	100	28.57	8.16	83.67	100	100	28.57	8.16	83.67
Medium	100	100	-	-	-	100	100	38.30	10.64	82.98	100	100	38.30	10.64	82.98
Large	100	100	-	-	-	100	100	56.00	44.00	84.00	100	100	56.00	44.00	84.00

**Table 3.7: Sources of information about the integrated cereal development program and pest & weed management/integrated nutrient management schemes by farm size category in Punjab, 2007-08**

(Multiple Response)

<b>Farm size category</b>	<b>Government officials</b>	<b>Radio</b>	<b>TV</b>	<b>Newspaper/pamphlet</b>
Marginal	-	-	-	-
Small	1 (7.14)	-	4 (28.57)	8 (57.14)
Semi-medium	19 (38.77)	17 (34.69)	28 (57.14)	30 (61.22)
Medium	23 (48.94)	13 (27.65)	33 (70.21)	33 (70.21)
Large	16 (64.00)	5 (20.00)	24 (96.00)	25 (100)
Total	59 (43.70)	35 (25.93)	89 (65.93)	96 (71.11)

**Note: Figures in parentheses shows per cent households**

**Table 3.8: Reasons advanced by the sample households for not knowing about integrated cereal development program and pest & weed management /integrated management schemes by farm size category in Punjab, 2007-08**

(Per cent households)

Farm size category	Total farmers who responded	Not interested	Non availability of TV, radio	Non availability of newspaper/pamphlet
Marginal	-	-	-	-
Small	<b>4</b> <b>(2.96)</b>	1 (7.14)	2 (14.28)	1 (7.14)
Semi-medium	<b>9</b> <b>(6.67)</b>	3 (6.12)	2 (4.08)	4 (8.16)
Medium	<b>7</b> <b>(5.19)</b>	3 (6.38)	1 (2.13)	3 (6.38)
Large	<b>3</b> <b>(2.22)</b>	2 (8.00)	-	1 (4.00)
Total	<b>23</b> <b>(17.04)</b>	9 (6.67)	5 (3.70)	9 (6.67)

Figures in parentheses shows per cent households

**Table 3.9: Assistance on the irrigation devices received by sample households by farm size category in Punjab, 2007-08**

(Number)

Farm size category	On electricity (Electric motor/ Tube well)	On diesel pump set	On irrigation (Canal water)	Other (Electricity)
Marginal	-	-	-	-
Small	-	-	14 (100)	14 (100)
Semi-medium	-	-	49 (100)	49 (100)
Medium	-	-	47 (100)	47 (100)
Large	-	-	25 (100)	25 (100)

Figures in parentheses shows per cent households

The assistance on agricultural implements and machinery such as cultivator, thresher, sprayer etc received by sample households by farm size category has been presented in Table 3.10. The assistance on cultivator was received by 6.12 per cent semi-medium farmers, 12.77 per cent medium farmers and 16 per cent large farmers. Similarly the incentives on the purchase of disk/blade were enjoyed by 4.08 per cent semi-medium, 19.15 per cent medium and 20 per cent large farmers. In case of thresher around 8 per cent semi-medium, 13 per cent medium and 24 per cent large sample households received assistance under macro management schemes. On the whole it was found that comparatively large farmers were the major beneficiaries under these schemes followed by medium and semi-medium farmers.

**Table 3.10: Assistance on agricultural implements and machinery received by sample households by farm size category in Punjab, 2007-08**

Implements	(Number)					
	Marginal	Small	Semi-medium	Medium	Large	Total
Bullock drawn	-	-	-	-	-	-
Puddler	-	-	-	-	-	-
Seed cum fertilizer	-	-	-	-	-	-
Cultivator	-	-	3 (6.12)	6 (12.77)	4 (16.00)	13 (9.63)
Disk/Blade	-	-	2 (4.08)	9 (19.15)	5 (20.00)	16 (11.85)
Multi purpose tool bars	-	-	-	-	-	-
Maize planter	-	-	-	-	-	-
Bund farmer	-	-	-	-	-	-
Manually planted	-	-	-	-	-	-
Paddy planter	-	-	-	-	-	-
Thresher	-	-	4 (8.16)	6 (12.77)	6 (24.00)	16 (11.85)
Low lift water devices	-	-	-	-	-	-
Maize shelter	-	-	-	-	-	-
Tractor	-	-	-	-	-	-
Sprayer	-	1 (7.14)	2 (4.08)	-	-	3 (2.22)
Power driven	-	-	-	-	-	-
Multi crop thresher	-	-	-	-	-	-
Other (specify)	-	-	-	-	-	-

Figures in parentheses shows per cent households

The various sources of obtaining assistance/subsidy on agriculture implements and machinery for sample households by farm size category have been shown in Table 3.11. The table revealed that district agricultural officer was the sole source of providing assistance/subsidy on agricultural implements and machinery for sample households irrespective to the farm size category in the sample districts.

**Table 3.11: Sources of obtaining assistance/ subsidy on agricultural implements and machinery for sample house hold by farm size category in Punjab, 2007-08**  
(Number)

Farm size Category	Panchayat Officer	Local Agricultural Officer	Assistant Agricultural Officer	District Agricultural Officer	Others
Marginal	-	-	-	-	-
Small	-	-	-	1 (7.14)	-
Semi Medium	-	-	-	11 (22.45)	-
Medium	-	-	-	21 (44.68)	-
Large	-	-	-	15 (60)	-

Figures in parentheses shows per cent households

Table 3.12 shows the source-wise soil testing facilities availed by sample households by farm size category. In case of small farmers, state agricultural department was found to be the major source of soil testing facilities followed by state agricultural universities. Contrary to it State Agricultural University turned out to be the most common and popular source of soil testing facilities among the semi-medium, medium and large sample



**Table 3.12: Source wise soil testing facilities availed by the sample households by farm size category in Punjab, 2007-08**

Farm size category	(Number)				
	State Agricultural University	State Agricultural Department	Society	Others (Private companies)	Total
Marginal	-	-	-	-	-
Small	4 (28.57)	7 (50.00)	1 (7.14)	2 (14.28)	14 (100)
Semi-medium	33 (68.75)	13 (27.08)	2 (4.17)	-	48 (100)
Medium	32 (68.08)	14 (29.79)	-	1 (2.13)	47 (100)
Large	17 (68.00)	7 (28.00)	-	1 (4.00)	25 (100)

Figures in the parentheses shows per cent to the total

**Table 3.13: Reasons advanced by sample households for not availing any source of soil testing by farm size category in Punjab, 2007-08**

Farm size category	(Number)			
	Not interested	Not Known	Not Easily Available	Other
Marginal	-	-	-	-
Small	-	-	-	-
Semi Medium	1 (2.04)	-	-	-
Medium	-	-	-	-
Large	-	-	-	-
Total	1 (0.007)	-	-	-

Figures in parentheses shows per cent households

households. The other sources as reported by sample households were societies and private companies etc.

Reasons advanced by sample households for not availing any source of soil testing as indicated in Table 3.13 highlighted that only single farmer belonging to semi-medium farm size category did not avail this facility from any source as he was not interested.

## **CHAPTER 4**

### **IMPACT ASSESSMENT OF INTEGRATED CEREAL DEVELOPMENT PROGRAM (ICDP) UNDER MACRO MANAGEMENT SCHEME**

Impact assessment of Integrated Cereal Development Program (ICDP) in paddy-wheat production system has been discussed in this chapter.

Table 4.1 presents the physical and financial targets under integrated cereal development program in terms of production and multiplication of certified seed on developmental seed farm, strengthening of seed testing laboratories, seed treatment and replacement of seed etc. during 2000-07 under macro management scheme of agriculture in the state. During 2000 to 2003 the major activities undertaken by the state under ICDP were found to be the seed treatment related activities. The production and multiplication of certified seed on departmental seed farm and strengthening of seed testing laboratories were taken up during 2004 and 2005. The efforts on replacement of seed were initiated in the year 2006 onwards with the targeted expenditure of Rs.161 lakh during 2006 and around Rs.96 lakh during 2007 for this component under macro management of agriculture.

The impact of integrated cereal development program has been discussed under the following two sections:

Section 4.1 Wheat production system

Section 4.2 Paddy production system

**Table 4.1: Physical and Financial targets for wheat under Integrated Cereal Development Program (ICDP), 2000 to 2007**

(Rs. lakh)

Scheme	Production and multiplication of certified seed on departmental seed farm (Acre)			Strengthening of seed testing lab. (Nos.)			Contingency			Previous liabilities			Seed Treatment (Lakh litres)			Replacement of Wheat seed (qtls)		
	P	F		P	F		P	F		P	F		P	F		P	F	
	Tar	State	GOI	Tar	State	GOI	Tar	State	GOI	Tar	State	GOI	Tar	State	GOI	Tar	State	GOI
2000	-	-	-	-	-	-	-	0.40	3.85	-	-	-	0.55	1.55	15.65	-	-	-
2001	-	-	-	-	-	-	-	0.43	3.86	-	-	-	0.65	2.00	20.00	-	-	-
2002	-	-	-	-	-	-	-	0.40	3.60	-	-	-	0.46	1.43	12.87	-	-	-
2003	-	-	-	-	-	-	-	2.00	18.00	-	4.68	42.12	-	-	-	-	-	-
2004	365	7.30	65.70	-	4.00	36.00	-	-	-	-	10.00	90.00	-	-	-	-	-	-
2005	-	-	-	2	1.20	10.80	-	-	-	-	-	-	-	-	-	-	-	-
2006	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	120000	16.10	144.90
2007	-	-	-	-	-	-	-	-	-	-	-	-	2	7.00	63.00	47500	9.58	86.25

**P-Physical**

**F-Financial**

Source: Directorate of Agriculture, Government of Punjab, Chandigarh: Annual Reports

#### **Section 4.1 Wheat production system**

Status of area, production and yield of wheat crop of sample households by farm size category before macro management scheme benefit and after macro management scheme benefit has been depicted in Table 4.1.1. During the period, total area under wheat crop increased by 1.44 per cent with the corresponding production increased by 6.21 per cent. The major wheat area increase has been noticed only in case of small sample households, registering around 54 per cent wheat acreage during the period. Over the period, the production of wheat has increased by around 65 per cent on small households, 4 per cent semi-medium, 7 per cent medium and 4 per cent on large sample households. The average yield increased to 7.55 per cent, 6.85 per cent, 4.42 per cent and 3.20 per cent in case of small, medium, semi-medium and large farmers respectively after the benefit of macro management scheme.

The source of seed and seed rate for wheat cultivation of sample households by farm size category during 2007-08 has been presented in Table 4.1.2. The major source of seed in all farm size categories was found to be the domestic seed constituting around 80 per cent and 95 per cent on large and small sample households respectively. The other important source of seed was Seed Corporation, sharing 5.30 per cent, 9.51 per cent, 10.78 per cent and 18.76 per cent of the total seed requirement of small, semi-medium, medium and large sample households categories respectively. The open market and retailers were not found to be the important source of seed in the sample districts.

**Table 4.1.1: Status of area, production and yield of wheat crop of sample households by farm size category in Punjab**

Farm size category	Area (Acre)			Production (qtl)			Yield (qtl/acre)		
	BMMSB	AMMSB	PERCENT CHANGE	BMMSB	AMMSB	PERCENT CHANGE	BMMSB	AMMSB	PERCENT CHANGE
Marginal	-	-	-	-	-	-	-	-	-
Small	42.25 (2.30)	64.75 (3.48)	53.25	799.79 (2.21)	1318.31 (3.44)	64.83	18.93	20.36	7.55
Semi-medium	267 (14.54)	267 (14.33)	0	5075.67 (14.05)	5299.95 (13.82)	4.41	19.01	19.85	4.42
Medium	627.5 (34.17)	627.5 (33.69)	0	12273.9 (33.98)	13114.7 5 (34.19)	6.85	19.56	20.90	6.85
Large	899.5 (48.99)	903.5 (48.50)	0.44	17972.0 1 (49.76)	18630.1 7 (48.56)	3.66	19.98	20.62	3.20
Total	1836.2 5 (100)	1862.7 5 (100)	1.44	36121.3 7 (100)	38363.1 8 (100)	6.21			

Figures in parentheses shows per cent to the total  
**BMMSB**-Before macro management scheme benefit  
**AMMSB**-After macro management scheme benefit

**Table 4.1.2: Sources of seed and seed rate for wheat cultivation of sample households by farm size category in Punjab, 2007-08**

Farm size category	(kg)								
	Seed corporation	Seed rate (Rs./kg)	Open market	Seed rate (Rs./kg)	Domestic seed	Seed rate (Rs./kg)	Others (Retail)	Seed rate (Rs./kg)	Total quantity
Marginal	-	-	-	-	-	-	-	-	-
Small	80 (5.30)	10.00	-	-	1430 (94.70)	11.57	-	-	1510 (100)
Semi-medium	980 (9.51)	12.44	-	-	9286.5 (90.10)	11.70	40 (0.39)	15.00	10306.5 (100)
Medium	2720 (10.78)	13.25	200 (0.79)	12.00	21520 (85.26)	11.76	800 (3.17)	15.75	25240 (100)
Large	6500 (18.76)	13.61	200 (0.58)	12.00	27417 (79.11)	10.45	540 (1.56)	19.72	34657 (100)

Figures in parentheses shows per cent to the total

Incentives in terms of wheat seed replacement subsidy provided to sample households by farm size category under macro management scheme of agriculture has been presented in Table 4.1.3. The table highlighted that the amount of incentives/subsidy increased with the increase in farm size varying between Rs.94 / household in small and Rs.2744 / household in large farm size category. The per cent incentive realized by sample households brought out that the major share of incentives was cornered by large farm size category sharing 59.33 per cent of the total incentives/subsidies provided to sample households. The small farm size category shared only 1.14 per cent of the total incentives provided by the state Government under macro management scheme of agriculture.

**Table 4.1.3: Incentives in terms of wheat seed replacement subsidy provided to sample households by farm size category in Punjab, 2007-08**

(Rs.)			
<b>Farm size category</b>	<b>Incentives to all house hold</b>	<b>Incentives/house hold</b>	<b>Per cent incentive</b>
Marginal	-	-	-
Small	1320	94.28	1.14
Semi-medium	13418	273.84	11.61
Medium	32280	686.81	27.92
Large	68600	2744.00	59.33
Total	115618	3798.93	100



Use of various soil ameliorates for wheat by sample households by farm size category as indicated in Table 4.1.4 highlighted that about 7 per cent small and 4 per cent semi-medium sample household was found using gypsum in the wheat fields. No sample households were using other ameliorates such as pyrite, lime and zinc etc. The major source of gypsum with the gypsum users was retailer only.

**Table 4.1.4: Use of various soil ameliorates for wheat by the sample households by farm size category in Punjab, 2007-08**

Farm size category	Gypsum	Pyrite	Lime	Zinc	(Number)
					Source (Retailer)
Marginal	-	-	-	-	-
Small	1 (7.14)	-	-	-	1 (7.14)
Semi-medium	2 (4.08)	-	-	-	2 (4.08)
Medium	-	-	-	-	-
Large	-	-	-	-	-
Total	3 (0.02)	-	-	-	3 (0.02)

Figures in parentheses shows per cent households

Table 4.1.5 presents the participation of sample households in various wheat-related demonstrations by farm size categories in the sample districts of the state. It was found that of the total sample households, only 5 per cent participated in demonstrations on zero tillage, 3 per cent in organic farming demonstrations and about 4 per cent in demonstrations on bio-fertilizers. The farmers who participated in such demonstrations

belonged either to medium or large sample households. No farmer from other categories like small and semi-medium participated in such demonstrations.

**Table 4.1.5: Participation of sample households in various wheat-related demonstrations by farm size category in Punjab, 2007-08**

Demonstrations	(Number)					
	Marginal	Small	Semi Medium	Medium	Large	Total
Zero Tillage	-	-	-	7 (14.89)	-	7 (5.19)
Organic farming	-	-	-	-	4 (16.00)	4 (2.96)
Bio Fertilizers	-	-	-	-	6 (24.00)	6 (4.44)
Crop Production	-	-	-	-	-	-

Figures in parentheses shows per cent households

The various difficulties faced by sample households in attending wheat-related demonstrations were non-availability of time and transport facilities. Around 93 per cent small farmers could not participate in such demonstrations due to inadequate transport facilities (Table 4.1.6). The medium and semi-medium farmers did not participate in these demonstrations mainly because of loss of other work. Inadequate transport facilities and non-availability of time were found to be the major constraints even though the participation in such demonstrations was free of any charge. The cost of participation of those medium and large farmers who participated in wheat-related demonstrations were borne by the organizers as indicated in Table 4.1.7.

**Table 4.1.6: Various difficulties in attending wheat-related demonstrations faced by sample households by farm size category in Punjab, 2007-08**

(Multiple response)

<b>Farm size category</b>	<b>Too far</b>	<b>Loss of other work (Non availability of time)</b>	<b>Non availability of transport</b>
Marginal	-	-	-
Small	10 (71.43)	10 (71.43)	13 (92.86)
Semi Medium	4 (8.16)	27 (55.10)	15 (30.61)
Medium	5 (10.64)	24 (51.06)	3 (6.38)
Large	-	3 (12.00)	-

Figures in parentheses shows per cent households

**Table 4.1.7: Cost of participation in wheat-related demonstrations on sample households by farm size category in Punjab, 2007-08**

(Number)

<b>Farm size category</b>	<b>Organizers</b>	<b>Self finance</b>	<b>Others</b>
Marginal	-	-	-
Small	-	-	-
Semi-medium	-	-	-
Medium	7 (14.89)	-	-
Large	10 (40.00)	-	-

Figures in parentheses shows per cent households

The different agencies involved in the organization of wheat-related demonstrations were studied and the same has been presented in Table 4.1.8. In the sample districts, the wheat-related demonstrations were either organized by State Agricultural Officers or by the State Agricultural Universities.

**Table 4.1.8: Agency wise organizations and wheat-related demonstrations for the sample households by farm size category in Punjab, 2007-08**

Agency	(Number)				
	Marginal	Small	Semi-medium	Medium	Large
Gram panchayats	-	-	-	-	-
Agricultural Development Officers	-	-	-	-	-
State Agricultural Officers	-	3 (100)	-	-	-
Indian Council of Agricultural Research (ICAR)	-	-	-	-	-
State Agricultural Universities (KVKs)	-	-	-	-	-
State Agricultural Universities	-	-	-	1 (100)	4 (100)
Total	-	3 (100)	-	1 (100)	4 (100)

Figures in parentheses shows per cent to the total

The various reasons advanced by sample households who could not attend various wheat-related demonstrations as shown in Table 4.1.9 brought out that around 93 per cent small, 59 per cent semi-medium, 36 per cent medium and 12 per cent large farmers were not aware of such demonstrations. Non availability of transport and time as a reason for not attending various such demonstrations has been highlighted by around 28 per cent medium farmers and 24 per cent large farmers.

**Table 4.1.9: Reasons advanced by sample households for not attending various wheat-related demonstrations by farm size category in Punjab, 2007-08**

(Multiple response)

Farm size category	Not interested	Not Known (Lack of information)	Other (Non- availability of transport and time)
Marginal	-	-	-
Small	4 (28.57)	13 (92.85)	-
Semi Medium	15 (30.61)	29 (59.18)	-
Medium	4 (8.51)	17 (36.17)	13 (27.65)
Large	8 (32.00)	3 (12.00)	6 (24.00)

Figures in parentheses shows per cent households

Around 71 per cent small, 82 per cent semi-medium, 96 per cent medium and 100 per cent large farmers suggested that information pertaining to such demonstrations/training should be disseminated through newspapers (Table 4.1.10). In addition, the information on such programmes through TV/radio has been sought by about 14 per cent, 71 per cent, 64 per cent and 92 per cent small, semi-medium, medium and large sample households respectively.

**Table 4.1.10: Suggestions advanced by the sample households on wheat-related demonstrations/trainings by farm size category, Punjab, 2007-08**  
(Multiple Response)

Farm size category	Suggestion-1 Information through Newspapers	Suggestion-2 Information through T.V., Radio
Marginal	-	-
Small	10 (71.42)	2 (14.28)
Semi Medium	40 (81.63)	35 (71.42)
Medium	45 (95.74)	30 (63.82)
Large	25 (100)	23 (92.00)

Figures in parentheses shows per cent households

***Impact of macro management of agriculture scheme on area, yield and production of wheat:***

Changes in area, yield and production of wheat due to various interventions made under macro management of agriculture scheme on the sample households by farm size category in the state has been worked out and the same has been presented in Table 4.1.11. Consequent upon the implementation of macro management of agriculture scheme the average area under wheat on small households increased from 3.02 acres to 4.63 acres registering an increase of 54 per cent before and after the scheme. In all other categories viz. semi-medium. Medium and large, no increase in area under wheat has been observed in the sample districts. The yield improvement has been noticed on all sample households irrespective to their farm size categories. The increase in yield over before and after the implementation of macro management of agriculture scheme has been estimated as 7.55

per cent, 4.42 per cent, 6.85 per cent and 3.20 per cent on small, semi-medium, medium and large holding size groups respectively. This has resulted in the increase of total production of wheat in case of all the farm size categories in the range of 4 per cent to 7 per cent with an exception of about 65 per cent on the small farm size category. The quantity of seed/acre was found to be similar (around 39 kg/acre) across various farm size categories before as well as after the implementation of macro management of agriculture scheme in sample districts. The price of seed has increased by 15-16 per cent during this period i.e. before macro management scheme and after macro management scheme. The major single source of seed remained the domestic before as well as after the scheme for all the farm size categories in the sample districts.

***Impact of macro management of agriculture scheme on income and expenditure of wheat:***

Changes in the income and expenditure of wheat due to various interventions made under macro management of agriculture scheme on the sample households by farm size category in the state has been worked out and presented in Table 4.1.12. Average yield of wheat has increased on all the sample households irrespective to their farm size category. The highest increase (7.55 per cent) in average yield has been noticed in case of small farm size category and lowest (3.20 per cent) in large farm size group. The average price of wheat has increased by 33 per cent in all the farm size categories mainly due to the hike in minimum support price of wheat announced by Government of India. The average price of by product has remained largely the same before and after macro management scheme benefit. The variable cost/acre of wheat also remained more or less the same in all these farm size categories before and after the macro management scheme benefit. Gross returns per acre of wheat increased by 31-37 per cent on sample households due to both hike in

average yield as well as price across the various farm size categories. As a result of increase in yield and price as well as reduction in variable costs, the overall returns over variable cost per acre has increased by about 66 per cent on small households, 47 per cent semi-medium, 51 per cent medium and 42 per cent on large sample households over the period i.e. before macro management scheme benefit and after macro management scheme benefit. The average wheat acreage increased on small households group by about 54 per cent where as in the remaining farm size categories wheat acreage was found more or less same over the period. The total income from wheat cultivation was increased by about 43 per cent on large households, 51 per cent on medium, 47 per cent on semi-medium with an exceptionally high i.e. 154 per cent on small households. It may be mentioned here that this large hike in income of small households was mainly due to the increase in area under wheat cultivation due to macro management scheme benefit. The decomposition analysis brought out that this hike in total income was due to 7.55 per cent increase in yield and around 65 per cent increase due to increase in area and yield taken together on small holding size group. In case of semi-medium and medium sized holdings, the total increase in income was due to increase in yield only, as no increase in wheat acreage has been reported on these farm size categories. In large farm size, the increase in income due to increase in yield as well as area was found to be 3.66 per cent (3.20 per cent increase due to yield only). On the whole it was found that all the sample households were benefited due to macro management scheme in terms of yield hike on their farms to the tune of 3 per cent to 8 per cent.



**Table 4.1.11: Changes in area, production and yield of wheat crop on sample households by farm size category in Punjab**

Farm size category	Area(Acre)		Production (qtls)		Yield (qtls/Acre)		Seed Rate				Major single source of seed	
	BMMSB	AMMSB	BMMSB	AMMSB	BMMSB	AMMSB	Qty(kgs)		Value(Rs./kg)		BMMSB	AMMSB
							BMMSB	AMMSB	BMMSB	AMMSB		
Marginal	-	-	-	-	-	-	-	-	-	-	-	-
Small	3.02	4.63 (53.82)	57.13	94.17 (64.83)	18.93	20.36 (7.55)	39.29	39.86 (1.45)	9.80	11.30 (15.31)	Domestic	Domestic
Semi Medium	5.49	5.49 (0.00)	103.59	108.16 (4.41)	19.01	19.85 (4.42)	39.29	39.20 (-0.23)	9.80	11.30 (15.31)	Domestic	Domestic
Medium	13.35	13.35 (0.00)	261.15	279.04 (6.85)	19.56	20.90 (6.85)	39.68	39.57 (-0.28)	9.85	11.45 (16.24)	Domestic	Domestic
Large	35.98	36.14 (0.44)	718.88	745.21 (3.66)	19.98	20.62 (3.20)	39.24	39.60 (0.91)	9.90	11.50 (16.16)	Domestic	Domestic

Figures in parenthesis shows per cent change  
 BMMSB-Before macro management scheme benefit  
 AMMSB-After macro management scheme benefit

**Table 4.1.12: Changes in the income and expenditure of the sample households from wheat crop by farm size category in Punjab**

Particulars	Marginal	Small		Semi medium		Medium		Large	
		BMMSB	AMMSB	BMMSB	AMMSB	BMMSB	AMMSB	BMMSB	AMMSB
i) Av. Yield (Q/acre)	-	18.93	20.36 (7.55)	19.01	19.85 (4.42)	19.56	20.90 (6.85)	19.98	20.62 (3.20)
ii) Price (Rs./Q)	-	640	850 (32.18)	640	850 (32.18)	640	850 (32.18)	640	850 (32.18)
iii) Price of By Product(Rs/Q)	-	130	130	130	130	130	130	130	130
iv) Av. Price [ii + iii]	-	770	980 (27.27)	770	980 (27.27)	770	980 (27.27)	770	980 (27.27)
v) Gross Returns [i * iv]	-	14576	19953 (36.89)	14638	19453 (32.89)	15061	20482 (35.99)	15385	20208 (31.35)
vi) Variable Costs/Acre	-	6248	6149 (-1.58)	4511	4535 (0.53)	4471	4535 (1.43)	4023	4074 (1.27)
vii) ROVC/acre [v - vi]	-	8328	13804 (65.75)	10127	14918 (47.31)	10590	15947 (50.59)	11362	16134 (41.99)
viii) Av. Wheat acreage	-	3.02	4.63 (53.82)	5.49	5.49 (0)	13.35	13.35 (0)	35.98	36.14 (0.44)
ix) Income (Rs.) [vii * viii]	-	25151	63913 (154.12)	55597	81900 (47.31)	141377	212892 (50.58)	408805	583083 (42.63)
a) Increase due to area and yield only	-	44020	72585 (64.89)	80361	83912 (4.42)	201067	214842 (6.85)	553538	573809 (3.66)
b) Increase due to yield only	-	14576	15677 (7.55)	14638	15285 (4.42)	15061	16093 (6.85)	15385	15877 (3.20)

Figures in parentheses shows per cent change

BMMSB-Before macro management scheme benefit

AMMSB-After macro management scheme benefit

The various wheat varieties chosen by sample households by farm size category and reasons thereof have been presented in Table 4.1.13. PBW-343 was found to be the most

preferred variety followed by PBW-502, Gold-17 and DBW-17 by all the sample households irrespective to their farm size category. The various reasons as highlighted by sample households for choosing these varieties were higher yield, marketing ease, better price and minimum risk etc.

**Table 4.1.13: Best wheat varieties chosen by sample households by farm size category, Punjab in 2007-08**

Farm size category	(Number)				Major reason for the Choice
	Variety 1 PBW-343	Variety 2 PBW-502	Variety 3 Gold-17	Variety 4 DBW-17	
Marginal	-	-	-	-	1. Higher yield 2. Marketing ease 3. Better price 4. Minimum risk
Small	6 (42.86)	4 (28.57)	2 (14.29)	2 (14.29)	
Semi Medium	26 (53.06)	16 (32.65)	5 (10.20)	2 (4.08)	
Medium	23 (48.94)	14 (29.79)	8 (17.02)	2 (4.25)	
Large	10 (40.00)	9 (36.00)	4 (16.00)	2 (8.00)	
Total	65 (48.15)	43 (36.00)	19 (14.07)	8 (5.93)	

Figures in parentheses shows per cent households

## **Section 4.2 Paddy production system**

Status of area, production and yield of paddy crop of sample households by farm size category before macro management scheme benefit and after macro management scheme benefit has been depicted in Table 4.2.1. During the period, total area under paddy crop increased by 22.79 per cent with the corresponding production increased by 26.89 per cent. The major paddy area increase has been noticed only in case of large sample households, registering around 31 per cent increase in paddy acreage during the period. Over the period, the production of paddy has increased by 36.06 per cent in large households, 24.09 per cent in semi-medium, 16.89 per cent in medium and 10.79 per cent in small sample households. The average yield increased to 3.82 per cent, 3.71 per cent, 2.76 per cent and 2.54 per cent in case of large, small, semi-medium and medium farmers respectively after the benefit of macro management scheme.

The source of seed and seed rate for paddy cultivation of sample households by farm size category during 2007-08 has been presented in Table 4.2.2. The major source of seed in all farm size categories was found to be the domestic seed, constituting around 49 per cent and 85 per cent on small and semi-medium sample households respectively. The other important source of seed was retailer sharing 43.30 per cent, 7.90 per cent, 13.18 per cent and 8.26 per cent of the total seed requirement of small, semi-medium, medium and large sample households categories respectively. The open market and Seed Corporation were not found to be the important source of seed in the sample districts.

**Table 4.2.1: Status of area, production and yield of paddy crop of sample households by farm size category in Punjab**

Farm size category	Area (Acre)			Production (qtl)			Yield (qtl/acre)		
	BMMSB	AMMSB	PERCENT CHANGE	BMMSB	AMMSB	PERCENT CHANGE	BMMSB	AMMSB	PERCENT CHANGE
Marginal	-	-	-	-	-	-	-	-	-
Small	47.74 (2.65)	51 (2.30)	6.83	1145.76 (2.53)	1269.39 (2.21)	10.79	24	24.89	3.71
Semi-medium	267.05 (14.77)	322.5 (14.53)	20.76	6582.78 (14.53)	8168.92 (14.21)	24.09	24.65	25.33	2.76
Medium	637.32 (35.26)	726.5 (32.73)	13.99	16054.09 (35.43)	18765.49 (32.64)	16.89	25.19	25.83	2.54
Large	855.5 (47.32)	1119.5 (50.44)	30.86	21524.38 (47.51)	29286.12 (50.94)	36.06	25.16	26.12	3.82
Total	1807.61 (100)	2219.5 (100)	22.79	45307.01 (100)	57489.92 (100)	26.89			

Figures in parenthesis shows per cent to the total  
**BMMSB**-Before macro management scheme benefit  
**AMMSB**-After macro management scheme benefit

**Table 4.2.2: Sources of seed and seed rate for paddy cultivation on sample households by farm size category in Punjab, 2007-08**

(kg)

Farm size category	Seed corporation	Seed rate (Rs./kg)	Open market	Seed rate (Rs./kg)	Domestic seed	Seed rate (Rs./kg)	Others (Retail)	Seed rate (Rs./kg)	Total quantity
Marginal	-	-	-	-	-	-	-	-	-
Small	30 (8.12)	20.00	-	-	179.5 (48.58)	11.30	160 (43.30)	9.60	369.5 (100)
Semi-medium	94 (5.15)	20.42	32 (1.75)	15.62	1553.5 (85.19)	11.86	144 (7.90)	20.31	1823.5 (100)
Medium	355 (8.15)	22.14	65 (1.49)	13.84	3362 (77.18)	14.53	574 (13.18)	13.03	4356 (100)
Large	506 (8.38)	19.20	100 (1.66)	20.00	4934 (81.70)	10.73	499 (8.26)	18.81	6039 (100)

Note: Figures in parentheses shows per cent to the total

Use of various soil ameliorates for paddy by sample households by farm size category as indicated in Table 4.2.3 highlighted that about 14 per cent small, 18 per cent semi-medium, 17 per cent medium and 28 per cent large sample households were found using gypsum in the paddy fields. No sample household was using other ameliorates such as pyrite, lime and zinc etc. The major source of gypsum with the gypsum users was retailer only.

**Table 4.2.3: Use of various soil ameliorates for paddy by the sample households by farm size category in Punjab, 2007-08**

Farm size category	(Number)				
	Gypsum	Pyrite	Lime	Zinc	Source (Retailer)
Marginal	-	-	-	-	-
Small	2 (14.29)	-	-	-	2 (14.29)
Semi Medium	9 (18.37)	-	-	-	9 (18.37)
Medium	8 (17.02)	-	-	-	8 (17.02)
Large	7 (28.00)	-	-	-	7 (28.00)
Total	26 (19.25)	-	-	-	26 (19.25)

Figures in parentheses shows per cent households

Table 4.2.4 presents the participation of sample households in various paddy-related demonstrations by farm size categories in the sample districts of the state. It was found that of the total sample households, only 5 per cent participated in demonstrations on zero tillage, 3 per cent in organic farming demonstrations, 4 per cent in bio-fertilizers, 17 per

cent in yield improvement and 8 per cent in demonstrations on crop diversification. The farmers who participated in such demonstrations belonged either to semi-medium, medium and large sample households. No farmer from small sample household participated in such demonstrations.

**Table 4.2.4: Participation of sample households in various paddy-related demonstrations by farm size category in Punjab, 2007-08**

Demonstrations	(Number)					
	Marginal	Small	Semi Medium	Medium	Large	Total
Zero Tillage	-	-	-	7 (14.89)	-	7 (5.19)
Organic farming	-	-	-	-	4 (16.00)	4 (2.96)
Bio Fertilizers	-	-	-	-	6 (24.00)	6 (4.44)
Yield Improvement Demonstration	-	-	7 (14.28)	13 (27.66)	3 (12.00)	23 (17.03)
Crop Diversification Demonstration	-	-	-	4 (8.51)	7 (28.00)	11 (8.15)

Figures in parentheses shows per cent households

The various difficulties faced by sample households in attending paddy-related demonstrations were non-availability of time and transport facilities. Around 86 per cent small farmers could not participate in such demonstrations due to inadequate transport facilities (Table 4.2.5). The medium and semi-medium farmers did not participate in these demonstrations mainly because of loss of other work. Inadequate transport facilities and



**Table 4.2.5: Various difficulties in attending paddy-related demonstrations found by sample households by farm size category in Punjab, 2007-08**

(Multiple response)

Farm size category	Too far	Loss of other work (Non availability of time)	Non availability of transport
Marginal	-	-	-
Small	12 (85.71)	9 (64.29)	12 (85.71)
Semi Medium	5 (10.20)	24 (48.98)	14 (30.16)
Medium	4 (8.51)	20 (42.55)	5 (10.64)
Large	-	4 (16.00)	-

Figures in parentheses shows per cent households

**Table 4.2.6: Cost of participation in paddy-related demonstrations on sample households by farm size category in Punjab, 2007-08**

(Number)

Farm size category	Organizers	Self Finance	Others
Marginal	-	-	-
Small	-	-	-
Semi Medium	7 (14.29)	-	-
Medium	17 (36.17)	-	-
Large	10 (40.00)	-	-

Figures in parentheses shows per cent households

non-availability of time were found to be the major constraints even though the participation in such demonstrations was free of any charge. The cost of participation of those medium and large farmers who participated in paddy-related demonstrations were borne by the organizers as indicated in Table 4.2.6.

The different agencies involved in the organization of paddy-related demonstrations were studied and the same has been presented in Table 4.2.7. In the sample districts, the paddy-related demonstrations were either organized by State Agricultural Officers or by the State Agricultural Universities.

**Table 4.2.7: Agency wise organizations and paddy-related demonstrations for the households by farm size category in Punjab, 2007-08**

Agency	(Number)				
	Marginal	Small	Semi-medium	Medium	Large
Gram panchayats	-	-	-	-	-
Agricultural Development Officers	-	-	-	-	-
State Agricultural Officers	1 (50)	1 (50)	1 (50)	1 (50)	1 (50)
Indian Council of Agricultural Research (ICAR)	-	-	-	-	-
State Agricultural Universities (KVKs)	1 (50)	1 (50)	1 (50)	1 (50)	1 (50)
Total	2 (100)	2 (100)	2 (100)	2 (100)	2 (100)

Figure in the parentheses shows per cent to the total

The various reasons advanced by sample households who could not attend various paddy-related demonstrations as shown in Table 4.2.8 brought out that around 64 per cent small, 31 per cent semi-medium and 8 per cent large farmers were not aware of such

demonstrations. Non availability of transport and time as a reason for not attending various such demonstrations has been highlighted by around 43 per cent small, 14 per cent semi-medium and 13 per cent medium farmers

**Table 4.2.8: Reasons advanced by sample households for not attending various paddy-related demonstrations by farm size category in Punjab, 2007-08**  
(Multiple response)

Farm size category	Not interested	Not Known (Lack of information)	Other (Non-availability of transport and time)
Marginal	-	-	-
Small	6 (42.86)	9 (64.29)	6 (42.86)
Semi Medium	9 (10.37)	15 (30.61)	7 (14.29)
Medium	10 (21.28)	-	6 (12.77)
Large	3 (12.00)	2 (8.00)	-

Figures in parentheses shows per cent households

Around 79 per cent small, 82 per cent semi-medium, 96 per cent medium and 100 per cent large farmers suggested that information pertaining to such demonstrations/training should be disseminated through newspapers (Table 4.2.9). In addition, the information on such programmes through TV/radio has been sought by about 57 per cent, 80 per cent, 68 per cent and 96 per cent small, semi-medium, medium and large sample households respectively.

**Table 4.2.9: Suggestions advanced by the sample households on paddy-related demonstrations/trainings by farm size category in Punjab, 2007-08**  
(Multiple Response)

Farm size category	Suggestion-1 Information through Newspapers	Suggestion-2 Information through T.V., Radio
Marginal	-	-
Small	11 (78.57)	8 (57.14)
Semi Medium	40 (81.63)	39 (79.59)
Medium	45 (95.74)	32 (68.09)
Large	25 (100)	24 (96.00)

Figures in parentheses shows per cent households

***Impact of macro management of agriculture scheme on area, yield and production of paddy:***

Changes in area, yield and production of paddy due to various interventions made under macro management of agriculture scheme on the sample households by farm size category in the state has been worked out and the same has been presented in Table 4.2.10. Consequent upon the implementation of macro management of agriculture scheme, the average area under paddy increased to 7 acres in small and 21 acres in semi-medium with an exceptional increase of 37 acres in large categories. The increase in yield over before and after the implementation of macro management of agriculture scheme has been estimated as 3.71 per cent, 2.76 per cent, 2.54 per cent and 3.82 per cent on small, semi-medium, medium and large holding size groups respectively. This has resulted in the increase of total production of paddy in case of all the farm size categories in the range of

11 per cent to 24 per cent with an exception of about 36 per cent on the large farm size category. The quantity of seed/acre was found to be similar (around 7 kg/acre) across various farm size categories before as well as after the implementation of macro management of agriculture scheme in sample districts. The price of seed has increased by 11-14 per cent during this period i.e. before macro management scheme and after macro management scheme. The major single source of seed remained the domestic before as well as after the scheme for all the farm size categories in the sample districts.

***Impact of macro management of agriculture scheme on income and expenditure of paddy:***

Changes in the income and expenditure of paddy due to various interventions made under macro management of agriculture scheme on the sample households by farm size category in the state has been worked out and the same has been presented in Table 4.1.11. Average yield of paddy has increased in the range of 3-4 per cent in all farm size categories. The highest increase (about 4 per cent) in average yield has been noticed in case of large farm size category and lowest (2.54 per cent) in medium farm size group. The average price of paddy has increased by about 31 per cent in all the farm size categories mainly due to the hike in minimum support price of paddy announced by Government of India. The variable cost/acre of paddy remained more or less the same in all these farm size categories before as well as after the macro management scheme benefit. Gross returns per acre of paddy increased by 35-36 per cent on sample households due to increase in average yield as well as price across the various farm size categories. The returns over variable cost per acre was in the range of 53-63 per cent in all farm size categories over the period i.e. before macro management scheme benefit and after macro management scheme benefit. The average paddy acreage increase was 6.74 per cent, 13.94 per cent, 20.73 per cent and 36.86 per cent

in case of small, medium, semi-medium and large farm size categories respectively. The total income from paddy cultivation was increased by about 74 per cent in small, 85 per cent in semi-medium, 75 per cent in medium and 84 per cent in large sample households. In large farm size, the increase in income due to increase in yield as well as area was found to be 24.75 per cent (3.82 per cent increase due to yield only). On the whole it was found that all the sample households were benefited due to macro management scheme in terms of yield hike on their farms to the tune of 3 per cent to 4 per cent.

**Table 4.2.10: Changes in area, production and yield of paddy crop on sample households by farm size category in Punjab**

Farm size category	Area (Acre)		Production (Qtls)		Yield (Qtls/Acre)		Seed Rate				Major single source of seed	
	BMMSB	AMMSB	BMMSB	AMMSB	BMMSB	AMMSB	Qty(Kgs)		Value(Rs.)		BMMSB	AMMSB
							BMMSB	AMMSB	BMMSB	AMMSB		
Marginal	-	-	-	-	-	-	-	-	-	-	-	-
Small	3.41	3.64 (6.74)	81.84	90.67 (10.79)	24	24.89 (3.71)	6.79	7.57 (11.49)	7.50	8.30 (10.67)	Domestic	Domestic
Semi Medium	5.45	6.58 (20.73)	134.34	166.71 (24.09)	24.65	25.33 (2.76)	7.14	7.16 (0.28)	6.95	7.89 (13.53)	Domestic	Domestic
Medium	13.56	15.45 (13.94)	341.58	399.27 (16.89)	25.19	25.83 (2.54)	6.64	6.77 (1.96)	7.00	7.98 (14.00)	Domestic	Domestic
Large	34.22	44.78 (36.86)	860.98	1171.44 (36.06)	25.16	26.12 (3.82)	6.92	6.92 (0.00)	7.25	8.21 (13.24)	Domestic	Domestic

Figures in parenthesis shows per cent increase

BMMSB-Before macro management scheme benefit

AMMSB-After macro management scheme benefit

**Table 4.2.11: Changes in income and expenditure of the sample households from paddy crop by farm size category in Punjab**

Particulars	Marginal	Small		Semi medium		Medium		Large	
		BMMSB	AMMSB	BMMSB	AMMSB	BMMSB	AMMSB	BMMSB	AMMSB
i) Yield (Q/acre)	-	24	24.89 (3.71)	24.65	25.33 (2.76)	25.19	25.83 (2.54)	25.16	26.12 (3.82)
ii) Av. Price (Rs./Q)	-	590	775 (31.36)	590	775 (31.36)	590	775 (31.36)	590	775 (31.36)
iii)Gross Returns [i * ii]	-	14160	19290 (36.23)	14544	19631 (34.98)	14862	20018 (34.69)	14844	20243 (36.37)
iv) Variable Costs/Acre	-	6129	6175 (0.75)	5004	5027 (0.46)	5124	5102 (-2.19)	4812	4881 (1.43)
v) ROVC/acre [iii – iv ]	-	8031	13115 (63.30)	9540	14604 (53.08)	9738	14916 (53.17)	10032	15362 (53.13)
vi) Av. rice acreage	-	3.41	3.64 (6.74)	5.45	6.58 (20.73)	13.56	15.45 (13.94)	37.22	44.78 (36.86)
vii) Income (Rs.) [v * vi]	-	27386	47739 (74.32)	51993	96094 (84.82)	132047	230452 (74.52)	373391	687910 (84.23)
a) Increase due to area and yield	-	48286	53454 (10.70)	79262	98336 (24.06)	201530	235453 (16.83)	553167	690096 (24.75)
b) Increase due to yield	-	14160	14685 (3.71)	14544	14945 (2.76)	14862	15240 (2.54)	14844	15411 (3.82)

Figures in parentheses shows per cent change  
 BMMSB-Before macro management scheme benefit  
 AMMSB-After macro management scheme benefit

The various paddy varieties chosen by sample households by farm size category and reasons thereof have been presented in Table 4.2.12. PAU-201 was found to be the most preferred variety followed by Pusa-44, Pusa-1121 and PR-116 by all the sample households irrespective to their farm size category. The various reasons as highlighted by



sample households for choosing these varieties were higher yield, marketing ease, better price and minimum risk etc.

**Table 4.2.12: Best paddy varieties chosen by sample households by farm size category in Punjab, 2007-08**

					(Number)
Farm size category	Variety PAU 201	Variety Pusa 44	Variety PR 116	Variety Pusa-1121	Major reason for the choice
Marginal	-	-	-	-	1. Higher yield 2. Marketing ease 3. Better price 4. Minimum risk
Small	4 (28.57)	3 (21.43)	3 (21.43)	4 (28.57)	
Semi Medium	16 (32.65)	18 (36.73)	8 (16.33)	7 (14.29)	
Medium	18 (38.29)	14 (29.79)	5 (10.64)	10 (21.28)	
Large	10 (40.00)	8 (32.00)	3 (12.00)	4 (16.00)	
Total	48 (35.56)	43 (31.85)	19 (14.07)	25 (18.52)	

Figures in parentheses shows per cent households

## **CHAPTER 5**

### **IMPACT ASSESSMENT OF INTEGRATED PEST, WEED AND NUTRIENT MANAGEMENT PROGRAMME UNDER MACRO MANAGEMENT SCHEME**

Impact assessment of integrated pest, weed and nutrient management programme in paddy-wheat production system has been discussed in this chapter. Table 5.1 depicts the physical / financial targets for pest, weeds management / integrated nutrient management under macro management of agriculture scheme in Punjab in terms of rat control, strengthening of existing pesticide testing laboratories, control of storage grain pests, provision of plant protection equipment, setting up of bio-control laboratories and supply of pesticides during the period 2000 to 2007. The table revealed that the efforts of state agricultural department for rat control and strengthening of existing pesticides testing laboratories had been very consistent over the years. The budget provision which was 22 and 33 lakh rupees during 2000 has increased to Rs.50 and about Rs.65 lakh rupees during 2007 for these activities respectively. The other components of pest and weed management like control of storage grain pests and providing plant protection equipments were started with great enthusiasm with budget provision of Rs.72 lakh and Rs.39 lakh during 2001, decelerating efforts with budget provision of Rs.20 lakh for these components during 2003 was terminated in 2005. The efforts on setting up of bio-control laboratories continued from 2000 to 2002 with a budget provision of Rs.110 lakh and Rs.50 lakh respectively. During the year 2006 and 2007 a budget of Rs.50 lakh in each year was provided for supply of quality pesticides to the farmers in the state.

**Table 5.1: Physical and financial targets for pest & weed management/integrated nutrient management under macro management scheme in Punjab, 2000 to 2007**

**(Rs. lakh)**

Scheme	Rat Control (Lakh ha)			Strengthening of existing pesticides testing Lab.(No)			Control of storage grains pest @ 25 % (Lakh families)			Plant protection equipment @ 25 % Subsidy (No)			Setting up of Bio-Control Lab (No)			Supply of pesticides (M.T)		
	P	F		P	F		P	F		P	F		P	F		P	F	
Year	Tar	State	GOI	Tar	State	GOI	Tar	State	GOI	Tar	State	GOI	Tar	State	GOI	Tar	State	GOI
2000	6.60	2.00	20.00	3	3.00	30.00	6.5	4.50	45.00	3850	2.50	25	1	10.00	100.00	-	-	-
2001	9.90	3.00	30.00	3	5.40	54.00	10.5	6.55	65.5.	5500	3.50	35	2	5.00	50.00	-	-	-
2002	3.60	4.00	36.00	3	2.00	18.00	4	2.00	18.00	4000	2.00	18	1	5.00	45.00	-	-	-
2003	1.75	2.00	18.00	3	2.00	18.00	8	2.00	18.00	10000	2.00	18	-	-	-	-	-	-
2004	3.50	4.00	36.00	3	2.70	23.40	8	2.00	18.00	20000	4.00	36	-	-	-	-	-	-
2005	3.50	4.00	36.00	3	2.10	18.90	-	-	-	10000	2.00	18	-	-	-	-	-	-
2006	25.0	3.00	27.00	3	5.00	45.00	-	-	-	-	-	-	-	-	-	30	5.00	45.00
2007	40.0	5.00	45.00	3	6.50	58.00	-	-	-	-	-	-	-	-	-	30	5.00	45.00

P-Physical

F-Financial

Source: Directorate of Agriculture, Government of Punjab, Chandigarh: Annual Reports

Fertilizer use by sample households in paddy-wheat production system by farm size categories during 2004-05, 2005-06 and 2006-07 has been demonstrated in Table 5.2. The average use of Urea was found to be about 274, 267, 273 and 276 kg / acre in paddy-wheat production system by small, semi-medium, medium and large sample households respectively during the year 2004-05. Average use of DAP varied by about 63 kg-72 kg / acre across various farm size categories during 2004-05, 62-70 kg / acre during 2005-06 and 61-70 kg / acre during 2006-07. Among the micronutrients, the average use of zinc varied between 4 kg-13 kg / acre across various farm size categories as well as during the study years. The average use of magnesium was 0.08 and 1 kg / acre on these farm size categories. During 2005-06 and 2006-07 semi-medium and medium farmers were found using iron on their fields of paddy and wheat too.

**Table 5.2: Use of Fertilizers by sample households in paddy-wheat production system by farm size category in Punjab, 2004/05-2006/07**

Farm size category	2004-05					2005-06					2006-07				
	Urea	DAP	Zn	Mg	Fe	Urea	DAP	Zn	Mg	Fe	Urea	DAP	Zn	Mg	Fe
Marginal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Small	273.93	64.29	4.28	-	-	255.40	62.13	5.42	0.51	-	250.55	61.23	6.69	0.69	-
Semi medium	266.57	63.37	5.62	-	0.26	279.98	63.10	6.80	0.42	0.22	276.24	61.76	8.09	0.61	0.22
Medium	273.09	71.81	9.46	0.08	0.42	273.42	68.98	9.98	0.90	0.40	270.31	68.12	10.20	1.18	0.40
Large	276.20	71.20	8.60	0.16	-	279.42	70.01	10.31	0.53	-	275.66	69.96	13.07	0.96	-

Use of various soil ameliorates in wheat and paddy crop by sample households by farm size category as indicated in Table 5.3 highlighted that about 14 per cent small, 18 per cent semi-medium, 17 per cent medium and 28 per cent large sample households were found using gypsum in their fields. No sample household was using other ameliorates such as pyrite, lime and zinc etc. The major source of gypsum with the gypsum users was retailer only.

**Table 5.3: Use of Soil Ameliorates by sample households in paddy-wheat production system by farm size category in Punjab, 2007-08**

Farm size category	(Number)				
	Gypsum	Pyrite	Lime	Zinc	Source (Retailer)
Marginal	-	-	-	-	-
Small	2 (14.29)	-	-	-	2 (14.29)
Semi Medium	9 (18.37)	-	-	-	9 (18.37)
Medium	8 (17.02)	-	-	-	8 (17.02)
Large	7 (28.00)	-	-	-	7 (28.00)

Figures in parentheses shows per cent households

The participation of sample households in pest and weed management/integrated nutrient management-related demonstration by farm size categories in paddy-wheat production system has been presented in Table 5.4. It revealed that during the year 2006, 7 per cent small sample households and 11 per cent medium sample households participated in such demonstrations for paddy and wheat crops. The duration of such demonstrations was one day only.

**Table 5.4: Participation of the sample households in pest and weed management / integrated nutrient management-related demonstrations by farm size category in Punjab, 2007-08**

				(Number)
Farm size category	Crop	Year	No of Farmers Attended	Duration (No of Days)
Marginal	-	-	-	-
Small	Paddy/Wheat	2006	1 (7.14)	1
Semi Medium	-	-	-	-
Medium	Paddy/Wheat	2006	7 (10.64)	1
Large	-	-	-	-

Figures in parentheses shows per cent households

The various difficulties faced by sample households in attending pest and weed management/integrated nutrient management-related demonstrations were non-availability of time and transport facilities. Around 71 per cent small farmers could not participate in such demonstrations due to inadequate transport facilities (Table 5.5). The medium and semi-medium farmers did not participate in these demonstrations mainly because of loss of other work. Inadequate transport facilities and non-availability of time were found to be the major constraints even though the participation in such demonstrations was free of any charge. The cost of participation of those medium and large farmers who participated in attending pest and weed management/integrated nutrient management-related demonstrations were borne by the organizers as indicated in table 5.6.

**Table 5.5: Various difficulties in attending pest and weed management/integrated nutrient management-related demonstrations faced by sample households by farm size category in Punjab, 2007-08**

(Multiple response)

Farm size category	Too far	Loss of other work (Non availability of time)	Non availability of transport
Marginal	-	-	-
Small	11 (78.57)	9 (64.29)	10 (71.43)
Semi Medium	12 (24.49)	31 (63.27)	16 (32.65)
Medium	8 (17.02)	34 (72.34)	9 (19.15)
Large	1 (4.00)	18 (72.00)	1 (4.00)

Figures in parentheses shows per cent households

**Table 5.6: Cost of participation in pest and weed management/integrated nutrient management related-demonstrations on sample households by farm size category in Punjab, 2007-08**

(Number)

Farm size category	Organizers	Self Finance	Others
Marginal	-	-	-
Small	1 (7.14)	-	-
Semi Medium	7 (14.89)	-	-
Medium	-	-	-
Large	-	-	-

Figures in parentheses shows per cent households



The different agencies involved in the organization of pest and weed management/integrated nutrient management-related demonstrations were studied and the same has been presented in Table 5.7. In the sample districts, pest and weed management/integrated nutrient management demonstrations were either organized by State Agricultural Officers or by the State Agricultural Universities.

**Table 5.7: Agency wise organizations and pest and weed management/integrated nutrient management-related demonstrations for the sample households by farm size category in Punjab, 2007-08**

Agency	(Number)				
	Marginal	Small	Semi-medium	Medium	Large
Gram panchayats	-	-	-	-	-
Agricultural Development Officers	-	-	-	-	-
State Agricultural Officers	-	1 (100)	-	-	-
Indian Council of Agricultural Research (ICAR)	-	-	-	-	-
State Agricultural Universities (KVKs)	-	-	-	1 (100)	-
Total	-	1 (100)	-	1 (100)	-

Figures in the parentheses shows per cent to the total

The various reasons advanced by sample households who could not attend pest and weed management/integrated nutrient management-related demonstrations as shown in Table 5.8 brought out that around 50 per cent small, 55.10 per cent semi-medium, 6.38 per cent medium and 16 per cent large farmers were not aware of such demonstrations. Non availability of transport and time as a reason for not attending various such demonstrations

has been highlighted by around 79 per cent small, 59 per cent semi-medium and 36 per cent medium farmers.

**Table 5.8: Reasons advanced by sample households for not attending various pest and weed management/integrated nutrient management-related demonstrations by farm size category in Punjab, 2007-08**

(Multiple response)

Farm size category	Not interested	Not Known (Lack of information)	Other (Non-availability of transport and time)
Marginal	-	-	-
Small	10 (71.43)	7 (50.00)	11 (78.57)
Semi Medium	23 (46.94)	27 (55.10)	29 (59.18)
Medium	13 (27.66)	3 (6.38)	17 (36.17)
Large	8 (32.00)	4 (16.00)	-

Figures in parentheses shows per cent households

Around 86 per cent small, 88 per cent semi-medium, 94 per cent medium and 100 per cent large farmers suggested that information pertaining to such demonstrations/training should be disseminated through newspapers (Table 5.9). In addition, the information on such programmes through TV/radio has been sought by about 93 per cent, 92 per cent, 85 per cent and 100 per cent small, semi-medium, medium and large sample households respectively.

**Table 5.9: Suggestions advanced by sample households for not attending various pest and weed management/integrated nutrient management-related demonstrations by farm size category in Punjab, 2007-08**

Farm size category	(Multiple response)	
	Suggestion-1 Information through Newspapers	Suggestion-2 Information through T.V., Radio
Marginal	-	-
Small	12 (85.71)	13 (92.86)
Semi Medium	43 (87.76)	45 (91.84)
Medium	44 (93.62)	40 (85.11)
Large	25 (100)	25 (100)

***Impact of macro management of agriculture scheme on fertilizer use pattern in paddy-wheat cropping system:***

Changes in the fertilizer use pattern in paddy-wheat crop by sample households by farm size category before and after implementation of macro management of agriculture scheme has been presented in Table 5.10. It was found that the use of Urea (kg / acre) in paddy has reduced, though marginally, in all the farm size categories varying between -0.82 per cent on semi-medium and -2.22 per cent on medium farm size category after the macro management scheme benefit. The use of zinc has increased from 4.28 kg / acre (before macro management scheme benefit) to 7.14 kg / acre (after macro management scheme), registering an increase of about 67 per cent on small farm size category. Similar increase in the use of zinc has been observed on all farm size categories varying between 10.38 per cent on medium farm size category to 57 per cent on large farm size category. The use of

iron was made only by semi-medium and medium farm size categories. The average use of iron on these farm size categories doubled/tripled after the implementation of macro management scheme. May be due to the easy availability of soil testing laboratories the use of zinc and iron has increased where as that of Urea has declined, though marginally, due to implementation of macro management of agriculture scheme in the sample districts.

In case of wheat crop too, the average use of Urea has declined in all the farm size categories varying between -1.83 per cent on medium farm size category to about -19.11 per cent on small farm size category with an exception of semi-medium farm size category where average use of Urea has rather increased by about 7 per cent. Similarly, the use of DAP for wheat cultivation has also reduced by 3-6 per cent across various farm size categories after the implementation of macro management of agriculture scheme on nutrient management. Likewise of paddy crop, the use of micronutrient such as zinc and magnesium has increased in wheat cultivation. The use of zinc has increased by 50 to 100 per cent. Small and semi-medium farmers were not using magnesium before the implementation of nutrient management scheme under macro management of agriculture started using magnesium with an average dose of 0.71 to 0.64 kg / acre after the implementation of macro management scheme. In case of medium and large farmers, the average dose of this deficient micronutrient increased from just 0.08 and 0.16 kg / acre to 1.23 and 1.00 kg / acre after the nutrient management program under macro management of agriculture scheme. On the whole, it may be inferred that with the strengthening of soil testing facilities / infrastructure under macro management scheme in the state, the farmers started using need based macro as well as micronutrient in their fields. The reduced use of fertilizers (Urea and DAP) and increased use of micro nutrients (zinc, iron and magnesium)

would certainly cut down the expenditure and enhance productivity levels of paddy-wheat production system in the state.

**Table 5.10: Changes in the fertilizer use pattern in paddy and wheat crop by sample households by farm size category in Punjab**

**PADDY**

Farm size category	UREA		DAP		Zinc		Iron	
	BMMSB	AMMSB	BMMSB	AMMSB	BMMSB	AMMSB	BMMSB	AMMSB
Marginal	-	-	-	-	-	-	-	-
Small	137.5	134.64 (-2.08)	1.43	1.43 (0.00)	4.28	7.14 (66.82)	-	-
Semi Medium	136.47	135.35 (-0.82)	-	-	5.31	7.66 (44.26)	0.06	0.26 (333.33)
Medium	139.47	136.38 (-2.22)	2.34	-	9.25	10.21 (10.38)	0.11	0.42 (281.82)
Large	138.8	136.2 (-1.87)	0.40	0.40 (0.00)	7.00	11 (57.14)	-	-

Figures in parenthesis shows the percent change  
 BMMSB-Before macro management scheme benefit  
 AMMSB-After macro management scheme benefit

## WHEAT

Farm size category	UREA		DAP		Zinc		Magnesium	
	BMMSB	AMMSB	BMMSB	AMMSB	BMMSB	AMMSB	BMMSB	AMMSB
Marginal	-	-	-	-	-	-	-	-
Small	136.43	110.36 (-19.11)	62.85	58.93 (-6.24)	-	-	-	0.71
Semi Medium	130.10	139.28 (7.06)	63.37	60.10 (-5.10)	0.31	0.62 (100)	-	0.65
Medium	133.62	131.17 (-1.83)	69.47	67.34 (-3.07)	0.21	0.21 (0)	0.08	1.23
Large	137.4	134.8 (-1.89)	70.8	68.8 (-2.82)	1.60	2.4 (50)	0.16	1

Figures in parenthesis shows the percent change  
 BMMSB-Before macro management scheme benefit  
 AMMSB-After macro management scheme benefit

It may be concluded that under macro management of agriculture scheme, efforts to strengthen integrated cereal development programme and integrated pest and weed management/ integrated nutrient management were the steps in right direction to maintain the soil fertility, to curtail the ever increasing cost of production, increasing productivity and hence profitability at farmer's field, yet the budget provision for these crucial activities were miniscule, just like a drop in the ocean. Such efforts need to be implemented on a large scale to tackle the alarming issues such as decelerating crop productivities as well as soil fertility in the state.

## **CHAPTER 6**

### **SUMMARY AND CONCLUSION**

Macro management of agriculture scheme was launched on November 2000 to move away from schematic approach to macro management mode by the integrating 27 centrally sponsored schemes. The previous pattern of rigid uniformity structured centrally sponsored schemes, permitting little or no flexibility, which resulted in large unutilized balances with states, was dispensed with. Integration of Centrally Sponsored Schemes under Macro Management approach enhanced the productivity of support programmes and accord greater flexibility to State Governments to develop and pursue activities on the basis of regional priorities. It is, thus, a major step towards achieving decentralization in pursuance of restoring primacy of States in agricultural development planning. The Central Government supplements the State Governments' efforts through regionally differentiated work plans comprising crop/area/target group specific interventions, formulated in an interactive mode and implemented in spirit of partnership with the states. Central Government provides 90 per cent of the outlay to states and 10 per cent is the share of the State. Out of Central Government's assistance of 90 per cent, 80 per cent is grant and 20 per cent is loan. Budgetary allocation of central Government has increased significantly from Rs. 381.88 crore in 2000-01 to Rs. 910.00 crore in 2006-07 for the proper implementation of the scheme. Out of this amount, about 44 per cent of the outlay has been spent on natural resource management activities, 15 per cent for the promotion of agricultural mechanization, 17 per cent on the crop production programme, 9 per cent on integrated nutrient and pest management activities, 5 per cent on the seed development programme, and around 10 per cent on innovation.

Under this scheme, the state of Punjab had Rs. 27.50 crore (Rs. 25.00 crore GOI + Rs. 2.50 crore state share) during 2000-01 for the specific purposes i.e. development of agriculture and horticulture, improving infrastructure for agricultural marketing and for better soil conservation and water management in the state. Since then, the state Government has been receiving funds under this scheme on regular basis for the thrust areas. During 2004-05, Rs. 16.67 crore (Rs. 15.00 crore GOI + Rs. 1.67 crore state share) was available with the state Government for the improvements in prioritized areas such as agriculture including agricultural marketing, horticulture, soil conservation and water management, and cooperation. Similarly, an amount of Rs. 22.22 crore (Rs. 20.00 crore GOI + Rs. 2.22 crore state share) was funded for agriculture including agricultural marketing and soil conservation and water management purposes for the year 2007-08. The major portion of funding (60% or more) under macro management scheme was sanctioned under the head agriculture including agricultural marketing in Punjab during all the years. The funding under this head accounted for as high as 69 per cent in 2000-01, 61 per cent in 2004-05 and 60 per cent during 2007-08. The proposed state action plan included seed plan and better pest/weed management for yield enhancement and cost optimization. The seed plan action was aimed at boosting agriculture production through providing certified seed/adoption of better seed replacement for wheat and paddy, seed multiplication and seed treatment for major crops. To follow the recommendation for seed replacement, wheat and paddy was provided to the farmers on 25% subsidy during the years 2001-02 onwards. In order to save the grains in stores from insect/pests, from rats in field/stores, good quality plant protection equipments and plant protection material was needed. The pest/weed management scheme was therefore targeted to weed control, rat control, providing plant protection equipments,



setting up of Bio-Control Laboratory and strengthening of Pesticides Testing Laboratories. To promote Integrated Pest Management approach, demonstrations-cum training was conducted in those areas where occurrence of diseases and pests were frequent on cotton crop. During 2005-06, insecticides/pesticides and plant protection equipments were provided to the farmers at 25 per cent subsidized rates.

Macro-management of agriculture scheme for supplementation/complementation of states efforts to work plans with regards to seed plan and scheme for pest/weed management have been in place for the last about six years with concretely defined physical and financial targets to be achieved in each year. Monitoring and evaluation of various objectives/mandates of this scheme is therefore necessary to study the level of its implementation in the state along with its overall impact on state agricultural development in general and farming community in particular. Ever since the implementation of Macro Management of Agriculture Scheme, study on the impact of its Seed Plan and Integrated Nutrient and Pest Management Sub Schemes has not been carried out. Hence, the present study tried to examine these aspects with the following specific objectives

### **Objectives**

- 1 To assess the impact of the interventions made under the sub schemes of ICDP and Balanced Integrated Use of Fertilizers submitted under the Macro Management of Agriculture scheme on the production and productivity of various crops with minimum cost.
- 2 To analyze the impact of efforts made by Punjab in increasing the seed replacement rates (crop-wise), in terms of ensuring timely availability of sufficient quality of good quality seeds, and

- 3 To analyze the impact of the activities to promote Balance Integrated Nutrient Management to maintain soil fertility and environment.

**Methodology:**

The study has been based on both secondary as well as primary data to accomplish the various specified objectives of the study.

***Secondary information/data and sources:***

The secondary information such as share of agriculture in State Gross Domestic Product and total work force, dynamics in state cropping pattern, area under high yielding varieties, demographic profile of the state, area yield and production of various crops etc. has been collected from secondary sources such as various publications of Ministry of Agriculture and Statistical Abstracts of Punjab. Funds sanctioned to Punjab state under Macro Management Scheme during 2000-01 to 2007-08 for various components such as development of major crops, soil reclamation and improvement of soil health, extension and promotion of agricultural machinery, pest and weed management/integrated nutrient management and soil conservation etc. have been extracted from macro management annual work plan reports prepared by Directorate of Agriculture, Government of Punjab. The information related to district wise infrastructure in terms of soil/fertilizer testing laboratories etc. have been obtained from unpublished sources of Government of Punjab.

***Primary information/data and sources:***

In Punjab macro management of agriculture scheme have been implemented since 2000-01 in all the districts of the state. The major components of these macro management schemes were integrated cereal development programme (seed replacement/treatment of paddy and wheat) and pest and weed management/integrated nutrient management implemented

concurrently all over the districts of the state. Keeping in view the intensity of efforts towards seed replacement/treatment under ICDP and other pest and weed management/INM related activities, the present study has been conducted in three districts of Punjab namely, Ludhiana, Patiala and Sangrur. The farmer beneficiaries covered under ICDP as well as pest and weed management/INM were identified with the help of list of such farmer beneficiaries in these districts, obtained from the officials of Department of Agriculture, Punjab. Efforts were made to take samples of farmers benefitted both under ICDP as well as pest and weed management/INM under Macro Management of Agriculture Scheme. A sample of 45 such farmer beneficiaries spreading over 10 villages falling in 4-6 blocks from each district has been chosen randomly, making a total sample size of 135 beneficiaries of these schemes from three sample districts of Punjab. The sample households were categorized as marginal (< 2.5 acres), small (2.5-5.0 acres), semi-medium (5-10 acres), medium (10-25 acres) and large (>25 acres) farm size groups. The sample included 14 small, 49 semi-medium, 47 medium and 25 large sample households. Just due to chance factor, no marginal holding sized household appeared in the sample. To access the impact of ICDP and pest and weed management/INM, the required information was collected from these 135 sample farmers with the help of an especially designed schedule for the purpose during the year 2007-08. Though, the macro management of agriculture scheme has been in operation in the state from 2001-02 onwards, the sample households took advantage of such schemes during 2005-06 and 2006-07. Therefore, in order to assess the impact of integrated cereal development and pest and weed management / integrated nutrient management scheme under macro management on agriculture scheme, the year

2004-05 was taken as the base year i.e. before macro management of agriculture scheme and 2007-08 as the current year i.e. after macro management of agriculture scheme.

***Statistical analysis:***

The simple statistical techniques like averages, percentages, tabular analysis, frequency distribution etc. have been applied for better explanation and interpretation of the results.

**Profile of the state / selected districts:**

The share of agriculture in the state gross domestic product in Punjab varied between 48 per cent during 1993-94 and 33.78 per cent during 2005-06. On the whole contribution of agriculture sector in state gross domestic product showed declining trend from 44 per cent in 1990-91 to around 35 per cent during 2007-08, reflecting the increasing contribution of manufacturing and service sector in the state over the years which is of course considered as a good signs of overall economic development of the state. Similarly total work force engaged in agricultural sector also declined from 55.26 per cent in 1991-92 to 38.95 per cent in 2001-02. Partly due to limited labour absorption capacity of agriculture and allied activities in the state, highly mechanized various farm operations in the sate as well as due to increasing employment avenues in the various economic sectors such as manufacturing and tertiary activities, the dependence of people in the sate on agriculture sector has declined over the years.

***Crop pattern:***

The total cereals (paddy, wheat maize and bajra) which were grown on 72.6 per cent of gross cropped area during 1990-91 have occupied around 80 per cent of the gross cropped area during 2006-07 in the state. The per cent area under paddy cultivation has increased from 25.58 per cent to 33.43 per cent and of wheat from 43.44 per cent to 44.02 per cent

during the study period. Contrary to it the area under maize and bajra got squeezed from 2.89 per cent and 0.16 per cent to 1.93 per cent and 0.08 per cent respectively during the corresponding period. Similarly, the other crops disappearing from the state crop map were found to be gram (0.83 per cent to 0.05 per cent) and groundnut (0.20 per cent to 0.05 per cent). The area under cotton has also declined from 8.74 per cent to 6.09 per cent in the state over the years. On the whole one can safely conclude that the monoculture of paddy and wheat has been strengthened in the state at the cost of other crops like maize, bajra, gram, groundnut, other oilseeds and sugarcane etc.

***Demographic profile:***

Male constituted about 53.31 per cent in the state varying between 53.34 per cent in Patiala and 54.82 per cent in Ludhiana. The rural-urban split brought out that around 52.91 per cent people in the state still live in rural area varying between 53.21 per cent in Ludhiana and 53.54 per cent in Sangrur district. The number of female per 1000 males was found alarmingly low at 876 in the state (824 in Ludhiana, 870 in Sangrur and 875 in Patiala). The density of population was found to be 484 people per sq. km in the state with as high as 805 person per sq.km in Ludhiana and 408 in Sangrur. Around 65 percent people in the state was found to be literate. Across the farm size category of the total male population, about 89 per cent, 57 per cent, 64 per cent and 55 per cent were found to be in the most productive age group (18-60 years) in small, semi-medium, medium and large farm size categories respectively. The corresponding figures were observed as 75 per cent, 67 per cent, 68 per cent and 65 per cent in case of female population of the sample households. Around 17 per cent to 29 per cent male population of sample households was found to be educated up to primary level across various farm size categories. Similarly, 27 per cent to

53 per cent of the male population of sample households was educated to SSLC level. The female population of sample households up to the level of SSLC was found to be 53 per cent, 58 per cent, 58 per cent and 56 per cent on small, semi-medium, medium and large farm size categories respectively. Illiterate population on the sample households was found between 3 per cent to 16 per cent in case of male population and 9 per cent to 25 per cent female population across various farm size categories in the state.

***Area, production and productivity of selected crops:***

The average yield of paddy in the state during 2006-07 was 3915 kg/ha (4475 kg/ha in Ludhiana, 4132 kg/ha in Patiala and 4519 kg/ha in Sangrur district). Similarly the acreage yield of wheat during the year was 4299 kg/ha with 4695 kg/ha in Ludhiana, 4522 kg/ha in Patiala and 4452 kg/ha in Sangrur district. The yield of sugarcane varied between 6670 kg/ha in Ludhiana and 7504 kg/ha in Sangrur district with an overall yield of 5984 kg/ha in the state.

***Soil testing infrastructure:***

The total number of soil testing laboratories along with their annual capacities in various districts of the state has remained the same (66 soil testing laboratories with total capacity of 595000 sample testing capacity) during 2004-05 to 2007-08. Of the total installed annual capacity of soil testing laboratories in the state the utilization was found to be 27.39 per cent during 2004-05. In the succeeding years the capacity utilization increased to 38.46 per cent (2005-06) and 56.17 per cent (2006-07). During 2007-08 total number of sample analyzed were 283369 against the installed capacity of 595000 registering capacity utilization at 47.63 per cent. The capacity utilization in this regard has been found quite satisfactorily in districts such as Barnala, Faridkot, Mansa and Moga where as serious

efforts need to be made to improve the capacity utilization in districts namely Gurdaspur, Kapurthala and Muktsar by creating awareness among the farmers about the significance of soil testing.

***Fertilizer testing infrastructure:***

Fertilizer testing facilities established in Faridkot and Ludhiana districts has been providing the required facilities to all the districts of the state. The targets fixed and the targets achieved for Faridkot fertilizer testing laboratory has brought out that it has been using to its fullest extent as the targets achieved has been even more (1524) than the target fixed (1500). Similarly, the working performance of Ludhiana fertilizer testing laboratory was found to be utilized at the desired level. The overall target achieved was found to be cent per cent with some over and under achievements across the districts.

**Performance of macro management scheme**

***Development of major crops (Wheat and paddy):***

During 2002-03, under macro management of agriculture scheme 0.91 lakh quintals of certified seed of wheat were distributed against the target of 1.31 lakh quintals. During 2007-08 the target fixed for replacement of wheat seed was of 47500 quintals of which 23717 quintals could actually be replaced, achieving around 50 per cent of the target fixed. Similarly, seed treatment was promoted on 47257 ha as against the target of 200000 ha during 2007-08. The per cent achieved target was found to be around 24 per cent in this regard in the state.

***Development of sugarcane based cropping system:***

The target of seed multiplication (1500 ha) has well been achieved by spending Rs.29.59 lakh against the targeted amount of Rs.30 lakh (Rs.3 lakh state Government and Rs.27 lakh

by Government of India contribution) during 2002-03. The target of providing 250 water saving devices has also been fully achieved with expenditure of Rs.13.50 lakh against the total targeted outlay of Rs.15 lakh for the purpose. The targeted number of demonstrations for single bud plantations and intercropping has been cent per cent achieved during 2007-08.

***Soil reclamation and improvement of soil health:***

Of the total money (Rs.282.20 lakh) earmarked for soil reclamation, only Rs.12.49 lakh actually could be utilized, achieving just about 15 per cent of the total physical target fixed in the state during 2002-03. This component of soil reclamation has been found very well addressed during 2007-08 achieving as high as 98 per cent of the physical targets. During 2002-03 the targets of soil improvement by green manuring were fixed at 17000 ha where as target achieved in this regard was 6108 ha. The vermiculture has been promoted in 26 villages against the target of 34 villages during 2002-03 under macro management scheme. The financial provisions earmarked under macro management of agriculture scheme for various interventions such as soil testing laboratories, micronutrient laboratories, fertilizer testing laboratories and establishment of compost plant were found to be utilized to the tune of 88-90 per cent during 2007-08 in the state.

***Extension and promotion of agricultural machinery:***

During 2002-03 22 aero blast sprayers as against the target of only 10 were provided to the farmers. Similarly, the physical target achieved in case of vertical conveyer reaper, rotavaters, straw reapers, potato planter and potato digger were found to be even more than target fixed during 2002-03 and 2007-08. Similar situation was also found in case of potato planter and digger during 2007-08.



***Development of bee-keeping:***

Around 25 per cent of the financial provisions planned under macro management of agricultural scheme for subsidy on bee-colonies as well as various equipments were utilized during 2002-03. The physical targets achieved were also in the range of 27 per cent to 29 per cent of the target fixed during 2002-03.

***Pest and weed management:***

For plant protection equipments Rs.33.29 lakh was spent against the total target of Rs.20 lakh (2 lakh state+18 GOI contribution) for this component during the year 2002-03. During 2007-08, provision of Rs.65 lakh were kept for strengthening of pesticides, of which Rs.50 lakh was actually spent to achieve the physical target cent per cent.

***Soil conservation:***

On water shed development programmes, rain water harvesting, reclamation of ravenous areas and efficient use of irrigation. Huge amount of Rs.700 lakh (Rs.7 lakh by state Government and Rs.630 lakh by GOI) had been earmarked for water shed development programmes for rainfed area and about Rs.64 lakh for efficient use of irrigation in the state during 2007-08.

**Socio economic characteristics of sample households:**

The average family size was found to be increased with the increase in farm size. The average number of family members was 4.00 on small, 4.69 on semi-medium, 5.42 on medium and 7.88 on large farm size households with an overall family size of 5.47 in the sample area. All heads of the families were literate. The caste wise distribution of sample households by farm size category highlighted that 93 per cent to 100 per cent of the sample households were from general caste across the various farm size categories. Only 7 per cent

small farmers belonged to schedule caste and 2 per cent semi-medium households were from OBC in the sample. On the whole 98.51 per cent sample households were from general caste and 0.74 per cent each from SC and OBC. Hence, it can be inferred that the farm activities are majorly performed by people belonging to general caste in the sample pockets of the state. Across the farm size category of the total male population, about 89 per cent, 57 per cent, 64 per cent and 55 per cent were found to be in the most productive age group (18-60 years) in small, semi-medium, medium and large farm size categories respectively. The total operational holding size was found to be 3.64 acres (small), 6.59 acres (semi-medium), 15.46 acres (medium) and 44.78 acres for the large holdings in the sample area. Whole of the area was irrigated in the region. In addition to agriculture, 92 per cent sample households were engaged in animal husbandry, 4 per cent in business and 6 per cent in regular jobs. A negligible proportion of sample households (0.74 per cent) adopted horticulture as major or subsidiary occupation in the sample districts. The major source of information about these schemes with sample households were found to be newspaper/pamphlets (71.11 per cent) followed by TV (65.93 per cent), Government officials (43.70 per cent) and radio (25.93 per cent). Across the farm size category TV was the common and most important source of information among large, medium, semi-medium and small farmers. In case of small farmers newspaper/pamphlets was the major source of such information in the sample districts of Punjab. It was found that around 17 per cent of the sample households did not know the specific schemes under macro management of agriculture though they were taking advantages under these schemes. The various reasons advanced by the sample households for not knowing the schemes were non-availability of TV/radio and newspaper/ pamphlets with them. Owing to the popular

policy of the state Government all the farmers irrespective to their farm size category was benefitted in terms of free irrigation (canal water) and free power (electricity) in the state.

The assistance on cultivator was received by 6.12 per cent semi-medium farmers, 12.77 per cent medium farmers and 16 per cent large farmers. Similarly the incentives on the purchase of disk/blade were enjoyed by 4.08 per cent semi-medium, 19.15 per cent medium and 20 per cent large farmers. In case of thresher around 8 per cent semi-medium, 13 per cent medium and 24 per cent large sample households received assistance under macro management scheme. On the whole it was found that comparatively large farmers were the major beneficiaries under these schemes followed by medium and semi-medium farmers. District agricultural officer was the sole source of providing assistance/subsidy on agricultural implements and machinery for sample households irrespective to the farm size category in the sample districts. In case of small farmers State Agricultural Department was found to be the major source of soil testing facilities followed by state agricultural universities. Contrary to it state agricultural university turned out to be the most common and popular source of soil testing facilities among the semi-medium, medium and large sample households. The other sources as reported by sample households were societies and private companies etc. Reasons advanced by sample households for not availing any source of soil testing indicated highlighted that only single farmer belonging to semi-medium farm size category did not avail this facility from any source as he was not interested.

### **Impact assessment of Integrated Cereal Development Program:**

During 2000-2003, the major activities undertaken by the state under ICDP were found to be the seed treatment related activities. The production and multiplication of certified seed on departmental seed farm and strengthening of seed testing laboratories

were taken up during 2004 and 2005. The efforts on replacement of seed were initiated in the year 2006 onwards with the targeted expenditure of Rs.161 lakh during 2006 and around Rs.96 lakh during 2007 for this component under macro management of agriculture.

**Wheat production system:**

During the period total area under wheat crop increased by 1.44 per cent with the corresponding production increase by 6.21 per cent. The major wheat area increase has been noticed only in case of small sample households registering around 54 per cent wheat acreage during the period. Over the period the production of wheat has increased by around 65 per cent small households, 4 per cent semi-medium, 7 per cent medium and 4 per cent on large sample households. The average yield increased to 7.55 per cent, 6.85 per cent, 4.42 per cent and 3.20 per cent in case of small, medium, semi-medium and large farmers respectively after the benefit of macro management scheme. The major source of seed in all farm size categories was found to be the domestic seed constituting around 80 per cent and 95 per cent on large and small sample households respectively. The other important source of seed was seed corporation sharing 5.30 per cent, 9.51 per cent, 10.78 per cent and 18.76 per cent of the total seed requirement of small, semi-medium, medium and large sample households categories respectively. The open market and retailers were not found to be the important source of seed in the sample districts. Amount of incentives/subsidy increased with the increase in farm size varying between Rs.94 per household in small and Rs.2744 in large farm size category. The per cent incentive realized by sample households brought out that the major share of incentives was cornered by large farm size category sharing 59.33 per cent of the total incentives/subsidies provided to sample households. The

small farm size category shared only 1.14 per cent of the total incentives provided by the state Government under macro management scheme of agriculture. Use of various soil ameliorates for wheat by sample households by farm size category highlighted that about 7 per cent small and 4 per cent semi-medium sample households were found using gypsum in the wheat fields. No sample households were using other ameliorates such as pyrite, lime and zinc etc. The major source of gypsum with the gypsum users was retailer only. It was found that of the total sample households only 5 per cent participated in demonstrations on zero tillage, 3 per cent in organic farming demonstrations and about 4 per cent in demonstrations on bio-fertilizers. The farmers who participated in such demonstrations belonged either to medium or large sample households. No farmer from other categories like small and semi-medium participated in such demonstrations. The various difficulties faced by sample households in attending wheat-related demonstrations were non-availability of time and transport facilities. Around 93 per cent small farmers could not participate in such demonstrations due to inadequate transport facilities. The medium and semi-medium farmers did not participate in these demonstrations mainly because of loss of other work. Inadequate transport facilities and non-availability of time were found to be the major constraints even though the participation in such demonstrations was free of any charge. The cost of participation of those medium and large farmers who participated in wheat-related demonstrations were borne by the organizers. In the sample districts the wheat-related demonstrations were either organized by state agricultural officers or by the state agricultural universities. The various reasons advanced by sample households who could not attend various wheat-related demonstrations brought out that around 93 per cent

small, 59 per cent semi-medium, 36 per cent medium and 12 per cent large farmers were not aware of such demonstrations.

***Impact of macro management of agriculture scheme on wheat cultivation:***

Consequent upon the implementation of macro management of agriculture scheme the average area under wheat on small households increase from 3.02 acres to 4.63 acres registering an increase of 54 per cent before and after the scheme (Table1). In all other categories viz. semi-medium. Medium and large, no increase in area under wheat has been observed in the sample districts. The yield improvement has been noticed on all sample households irrespective to their farm size categories. The increase in yield over before and after the implementation of macro management of agriculture scheme has been estimated as 7.55 per cent, 4.42 per cent, 6.85 per cent and 3.20 per cent on small, semi-medium, medium and large holding size group respectively. This has resulted in the increase of total production of wheat incase of all the farm size categories in the range of 4 per cent to 7 per cent with an exception of about 65 per cent on the small farm size category. The quantity of seed/acre was found to be similar (around 39 kg/acre) across various farm size categories before as well as after the implementation of macro management of agriculture scheme in sample districts. The major single source of seed remained the domestic before as well as after the scheme for all the farm size categories in the sample districts.

***Impact of macro management of agriculture scheme on income/expenditure of wheat cultivation:***

Average yield of wheat has increased on all the sample households irrespective to their farm size category. The highest increase (7.55 per cent) in average yield has been noticed in case of small farm size category and lowest (3.20 per cent) in large farm size group. The average price of wheat has increased by 33 per cent in all the farm size categories mainly

due to the hike in minimum support price of wheat announced by Government of India. The average price of by product has remained largely the same before and after macro management scheme benefit. The variable cost/acre of wheat also remained more or less the same in all these farm size categories before and after the macro management scheme benefit. Gross returns per acre of wheat increased by 31-37 per cent on sample households due to both hike in average yield as well as price across the various farm size categories (Table 2). As a result of increase in yield and price as well as reduction in variable costs the overall returns over variable cost per acre has increased by about 66 per cent on small households, 47 per cent semi-medium, 51 per cent medium and 42 per cent on large sample households over the period i.e. before macro management scheme benefit and after macro management scheme benefit. The total income from wheat cultivation was increased by about 43 per cent on large households, 51 per cent on medium, 47 per cent on semi-medium with an exceptionally high i.e. 154 per cent on small households. It may be mentioned here that this large hike in income of small households was mainly due to the increase in area under wheat cultivation due to macro management scheme benefit. The decomposition analysis brought out that this hike in total income was due to 7.55 per cent increase in yield and around 65 per cent increase due to increase in area and yield taken together on small holding size group. In case of semi-medium and medium size house holdings the total increase in income was due to increase in yield only as no wheat acreage has been reported on these farm size categories. In large farm size the increase in income due to increase in yield as well as area was found to be 3.66 per cent (3.20 per cent increase due to yield only). On the whole it was found that all the sample households were benefited due to macro management scheme in terms of yield hike on their farms to the tune of 3 per

cent to 8 per cent. PBW-343 was found to be the most preferred variety followed by PBW-502, Gold-17 and DBW-17 by all the sample households irrespective to their farm size category. The various reasons as highlighted by sample households for choosing these varieties were higher yield, marketing ease, better price and minimum risk etc.



**Table 1: Changes in area, production and yield of wheat crop on sample households by farm size category in Punjab**

Farm size category	Area(Acre)		Production (qtls)		Yield (qtls/Acre)		Seed Rate				Major single source of seed	
	BMMSB	AMMSB	BMMSB	AMMSB	BMMSB	AMMSB	Qty(kgs)		Value(Rs./kg)		BMMSB	AMMSB
							BMMSB	AMMSB	BMMSB	AMMSB		
Marginal	-	-	-	-	-	-	-	-	-	-	-	-
Small	3.02	4.63 (53.82)	57.13	94.17 (64.83)	18.93	20.36 (7.55)	39.29	39.86 (1.45)	9.80	11.30 (15.31)	Domestic	Domestic
Semi Medium	5.49	5.49 (0.00)	103.59	108.16 (4.41)	19.01	19.85 (4.42)	39.29	39.20 (-0.23)	9.80	11.30 (15.31)	Domestic	Domestic
Medium	13.35	13.35 (0.00)	261.15	279.04 (6.85)	19.56	20.90 (6.85)	39.68	39.57 (-0.28)	9.85	11.45 (16.24)	Domestic	Domestic
Large	35.98	36.14 (0.44)	718.88	745.21 (3.66)	19.98	20.62 (3.20)	39.24	39.60 (0.91)	9.90	11.50 (16.16)	Domestic	Domestic

Figures in parenthesis shows per cent increase  
 BMMSB-Before macro management scheme benefit  
 AMMSB-After macro management scheme benefit

**Table 2: Changes in the income and expenditure of the sample households from wheat crop by farm size category in Punjab**

(Rs.)

Particulars	Marginal	Small		Semi medium		Medium		Large	
		BMMSB	AMMSB	BMMSB	AMMSB	BMMSB	AMMSB	BMMSB	AMMSB
i) Av. Yield (Q/acre)	-	18.93	20.36 (7.55)	19.01	19.85 (4.42)	19.56	20.90 (6.85)	19.98	20.62 (3.20)
ii) Price (Rs./Q)	-	640	850 (32.18)	640	850 (32.18)	640	850 (32.18)	640	850 (32.18)
iii) Price of By Product(Rs./Q )	-	130	130	130	130	130	130	130	130
iv) Av. Price [ii + iii]	-	770	980 (27.27)	770	980 (27.27)	770	980 (27.27)	770	980 (27.27)
v) Gross Returns [i * iv]	-	14576	19953 (36.89)	14638	19453 (32.89)	15061	20482 (35.99)	15385	20208 (31.35)
vi) Variable Costs/Acre	-	6248	6149 (-1.58)	4511	4535 (0.53)	4471	4535 (1.43)	4023	4074 (1.27)
vii) ROVC/acre [v – vi]	-	8328	13804 (65.75)	10127	14918 (47.31)	10590	15947 (50.59)	11362	16134 (41.99)
viii) Av. Wheat acreage	-	3.02	4.63 (53.82)	5.49	5.49 (0)	13.35	13.35 (0)	35.98	36.14 (0.44)
ix) Income (Rs.) [vii * viii]	-	25151	63913 (154.12)	55597	81900 (47.31)	141377	212892 (50.58)	408805	583083 (42.63)
a) Increase due to area and yield only	-	44020	72585 (64.89)	80361	83912 (4.42)	201067	214842 (6.85)	553538	573809 (3.66)
b) Increase due to yield only	-	14576	15677 (7.55)	14638	15285 (4.42)	15061	16093 (6.85)	15385	15877 (3.20)

Figures in parentheses shows per cent change

BMMSB-Before macro management scheme benefit

AMMSB-After macro management scheme benefit

## **Paddy production system**

During the period total area under paddy increased by 22.79 per cent with the corresponding production increase by 26.89 per cent on the sample households. The major increase has been noticed only in case of large sample households registering around 31 per cent paddy acreage during the period. Over the period the paddy production has increased by around 36.06 per cent in large households, 24.09 per cent semi-medium, 16.89 per cent medium and 10.79 per cent in small sample households. The average yield increased by 3.82 per cent, 3.71 per cent, 2.76 per cent and 2.54 per cent in case of large, small, semi-medium and medium farmers respectively. The major source of seed in all farm size categories was found to be the domestic seed constituting around 49 per cent and 85 per cent on small and semi-medium sample households respectively. The other important source of seed was retailer sharing 43.30 per cent, 7.90 per cent, 13.18 per cent and 8.26 per cent of the total seed requirement of small, semi-medium, medium and large sample households' categories respectively. The open market and seed corporation were not found to be the important source of seed in the sample districts. Use of various soil ameliorates for paddy by sample households by farm size category highlighted that about 14 per cent small, 18 per cent semi-medium, 17 per cent medium and 28 per cent large sample households were found using gypsum in the paddy fields. No sample households were using other ameliorates such as pyrite, lime and zinc etc. The major source of gypsum with the gypsum users was retailer only. It was found that of the total sample households only 5 per cent participated in demonstrations on zero tillage, 3 per cent in organic farming demonstrations, 4 per cent in bio-fertilizers, 17 per cent in yield improvement and 8 per cent in demonstrations on crop diversification. The farmers who participated in such

demonstrations belonged either to semi-medium, medium and large sample households. No farmer from small sample household participated in such demonstrations. The various difficulties faced by sample households in attending paddy-related demonstrations were non-availability of time and transport facilities. Around 86 per cent small farmers could not participate in such demonstrations due to inadequate transport facilities. The medium and semi-medium farmers did not participate in these demonstrations mainly because of loss of other work. Inadequate transport facilities and non-availability of time were found to be the major constraints even though the participation in such demonstrations was free of any charge. The cost of participation of those medium and large farmers who participated in wheat-related demonstrations were borne by the organizers. In the sample districts the paddy-related demonstrations were either organized by State Agricultural Officers or by the State Agricultural Universities. The various reasons advanced by sample households who could not attend various paddy-related demonstrations brought out that around 64 per cent small, 31 per cent semi-medium and 8 per cent large farmers were not aware of such demonstrations. Non availability of transport and time as a reason for not attending various such demonstrations has been highlighted by around 43 per cent small, 14 per cent semi-medium and 13 per cent medium farmers

Around 79 per cent small, 82 per cent semi-medium, 96 per cent medium and 100 per cent large farmers suggested that information pertaining to such demonstrations/training should be disseminated through newspapers. In addition, the information on such programmes through TV/radio has been sought by about 57 per cent, 80 per cent, 68 per cent and 96 per cent small, semi-medium, medium and large sample households respectively.

***Impact of macro management of agriculture scheme on paddy cultivation:***

Consequent upon the implementation of macro management of agriculture scheme the average area under paddy increased to the range between 7 acres in small and 21 acres in semi-medium with an exceptional increase of 37 acres in large categories (Table 3). The increase in yield has been estimated as 3.71 per cent, 2.76 per cent, 2.54 per cent and 3.82 per cent on small, semi-medium, medium and large holding size groups respectively. This has resulted in the increase of total production of paddy in case of all the farm size categories in the range of 11 per cent to 24 per cent with an exception of about 36 per cent on the large farm size category. The quantity of seed/acre was found to be similar (around 7 kg/acre) across various farm size categories before as well as after the implementation of macro management of agriculture scheme in sample districts. The price of seed has increased by 11-14 per cent during this period i.e. before macro management scheme (2004-05) and after macro management scheme (2007-08). The major single source of seed remained the domestic before as well as after the scheme for all the farm size categories in the sample districts.

***Impact of macro management of agriculture scheme on income and expenditure of paddy:***

Average yield of paddy has increased in the range of 3 per cent to 4 per cent in all farm size categories. The highest increase (about 4 per cent) in average yield has been noticed in case of large farm size category and lowest (2.54 per cent) in medium farm size group. The average price of paddy has increased by about 31 per cent in all the farm size categories mainly due to the hike in minimum support price of paddy announced by Government of India. The variable cost/acre of paddy remained more or less the same in all these farm size categories before as well as after the macro management scheme benefit. Gross returns per

acre of paddy also increased by 35-36 per cent on sample households due to increase in average yield as well as price across the various farm size categories. The returns over variable cost per acre was in the range of 53-63 per cent in all farm size categories over the period i.e. before macro management scheme benefit and after macro management scheme benefit. The average paddy acreage was 6.74 per cent, 13.94 per cent, 20.73 per cent and 36.86 per cent in case of small, medium, semi-medium and large farm size categories respectively. The total income from paddy cultivation was increased by about 74 per cent in small, 85 per cent in semi-medium, 75 per cent in medium and 84 per cent in large sample households. In large farm size the increase in income due to increase in yield as well as area was found to be 24.75 per cent (3.82 per cent increase due to yield only). On the whole it was found that all the sample households were benefited due to macro management scheme in terms of yield hike on their farms to the tune of 3 per cent to 4 per cent.

**Table 3: Changes in area, production and yield of paddy crop on sample households by farm size category in Punjab**

Farm size category	Area (Acre)		Production (Qtls)		Yield (Qtls/Acre)		Seed Rate				Major single source of seed	
	BMMSB	AMMSB	BMMSB	AMMSB	BMMSB	AMMSB	Qty(Kgs)		Value(Rs.)		BMMSB	AMMSB
							BMSB	AMS	BMSB	AMS		
Marginal	-	-	-	-	-	-	-	-	-	-	-	-
Small	3.41	3.64 (6.74)	81.84	90.67 (10.79)	24	24.89 (3.71)	6.79	7.57 (11.49)	7.50	8.30 (10.67)	Domestic	Domestic
Semi Medium	5.45	6.58 (20.73)	134.34	166.71 (24.09)	24.65	25.33 (2.76)	7.14	7.16 (0.28)	6.95	7.89 (13.53)	Domestic	Domestic
Medium	13.56	15.45 (13.94)	341.58	399.27 (16.89)	25.19	25.83 (2.54)	6.64	6.77 (1.96)	7.00	7.98 (14.00)	Domestic	Domestic
Large	34.22	44.78 (36.86)	860.98	1171.44 (36.06)	25.16	26.12 (3.82)	6.92	6.92 (0.00)	7.25	8.21 (13.24)	Domestic	Domestic

Figures in parenthesis shows per cent increase  
 BMMSB-Before macro management scheme benefit  
 AMMSB-After macro management scheme benefit

**Table 4: Changes in income and expenditure of the sample households from paddy crop by farm size category in Punjab**

Particulars	Marginal	Small		Semi medium		Medium		Large	
		BMMSB	AMMSB	BMMSB	AMMSB	BMMSB	AMMSB	BMMSB	AMMSB
i) Yield (Q/acre)	-	24	24.89 (3.71)	24.65	25.33 (2.76)	25.19	25.83 (2.54)	25.16	26.12 (3.82)
ii) Av. Price (Rs./Q)	-	590	775 (31.36)	590	775 (31.36)	590	775 (31.36)	590	775 (31.36)
iii)Gross Returns [i * ii]	-	14160	19290 (36.23)	14544	19631 (34.98)	14862	20018 (34.69)	14844	20243 (36.37)
iv) Variable Costs/Acre	-	6129	6175 (0.75)	5004	5027 (0.46)	5124	5102 (-2.19)	4812	4881 (1.43)
v) ROVC/acre [iii – iv ]	-	8031	13115 (63.30)	9540	14604 (53.08)	9738	14916 (53.17)	10032	15362 (53.13)
vi) Av. rice acreage	-	3.41	3.64 (6.74)	5.45	6.58 (20.73)	13.56	15.45 (13.94)	37.22	44.78 (36.86)
vii) Income (Rs.) [v * vi]	-	27386	47739 (74.32)	51993	96094 (84.82)	132047	230452 (74.52)	373391	687910 (84.23)
a) Increase due to area and yield	-	48286	53454 (10.70)	79262	98336 (24.06)	201530	235453 (16.83)	553167	690096 (24.75)
b) Increase due to yield	-	14160	14685 (3.71)	14544	14945 (2.76)	14862	15240 (2.54)	14844	15411 (3.82)

Figures in parentheses shows per cent change  
 BMMSB-Before macro management scheme benefit  
 AMMSB-After macro management scheme benefit

PAU-201 was found to be the most preferred variety followed by Pusa-44, Pusa-1121 and PR-116 by all the sample households irrespective to their farm size category. The various reasons as highlighted by sample households for choosing these varieties were higher yield, marketing ease, better price and minimum risk etc.



## **Impact assessment of Integrated Pest, Weed and Nutrient Management Programme in paddy-wheat production system**

The efforts of state agricultural department for rat control and strengthening of existing pesticides testing laboratories had been very consistent over the years. The budget provision which was 22 and 33 lakh rupees during 2000 has increased to Rs.50 and about 65 lakh rupees during 2007 for these activities respectively. The other components of pest and weed management like control of storage grain pests and providing plant protection equipments were started with great enthusiasm with budget provision of Rs.72 lakh and Rs.39 lakh during 2001, decelerating efforts with budget provision of Rs.20 lakh for these components during 2003 was terminated in 2005. The efforts on setting up of bio-control laboratories continued from 2000 to 2002 with a budget provision of Rs.110 lakh and Rs.50 lakh respectively. During the year 2006 and 2007 a budget of Rs.50 lakh in each year was provided for supply of quality pesticides to the farmers in the state. The average use of Urea was found to be about 274, 267, 273 and 276 kg / acre in paddy-wheat production system by small, semi-medium, medium and large sample households respectively during the year 2004-05. Average use of DAP varied by about 63 kg-72 kg / acre across various farm size categories during 2004-05, 62-70 kg / acre during 2005-06 and 61-70 kg / acre during 2006-07. Among the micronutrients, the average use of zinc varied between about 4kg-13 kg / acre across various farm size categories as well as during the study years. The average use of magnesium was 0.08 and 1 kg / acre on these farm size categories. During 2005-06 and 2006-07 semi-medium and medium farmers were found using iron on their fields of paddy and wheat too. Use of various soil ameliorates in wheat and paddy crop by sample households by farm size category highlighted that about 14 per cent small, 18 per cent semi-medium, 17 per cent medium and 28 per cent large sample households were

found using gypsum in their fields. No sample households were using other ameliorates such as pyrite, lime and zinc etc. The major source of gypsum with the gypsum users was retailer only. The participation of sample households in pest and weed management/integrated nutrient management-related demonstration by farm size categories in paddy-wheat production system revealed that during the year 2006, 7 per cent small sample households and 11 per cent medium sample households farmers participated in such demonstrations for paddy and wheat crops. The duration of such demonstrations was one day only. The various difficulties faced by sample households in attending pest and weed management/integrated nutrient management-related demonstrations were non-availability of time and transport facilities. Around 71 per cent small farmers could not participate in such demonstrations due to inadequate transport facilities. The medium and semi-medium farmers did not participate in these demonstrations mainly because of loss of other work. Inadequate transport facilities and non-availability of time were found to be the major constraints even though the participation in such demonstrations was free of any charge. The cost of participation of those medium and large farmers who participated in attending pest and weed management/integrated nutrient management-related demonstrations were borne by the organizers.

In the sample districts pest and weed management/integrated nutrient management demonstrations were either organized by state agricultural officers or by the state agricultural universities. The various reasons advanced by sample households who could not attend pest and weed management/integrated nutrient management-related demonstrations brought out that around 50 per cent small, 55.10 per cent semi-medium, 6.38 per cent medium and 16 per cent large farmers were not aware of such

demonstrations. Non availability of transport and time as a reason for not attending various such demonstrations has been highlighted by around 79 per cent small, 59 per cent semi-medium and 36 per cent medium farmers. Around 86 per cent small, 88 per cent semi-medium, 94 per cent medium and 100 per cent large farmers suggested that information pertaining to such demonstrations/training should be disseminated through newspapers. In addition, the information on such programmes through TV/radio has been sought by about 93 per cent, 92 per cent, 85 per cent and 100 per cent small, semi-medium, medium and large sample households respectively.

***Impact of macro management of agriculture scheme on fertilizer use pattern in paddy-wheat cropping system:***

The use of Urea (kg per acre) in paddy has reduced through marginally in all the farm size categories varying between -0.82 per cent on semi-medium and -2.22 per cent on medium farm size category after the macro management scheme benefit (Table 5). The use of zinc has increased from 4.28 per acre (before macro management scheme benefit) to 7.14 kg per acres (after macro management scheme) registering an increase of about 67 per cent on small farm size category. Similar increase in the use of zinc has been observed on all farm size categories varying between 10.38 per cent on medium farm size category to 57 per cent on large farm size category. The use of iron was made only by semi-medium and medium farm size categories. The average use of iron on these farm size categories doubled/tripled after the implementation of macro management scheme. May be due to the easy availability of soil testing laboratories the use of zinc and iron has increased where as that of Urea has declined through marginally due to implementation of macro management of agriculture scheme in the sample districts. In case of wheat crop too the average use of Urea has declined in all the farm size categories varying between -1.83 per cent on medium

farm size category to about -19.11 per cent on small farm size category with an exception of semi-medium farm size category where average use of Urea has rather increased about 7 per cent. Similarly the use of DAP for wheat cultivation has also reduced by 3 per cent to 6 per cent across various farm size categories after the implementation of macro management of agriculture scheme on nutrient management. Likewise of paddy crop, the use of micronutrient such as zinc and magnesium has increased in wheat cultivation. The use of zinc has increased by 50 to 100 per cent. Small and semi-medium farmers were not using magnesium before the implementation of nutrient management scheme under macro management of agriculture started using magnesium with an average dose of 0.71 to 0.64 kg per acre after the implementation of macro management scheme. In case of medium and large farmers the average dose of this deficient micronutrient increased from just 0.08 and 0.16 kg per acre to 1.23 and 1.00 kg per acre after the nutrient management program under macro management of agriculture scheme. On the whole it may be inferred that with the strengthening of soil testing facilities / infrastructure under macro management scheme in the state the farmers started using need based macro as well as micronutrient in their fields. The reduced use of fertilizers (Urea and DAP) and increased use of macro nutrients (zinc, iron and magnesium) would certainly cut down the expenditure and enhance productivity levels of paddy-wheat production system in the state.

**Table 5: Changes in the fertilizer use pattern in paddy and wheat crop by sample households by farm size category**

**PADDY**

Farm size category	UREA		DAP		Zinc		Iron	
	BMMSB	AMMSB	BMMSB	AMMSB	BMMSB	AMMSB	BMMSB	AMMSB
Marginal	-	-	-	-	-	-	-	-
Small	137.5	134.64 (-2.08)	1.43	1.43 (0.00)	4.28	7.14 (66.82)	-	-
Semi Medium	136.47	135.35 (-0.82)	-	-	5.31	7.66 (44.26)	0.06	0.26 (333.33)
Medium	139.47	136.38 (-2.22)	2.34	-	9.25	10.21 (10.38)	0.11	0.42 (281.82)
Large	138.8	136.2 (-1.87)	0.40	0.40 (0.00)	7.00	11 (57.14)	-	-

Figures in parenthesis shows the percent change  
**BMMSB**-Before macro management scheme benefit  
**AMMSB**-After macro management scheme benefit

## WHEAT

(kg/acre)

Farm size category	UREA		DAP		Zinc		Magnesium	
	BMMSB	AMMSB	BMMSB	AMMSB	BMMSB	AMMSB	BMMSB	AMMSB
Marginal	-	-	-	-	-	-	-	-
Small	136.43	110.36 (-19.11)	62.85	58.93 (-6.24)	-	-	-	0.71
Semi Medium	130.10	139.28 (7.06)	63.37	60.10 (-5.10)	0.31	0.62 (100)	-	0.65
Medium	133.62	131.17 (-1.83)	69.47	67.34 (-3.07)	0.21	0.21 (0)	0.08	1.23
Large	137.4	134.8 (-1.89)	70.8	68.8 (-2.82)	1.60	2.4 (50)	0.16	1

Figures in parenthesis shows the percent change  
 BMMSB-Before macro management scheme benefit  
 AMMSB-After macro management scheme benefit

It may be concluded that under macro management of agriculture scheme, efforts to strengthen integrated cereal development programme and integrated pest and weed management/ integrated nutrient management were the steps in right direction to maintain the soil fertility, to curtail the ever increasing cost of production, increasing productivity and hence profitability at farmer's field, yet the budget provision for these crucial activities were miniscule, just like a drop in the ocean. Such efforts need to be implemented on a large scale to tackle the alarming issues such as decelerating crop productivities as well as soil fertility in the state.

## **REFERENCES**

Government of Punjab, Macro Management Work Plan for 2000/01 to 2007/08,  
Department of Agriculture and Soil Conservation.

Statistical Abstracts of Punjab, *various issues*.

## **COMMENTS ON DRAFT REPORT**

We are in receipt of your draft report of the study "Macro management of agriculture schemes in Punjab"

We would like to suggest some facts for your consideration and send the final report both hard and soft copies at your earliest.

1. According to the study design and methodology of the project, you are expected to study the impact of three schemes, as the state Punjab lies in the category of the state which have

implemented three schemes. Please refer to the project Proposal and methodology) and you were also suggested to select three blocks for three schemes with a total sample size of 135 farmers. But the report conducts the study in three blocks for two schemes, which is a deviation from our methodology of the study. It should be noted that this is a co-ordinated study which includes many research centers , so it is necessary to comply with the study design and methodology, so that the impact of the schemes are better captured.

2. It is necessary to clearly assess the efforts made by the state in the effective implementation of the MMA Schemes in the state. So it is suggested to bring out the state's intervention towards the schemes.

3. The report has discussed the MMA Schemes and their achievements largely at the national level rather than assessing their implementation and impacts of the selected scheme for the study.

4. You are strongly suggested to strictly comply with the standard table formats while preparing the reports which is common and sent to all the AERCs.

5. It is also felt that too much importance is given to the soil testing and its related activities which is not a prime objective of the study.

You are requested to incorporate the changes suggested above and send the draft at your earliest.

Sd/

ISEC  
Bangalore



## **ACTION TAKEN**

Date of the Draft Report: 5/3/10

Date of Receipt of Comments: 19/3/10

- 1 In Punjab under Macro management of agriculture scheme, the major interventions have been related to ICDP, pest and weed management and integrated nutrient management (soil health) etc. The impact of all these three have been properly studied in the report. Since, the sample farmers were same for all these schemes, to avoid large scale duplication of tables, pest weed management and INM have been put together.
- 2 The efforts made by the state in the effective implementation of macro management of agriculture scheme in the state have already been assessed. The various states' interventions (seed treatment of wheat and paddy @ 25 per cent subsidy, IPM demonstrations @ Rs.17000/- per Farmers Field School (FFS), farmers training camps @ Rs.17000/- per Farmers Field School (FFS), ridgers for bed plantation @ Rs.6000 per ridger, demonstration of machinery such as paddy transplanter etc, other subsidy schemes for allied enterprises under macro

- management of agriculture scheme) towards the scheme have been clearly mentioned on the bottom of tables 2.2.1 through 2.2.5.
- 3 As pointed out, the report has certainly not discussed the macro management of agriculture schemes and their achievements at national level except few paragraphs in introduction chapter. The whole report is fully dedicated on the targets and achievements under macro management of agriculture scheme in the state as a whole as well as studied the impact of ICDP and pest and weed management/INM on the income, expenditure, use of micro/macro nutrients etc. etc at the farmer level.
  - 4 The report has been well documented in accordance with the standard table format provided by ISEC. All the tables have been prepared as per the ISEC requirements except table on cash prize for gram panchayats (4.2.7) which was not found relevant for the state.
  - 5 Soil health, being the major concern of the state, has been a major component under INM related activities well deserves its elaboration in the context of Punjab.

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