



Department of Agriculture
Himachal Pradesh

DISTRICT AGRICULTURE PLAN

SIRMAUR, HIMACHAL PRADESH

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District Agriculture Plans of Himachal Pradesh

- 1. Bilaspur**
- 2. Chamba**
- 3. Hamirpur**
- 4. Kangra**
- 5. Kinnaur**
- 6. Kullu**
- 7. Lahaul-Spiti**
- 8. Mandi**
- 9. Shimla**
- 10. Sirmaur**
- 11. Solan**

FOREWORD

Reducing hunger and poverty in the country by half by 2015, the first UN millennium development goal, remains a serious concern. The small and marginal farmers constituting 65 per cent of the producers in India face hunger and poverty. Food insecurity among them is both a cause and consequence of poverty. Farmers are also consumers and 70 per cent of the consumers in India are also those who earn their livelihood in farming. Because of continuing poor performance of agriculture in rainfed areas and by these farmers, the growth rates of Indian agriculture witnessed sharp deceleration during the last decade, plummeting to less than 2 per cent for the decade 1995-2005 and then rising slightly above two per cent during 2006-07. However, it is still much less than the expected growth rate of 4 per cent. The Eleventh Five Year Plan (2007-2012) has set a target of 4 per cent for agricultural sector against 9 per cent for the economy as a whole. Therefore, how the nation and states jointly prepare the farmers to learn to live under the new challenges and opportunities will largely determine the success in managing the national food security and poverty scenario.

The uncommon opportunities for launching a new initiative named evergreen revolution, especially to address agricultural concerns of small farmers in rainfed areas, demand innovative policies and strategies, new planning and frontier technologies which can enhance productivity per unit of land and water. For this purpose, the most important strategic programme introduced in the Eleventh Five Year Plan is Rashtriya Krishi Vikas Yojna (RKVY) with an outlay of Rs. 25,000 crores. It gives states more flexibility and incentives to spend more on agricultural sector. The additional assistance is given to the state governments, provided expenditure on agriculture by the state governments is higher than the base period, which is defined as the moving average of the expenditure of the preceding three years. The success of efforts of states in the coming five years will depend on the scale of success of synergies it is able to develop with RKVY and other programmes.

To avail additional assistance under this scheme, a framework has been provided which requires that every district should draw up a district agriculture plan that fully utilises an initial resource envelope from all existing schemes, state or central, including resources at the district level from central schemes such as those of Ministry of Rural Development, Ministry of Panchayati Raj and other Ministries. *“The DISTRICT AGRICULTURE PLANS (DAPs) are aimed at determining the overall resource envelope of each district, its production plan and the associated input plan”*. The DAPs will document the diversity of farming economy and growth patterns within the district, potential micro climatic niches, farming systems and natural resources, cropping patterns and livestock. It has also been emphasised to integrate these district level agricultural plans with the state plan. It has been made mandatory to prepare DAPs in accordance with the guidelines issued by the Planning Commission, so as to benefit from the new central schemes for agricultural development.

It is in this context that the Department of Agriculture, Govt of Himachal Pradesh, entrusted the task of preparing the District Agriculture Plans (DAPs) of eleven districts except Una and State Agriculture Plan (SAP) to the H.P. Agricultural University, Palampur. The university took this gigantic task seriously and constituted a core team of agricultural economists under the leadership of Dr. H. R. Sharma, Professor and Head Department of Agricultural Economics, Extension Education & Rural Sociology. The team developed conceptual framework and evolved methodology for the selection of sample panchayats. Overall, 367 sample panchayats were selected from all the 72 blocks of eleven districts in the state. Two questionnaires, one to collect data at the block level and other to collect data at the panchayat level, were prepared. To accomplish the task of data collection, over 200 scientists of the university were engaged for conducting field survey and secondary data collection from across the state in as many as 72 teams. The scientists remained in the field for about two weeks and collected data from the

selected panchayats and blocks using participatory rural appraisal (PRA). To ensure comprehensiveness in data collection for these plans, each district was assigned to a team(s) of agricultural economists. The agricultural economists incharge of different districts worked to prepare draft agriculture plans for different districts, including state agriculture plan.

The field data were further compiled and analysed by the core team of agricultural economists. The plans have been prepared as per the guidelines laid down by the Planning Commission in Comprehensive District Agriculture Plan Manual (C-DAP). Each DAP document contains a plethora of information on various aspects of agricultural development such as cropping patterns, cropping systems, input use, yield gaps, diseases, constraints and required R&D interventions, projected rates of growth for major agricultural crops and agricultural sector including horticulture and animal husbandry and projected input requirements. DAP documents also contain estimates on rural roads, available irrigation potential including water harvesting, soil conservation, human resource requirement and researchable issues that require attention to boost agricultural production and productivity of agricultural sector.

In accomplishing this task, a large team of scientists, administrative staff of the university and key persons of the state Government played key roles. The team leader, Dr. H. R. Sharma and his core team comprising Dr. S. K. Chauhan, Dr. K. D. Sharma, Dr. Virender Kumar and Dr. Harbans Lal prepared the broad framework for preparing the plans. Dr. Kamlesh Singh, Professor Statistics, Mr. Vaibhav Kalia and Mr. Kapil Sharma computer programmers developed a computer programme to analyse the data. The District Agriculture Plan for Sirmaur was prepared by Dr. Manoj Gupta, Scientist Regional Research Station Dhaulakuan. In addition, a large number of scientists and administrative staff of the university were involved in the first ever such state wide field survey for weeks. I wish to place on record my appreciation of the wonderful work done by each one of the above named persons and those I could not mention by name.

Throughout the work on DAPs, the university team received valuable backup advisory support from several officers of the Department of Agriculture, Horticulture and Animal Husbandry in particular from Mr. J. C. Rana, Director, Agriculture, Mr. H. R. Sharma, Additional Director, Agriculture and Mr. Y. P. Thakur, Superintendent Engineer (Soil Conservation) and on behalf of the university I wish to thank them. Lastly, I appreciate and acknowledge the cooperation and help so willingly offered to survey teams and economist incharges by the district level officers of different departments, especially those from the agriculture department, the scientists of UHF, Solan and the Pradhans of Panchayats as well as farmers, during the field surveys and report preparation.



DR TEJ PARTAP
Vice Chancellor

Palampur, March 18, 2009

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EXECUTIVE SUMMARY

I. District Agricultural Plan: Funding Proposal for Five Years (Lakh Rs.)

Sr. No.	Schemes	Total Plan Outlay	Yearly Allocation				
			I	II	III	IV	V
I	Interventions to Improve and Enhance Sustainability of Crop Production System	3772	565.8	754.4	754.4	754.4	943
1	Improvement of productivity of cereals, pulses, oilseeds, vegetables and spices crops through promotion of HYV seeds including hybrids	250	37.5	50	50	50	62.5
2	Improvement of soil health through vermi-composting, bio-fertilizers, micro nutrients, soil testing etc.	260	39	52	52	52	65
3	Protection of crops against biotic stresses (diseases, pests, weeds) and abiotic stresses (hailstorms, drought, flash floods, etc) and other risk factors	150	22.5	30	30	30	37.5
4	Water use efficiency through micro irrigation	1000	150	200	200	200	250
	(i) Sprinkler	900	135	180	180	180	225
	(ii) Drip	100	15	20	20	20	25
5	Agricultural mechanization through popularization of improved tools and hill specific machinery like power tillers, tractors, crop planters/ harvesters, sprayers, clod breakers and gender friendly post harvesting equipments to remove women drudgery	220	33	44	44	44	55
6	Protected (poly house) cultivation to minimize risk factors and enhance quality and productivity	1792	268.8	358.4	358.4	358.4	448
7	Strengthening and improvement of quality control infrastructure (seed, pesticides and fertilizer testing laboratories)	20	3	4	4	4	5
8	Strengthening of seed production farms and promotion of infrastructure to improve seed production and replacement	80	12	16	16	16	20
II	Need Based Infrastructure Development	6213	931.95	1242.6	1242.6	1242.6	1553.25
1	Improvement of on-farm water delivery and efficiency of existing irrigation systems	6163	924.45	1232.6	1232.6	1232.6	1540.75
2	Rural markets	50	7.5	10	10	10	12.5
III	Natural Resource Conservation and Management	10407	1561.05	2081.4	2081.4	2081.4	2601.75
1.	Soil conservation of arable and non-	1500	225	300	300	300	375

	arable land through engineering measures						
2.	Water harvesting check dams, ponds, tanks, etc	6563	984.45	1312.6	1312.6	1312.6	1640.75
3.	Land improvement	2344	351.6	468.8	468.8	468.8	586
IV	Niche Based Enterprises for Rural Entrepreneurs	605	90.75	121	121	121	151.25
	(i) Organic farming	280	42	56	56	56	70
	(ii) Sericulture	100	15	20	20	20	25
	(iii) Agro-tourism	225	33.75	45	45	45	56.25
V	Fruit Production	875	131.25	175	175	175	218.75
VI	Livestock, Poultry & Fisheries	8322	1248.3	1664.4	1664.4	1664.4	2080.5
1	Livestock improvement	8262	1239.3	1652.4	1652.4	1652.4	2065.5
2	Fisheries	60	9	12	12	12	15
VII	Human Resources	3201	480.15	640.2	640.2	640.2	800.25
1	Additional man power requirement	3108	466.2	621.6	621.6	621.6	777
2	Capacity building of extension personnel	93	13.95	18.6	18.6	18.6	23.25
VIII	Research & Extension	710	106.5	142	142	142	177.5
IX	All Sectors & Schemes	34105	5115.75	6821	6821	6821	8526.25

Note: The funding proposal for the next five year plan is extracted from the comprehensive District Agriculture Plan. This plan excludes full amount of funds earmarked for development of irrigation and rural roads for connectivity and 50 per cent of the funds estimated for rural markets and water harvesting

II. Comprehensive District Agricultural Plan: Sectoral Outlays and Yearly Allocation (Rs. in Lakhs)

Sr. No.	Schemes	Total Plan Outlay	Yearly Allocation				
			I	II	III	IV	V
I	Interventions to Improve and Enhance Sustainability of Crop Production System	3772	565.8	754.4	754.4	754.4	943
1	Improvement of productivity of cereals, pulses, oilseeds, vegetables and spices crops through promotion of HYV seeds including hybrids	250	37.5	50	50	50	62.5
2	Improvement of soil health through vermi-composting, bio-fertilizers, micro nutrients, soil testing etc.	260	39	52	52	52	65
3	Protection of crops against biotic stresses (diseases, pests, weeds) and abiotic stresses (hailstorms, drought, flash floods, etc) and other risk factors	150	22.5	30	30	30	37.5
4	Water use efficiency through micro irrigation	1000	150	200	200	200	250
	(i) Sprinkler	900	135	180	180	180	225
	(ii) Drip	100	15	20	20	20	25
5	Agricultural mechanization through popularization of improved tools and hill specific machinery like power tillers, tractors, crop planters/ harvesters, sprayers, clod breakers and gender friendly post harvesting equipments to remove women drudgery	220	33	44	44	44	55
6	Protected (poly house) cultivation to minimize risk factors and enhance quality and productivity	1792	268.8	358.4	358.4	358.4	448
7	Strengthening and improvement of quality control infrastructure (seed, pesticides and fertilizer testing laboratories)	20	3	4	4	4	5
8	Strengthening of seed production farms and promotion of infrastructure to improve seed production and replacement	80	12	16	16	16	20
II	Need Based Infrastructure Development	15881	2382.15	3176.2	3176.2	3176.2	3970.25
1	Irrigation	7318	1097.7	1463.6	1463.6	1463.6	1829.5

2	Improvement of on-farm water delivery and efficiency of existing irrigation systems	6163	924.45	1232.6	1232.6	1232.6	1540.75
3	Rural markets	100	15	20	20	20	25
4	Rural roads for connectivity	2300	345	460	460	460	575
III	Natural Resource Conservation and Management	16969	2545.35	3393.8	3393.8	3393.8	4242.25
1.	Soil conservation of arable and non-arable land through engineering measures	1500	225	300	300	300	375
2.	Water harvesting check dams, ponds, tanks, etc	13125	1968.75	2625	2625	2625	3281.25
3.	Land improvement	2344	351.6	468.8	468.8	468.8	586
IV	Niche Based Enterprises for Rural Entrepreneurs	605	90.75	121	121	121	151.25
	(i) Organic farming	280	42	56	56	56	70
	(ii) Sericulture	100	15	20	20	20	25
	(iii) Agro-tourism	225	33.75	45	45	45	56.25
V	Fruit Production	875	131.25	175	175	175	218.75
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1	Livestock improvement	8262	1239.3	1652.4	1652.4	1652.4	2065.5
2	Fisheries	60	9	12	12	12	15
VII	Human Resources	3201	480.15	640.2	640.2	640.2	800.25
1	Additional man power requirement	3108	466.2	621.6	621.6	621.6	777
2	Capacity building of extension personnel	93	13.95	18.6	18.6	18.6	23.25
VIII	Research & Extension	710	106.5	142	142	142	177.5
IX	All Sectors & Schemes	50335	7550.25	10067	10067	10067	12583.75

III. Projected Output Growth in Foodgrains and Vegetables Production

Crops	Existing			Potential Production (MT)		Growth (% p. a.)	
	Area (ha)	Production (MT)	Yield (q/ha)	Scenario I	Scenario II	Scenario I	Scenario II
Maize	22860	46865	20.50	60248	59940	5.71	5.58
Paddy	5435	7776	14.31	12004	11953	10.88	10.74
Wheat	26036	48422	18.60	64751	64434	6.74	6.61
Barley	2505	3908	15.60	4596	4570	3.52	3.39
Pulses	3579	2509	7.01	2950	2934	3.52	3.39
Foodgrains	60595	109513	17.91	146895	144183	6.83	6.33
Vegetables	6353	111169	175.00	129793	171693	3.35	10.89

Note: i. Scenario I output growth with increased irrigated area and crop improvement programmes
 ii. Scenario II output growth with diversion of 20 % irrigated area to vegetable crops

IV. Projected Output and Growth Rate in the Production of Different Crops

Cereal	Current Production (mt)	Projected Production (mt)	Growth rate (% p.a.)
Maize	87050.34	131319.53	10.17
Paddy	5068.96	9260.6	16.54
Wheat	72462.84	117574.51	12.45
Barley	1317.84	2390.2	16.27
Mash	857.15	1117.55	6.08
Rajmash	46.8	114.4	28.89
Toria	364.76	489.11	6.82
Sarson	322.3	509.82	11.64
Potato	11129.64	17354.5	11.19
Peas	3039.96	4764.76	11.35
Tomato	35560.98	46892.43	6.37
Cauliflower	143.98	177.1	4.60
Beans	1532.42	2159.68	8.19
Capsicum	1234.2	1694	7.45
Ginger	17336	28888.08	13.33
Garlic	10088.64	15960.12	11.64
Onion	2990.46	3693.75	4.70
Sugarcane	18235	27702.5	10.38

V. Projected Output Growth in Fruit Production

Particulars	Existing			Potential			Growth rate in production (% p.a.)
	Area (ha)	Production (mt)	Yield (q/ha)	Area (ha)	Production (mt)	Yield (q/ha)	
Apple	1463	5642	38.6	2300	11061	48.1	9.6
Stone fruits	1753	4580	26.1	3450	12215	35.4	20.8
Citrus fruits	272	792	29.1	650	2565	39.5	28.0
Mango	448	1677	37.4	850	3818	44.9	16.0
Strawberry	135	972	72.0	350	2760	78.9	184.0

VI. Projected Output Growth in Livestock Products and Live Animals for Sale

Particulars	Existing			Potential (MT)			Growth rate in production (% p.a.)
	No	Prod (MT)	Milk	No.	Prod (MT)	Milk	
			Yield (l/day)			Yield (l/day)	
Local	115113	171.9	1.49	115113	383.7	3.33	24.64
Cross bred	32447	137.8	4.25	32447	281.2	8.67	20.81
Buffalo	48672	151	3.1	48672	324.5	6.67	22.98
Wool/Sheep	17758	7.4	0.42	17758	17.8	2	28.11
Sheep/Goat for meat	138826			166591			4.00

VII Projected Value Output and Growth of Agriculture and Allied Sectors

Cereal	Current value (Rs lakh)	Projected value (Rs lakh)	Growth rate (% p. a.)
Agriculture	22811.45	35697.29	11.30
Horticulture	2516.97	3282.21	6.08
Livestock	73.55	159.09	23.26
Fisheries	3.40	4.15	4.41
Overall without fisheries	25401.96	39138.60	10.82

Interventions

- To make certain availability of quality inputs like improved seeds, fertilizers, plant protection material by improving and strengthening delivery system
- Improvement of physical, chemical and biological parameters on the basis of soil health cards proposed to be given to all farmers
- To ensure judicious and balanced nutrients application through an optimum mix of chemical, organic and bio-fertilisers.
- Promotion of rainwater harvesting for meeting the critical water needs of the cash crops.

- Reduction of drudgery of farmers particularly women through promotion of mechanization conducive to hill farming.
- To ensure quality of inputs by strengthening and improving of quality control infrastructure (seed, pesticides and fertilizer testing laboratories)
- Promotion of protected cultivation along with supporting infrastructure for quality production of high value cash crops
- To take effective steps (Creation of monkey sanctuaries, planting of wild fruit species in the forests and sterilization) to check the monkey menace
- Construction of adequate number of CAS (Control Atmosphere Storage) at critical points
- To take measures to check the damage caused by frost and hailing

Research and Extension Support

- Refinement and validation of technologies for different agro-ecological situations
- Transfer of technologies through extension interventions like trainings, demonstrations, exposure visits, replication of success stories, etc.
- Validation of ITKS
- Use of IT for technology dissemination by creating IT hubs at focal points
- To create a farmers advisory system to address their day - to - day queries
- To promote and strengthen the public- private partnership for ensuring delivery of need based inputs and technologies

VIII Augmentation of Land and Water Resources: Physical Targets (Ha)

Blocks	Cultivated land	Potential cultivable land	Productive support land	Potential support land	Existing irrigated area	Potential irrigated land	Irrigation potential through water harvesting
Pachhad	4788	6128	3570	5354	240	450	900
Rajgarh	5041	4445	3274	4912	796	487	1200
Nahan	6018	2531	4232	6348	1453	407	1500
Sangrah	5540	4375	5746	8619	402	400	800
Shilai	4519	1529	3343	5014	830	1237	600
Paonta	14597	3913	1557	2336	7859	2196	250
District	40503	22921	21722	32583	11580	5177	5250

Interventions

- *In situ* soil and water conservation by employing different measures
- Improvement of support lands (public & private grasslands) by employing different measures for the control invasive shrubs, weeds, etc.

- Use of water potential to provide assured irrigation to rain fed areas
- Water harvesting to create water potential for irrigation and to augment ground water

IX Projected Fertilizers Demand by 2012-13 (MT)

Fertilisers	Scenario-I	Scenario-II	Scenario-III
CAN	36	46	59
Urea	4058	4891	5874
NPK 12:32:16	2029	2432	2905
SSP	20	25	32
MOP	520	597	683

Note:

- Scenario-I projects demand on the basis of growth rate of demand for different fertilisers during the last five years.
- Scenario-II projects on the basis of growth rate of demand plus 2 per cent increase in demand arising from ongoing process of crop diversification in the district.
- Scenario-III projects on the basis of growth rate of demand during the last five years plus 2 per cent growth in demand arising due to crop diversification plus additional 2 per cent increase in demand if the target of proposed area under irrigation is fulfilled.

X Potential Enterprises for Gainful Employment

Sector	Enterprises
Farm	Protected cultivation, fishery, medicinal plants, mushroom, beekeeping, organic farming, seed production, floriculture, nursery raising, dairy, sericulture
Non-Farm	Vermi-compost, rural craft, fruits and vegetable processing, mushroom, compost

XI Human Resource Requirement (No.)

Block	Crop Production	Horticulture	Animal Husbandry	Others	Total
Pachhad	10	9	8	9	36
Rajgarh	17	10	10	9	46
Nahan	17	11	6	10	44
Sangrah	16	8	9	7	40
Shilai	17	9	8	7	41
Paonta	27	9	11	10	57
District	104	56	52	52	264

Intervention

- Placement of optimum number of personnel to implement the interventions proposed in the plan.
- Orientation of the extension personnel through need based trainings
- Exposure visits to success stories achieved within or outside the district.

XII Some Quantitative Outcomes

- Foodgrain production shall increase from 1,09,513 metric tonnes to 1,46,895 metric tonnes after the implementation of the plan recording a growth rate of 6.83 per cent per annum in scenario I. Even in scenario II when 20 per cent of irrigated land is shifted to vegetable production, the growth rate in foodgrains production shall be very high at 6.33 per cent per annum
- Production of vegetables would increase from 1,11,169 metric tonnes to 1,29,793 metric tonnes in scenario I registering a growth rate of 3.35 per cent per annum when the proportion of area under these crops remains same and to 1,71,693 metric tonnes recording a growth rate of 10.89 per cent per annum in scenario II when 20 per cent of the irrigated area is brought under these crops. This will generate a marketable surplus of 1,54,523 metric tonnes which in monetary terms amounts to Rs 139.07 crores. This will create huge employment opportunities through backward and forward linkages.
- Yields of average farmers and that of progressive farmers of different crops and the current area under different crops have been used to calculate the projected production of different crops. The growth rate over the existing production are very high ranging from as high as 28.89 per cent in case of rajmash followed by paddy (16.54 per cent per annum) and Barley (16.27 per cent). The growth in case of cereals crops are projected at 10.17 per cent for maize, and 12.45 per cent for wheat.
- Based on yields of progressive farmers, the production of different fruit crops is expected to register high growth rates. For example, the production of important fruit crops like apple, stone fruit, citrus fruit, mango and strawberry is expected to increase at a rate of 9.6 per cent, 20.8 per cent, 28.0 per cent, 16.0 per cent and 184.0 per cent per annum respectively.
- The milk production is expected to increase about fifty five per cent. The milk from crossbred cows, local cows and buffaloes is expected to increase at a rate of 24.64 per cent, 20.81 per cent and 22.98 per cent, respectively. Wool production is expected to increase by 28.11 per cent per annum.
- Irrigation potential shall be created which will provide irrigation to an area of 10,427 hectares.
- Available water potential shall be exploited and thereby 10,427 hectares (5,177 ha through irrigation sources and 5,250 ha through water harvesting) of land shall be brought under protective and assured irrigation.
- With the implementation of plan 54.33 per cent of the arable land will have assured irrigation facilities compared to existing 28.59 per cent.
- Land amounting to 22,921 hectares infested with soil erosion, stream bank erosion, etc shall be treated by adopting soil conservation measures.
- Support land (permanent pasture & grazing lands) of 54,305 hectares shall be treated against invasive weeds and shrubs. This shall improve the fodder production to the approximate level of 5,431 metric tonnes.

- Supply of the fertilizers is increasing in response to increase in its demand. Demand of different types of fertilisers like CAN, UREA, 12:32:16, SSP and MOP is projected to increase to 36, 4058, 2029, 20 and 520 metric tonnes, respectively by the year 2012-13 under scenario I. Under scenario II, the demand for these fertilisers is projected to increase at 46, 4891, 2432, 25 and 597 metric tones respectively and in scenario III it is projected to increase to 59, 5874, 2905, 32 and 683 metric tonnes, respectively.
- Agriculture, horticulture and animal husbandry sectors are projected to grow at 11.30 per cent, 6.08 per cent and 23.26 per cent per annum, respectively. The overall growth rate of agriculture excluding fishery is projected at 10.82 per cent per annum. The fish production is projected to grow at 4.41 per cent per annum.

XIII Researchable Issues

Crop Production

- Characterization and classification of soils of different ecological zones of Sirmour district.
- Delineation of the Acid Soil Regions (ASR)
- Integrated nutrient management technology demonstration on farm fields.
- Issues in solid waste management for organic farming in major cash crops of respective region
- Evaluation of resource conservation technologies (like conservation tillage, deficit water management, pressurized irrigation systems, nutrient-water interaction studies, recycling of waste organic residues etc.) for irrigated and rain fed areas
- Issues relating to increasing water productivity of stored water through crop diversification and soil and water management practices
- Nutrient indexing and improvement of soil health
- Development of practices for organic farming under different cropping systems
- Development of resource conservation (soil and water) horticulture practices
- Protected cultivation technology and monitoring soil health in poly houses
- Development of high yielding varieties of various crops having wider adaptability and resistance to various biotic and a-biotic stresses, through exploitation of land races, agronomic basis and alien species using conventional as well as non-conventional breeding approaches. The focus will be on the development of improved varieties of various niche based crops e.g.) scented basmati rice (low hills), red rice (mid hills), special purpose corn e.g. baby corn, sweet corn, pop corn in all maize growing districts
- Remunerative pulses like rajmash in high hills; mash in low and mid hills; greensoybean and dual purpose linseed in low and mid hills
- Under utilized but highly nutritive crops like rice bean, fababean and adzuki beans in low and mid hills; pseudo cereals like amaranths

- Development of hybrid varieties of maize and rice to raise overall productivity of these two important crops.
- Concerted efforts on ensuring effective selection, conservation, evaluation, documentation and utilization of genetic resources.
- Ensuring wider coverage under improved crop varieties with major emphasis on quality seed production
- Demonstration of effective technologies for eradication of obnoxious weed from crop and non-crop lands.
- Identification of remunerative cropping sequences for various ecological and farming situations in Sirmour.
- Mechanisation of the farm practices for reduction of farmers' drudgery.
- Water harvesting and efficient use of stored for meeting the critical water needs of the crops.
- Development/identification of hybrids and varieties of potential vegetable crops
- Development of hybrids and production technology for protected cultivation
- Identification of vegetable based promising cropping sequences
- Identification of cereal based promising cropping sequences
- Standardization of agro-technology for organic vegetable production
- Development of leaf curl resistant varieties in tomato
- Evaluation and assessment of white rust resistant varieties in pea
- Development/refinement of production technology in ginger
- Identification/development of potential varieties of under ground vegetables viz., elephant foot yam, turmeric and colocasia especially in monkey menace areas
- Weed management studies in potential vegetables
- Standardization of production technology of hybrids
- Standardization of production technology for rainfed cultivation of potential vegetable crops
- Development of pest forecasting modules for rice leaf folder.
- Formulation of bio-intensive IPM strategies for the management of *Helicoverpa armigera* (tomato and gram), fruit flies (cucurbits and tomatoes), white grubs (potato, maize, peas, ginger, cabbage etc), cut worms (cereals and vegetables), leaf miner and pod borer (peas), hairy caterpillar (mash, til, soybean), termites (cereals and vegetables), stem borer and aphids (maize), plant parasitic nematodes (cereals and vegetables).
- Insect pest and nematode management under protected cultivation situations.

- Management of insecticide resistance in field populations of *Plutella xylostella*, *Leucinodes orbonalis* and *Trialeurodes vaporariorum* (polyhouses).
- Collection and utilization of local strains of entomopathogenic organisms for insect pest management under organic farming situations.
- Identification and utilization of native botanicals for eco-friendly pest management.
- Pesticide residue analysis in vegetables and determination of MRL's for consumer safety.
- Germplasm screening for resistance against major insect pests (cereals, pulses, oilseeds and vegetables).
- Survey and surveillance for identification of new invasion of insect pests.
- Safe management alternatives for the stored grain pests.
- Disease and pest management in honey bees; management of bee colonies for pollination in different crops for higher productivity; management practices for migratory beekeeping for better economic returns; quality analysis of honey from different sources for value addition.
- Identification and management of insect-pests of medicinal, aromatic and ornamental plants.
- Management of pomegranate fruit borer in wild and cultivated pomegranate crop
- Survey and surveillance of major diseases in important crops
- Pathogenic and genetic diversity in pathogens associated with rhizome rot of ginger, major crop (rice (blast), wheat (rusts and smuts), rajmash (anthracnose, BCMV, angular leaf spot), bacterial wilt of solanaceous vegetables, linseed rust)
- Development of disease forecasting modules for rice blast, potato blight
- Identification of resistant sources and study of genetics of resistance in all crops
- Marker assisted selection of resistance genes using molecular markers and their use in gene pyramiding for resistance in commercial varieties
- Development of integrated disease management modules suitable for organic and protected agriculture conditions
- Development of detection techniques for pathogens of quarantine importance and certification purposes for important seed and soil borne diseases (pea root rot and wilt complex, bacterial wilt, bean mosaic, urdbean leaf crinkle, bacterial blight, potato viruses etc.)
- Development of IDM module important diseases of major crops
- Development of management strategies for mango malformation and diseases of ornamental crops like gladiolus, carnation, liliun etc.
- Disease management in pomegranate

- Development of management strategies for disease problems in garlic, cabbage and colocasia

Animal Husbandry

- Documentation of the prevailing ethno-veterinary practices among livestock farmers of Sirmour district; for their scientific validation
- Development of a strategic dairy farming package for livestock farmers in the face of 'Livestock Revolution 2020'
- Constraints in way of adoption of dairy technology and perceptions of stake-holders i.e. livestock-keepers, veterinarians, paravets and development agencies/ NGOs
- Identification of the indigenous livestock health practices among livestock farmers
- A gender analytic study of the contributions of male and female farmers to animal husbandry operations
- Appropriateness of the recommended animal husbandry technologies for small scale production systems
- Identification of the critical technical gaps in attaining the profitability under hill cattle production system
- Cultivation and propagation of nutritious fodder grasses in wastelands in Sirmour district
- Development of an Integrated Livestock (cattle and poultry) Production Model (ILPM) for Sirmour livestock farmers
- A study of the training aspirations of women livestock farmers for profitable livestock / dairy farming

Horticulture

- Field testing of high yielding and better cultivars of peach and plum under mid hills, and of citrus, mango, amla and strawberry in lower areas
- Identification of niche area and remapping of different fruit growing belts
- Diversification of fruits and their varieties
- Development of efficient propagation techniques for walnut, pecan and persimmon
- Development of agro-techniques to combat the replant problem in stone fruits.
- Development of fruit based multi cropping system
- Development of modules for INM for different fruit crops
- Standardisation of agro-techniques to control regular bearing in olive
- Development of production module for organic fruit farming
- Development of irrigation and fertigation modules

- Delineation of areas/locations suitable for different flower crops
- Availability of authentic and quality germplasm/ planting material of various crops to the growers at affordable prices.
- Standardisation of location specific production technology for different flower crops.

Socio-economic Issues

- Analysing trends and patterns of demand, prices and markets of emerging crops and enterprises in the context of ongoing process of globalisation
- Understanding economic implications of climate change towards cropping systems, cropping patterns and livelihoods of the farmers
- Assessing impact of the ongoing process of commercialisation of agriculture on natural resource base (soil, water and environment) and its implications towards livelihoods of the farmers
- Studies on impact assessment and policy implications of various developmental programmes/schemes
- Study of the labour migration in Sirmour and suggest various measures to check this problem.
- Dynamics of the farming systems and its impact on the socio-economic conditions of the farmers.

XIV Sum Up

In brief, the implementation of District Agricultural Plan (DAP) shall strengthen and improve the physical and institutional infrastructure and shall restore, rejuvenate, conserve and enhance the health of the available natural resource base. It shall also give a boost to the ongoing process of crop diversification towards high value cash crop agriculture including off-season vegetable and other niche based enterprises generating huge employment opportunities for the rural unemployed youth. In concrete terms, the implementation of the plan shall go a long way in ensuring ecological sustainability and economic viability of the production systems of the district.

Chapter I

INTRODUCTION

1.1 Background

Planning is an act or process of preparing or carrying out a focussed activity with goals, procedures and policies for economic emancipation of a social or economic unit in a given time frame. The document containing goals, targets and policies to accomplish plan targets is defined as plan. Planning in the context of district agricultural plans is an exercise for preparing an integrated plan considering available resources and encompassing all sectoral activities and schemes being carried out by the government or non-government organisations in a local government area such as panchayat, block/taluka or district. Accordingly, the plan thus prepared is called panchayat or block or district plan. The process of democratic decentralised planning in India dates back to the First Five-Year Plan (1951-1956) which underlined the need to break up the planning exercise into national, state, district and community levels. Two new elements, namely, establishment of District Development Council and drawing up of village plans and people's participation in planning process through democratic decisions were added in the Second Five Year Plan following the recommendations of Balwant Rai Mehta Committee in 1957. Several new elements have been added to strengthen the process of decentralised planning in the subsequent plans. The importance of preparing panchayat/block/district plan lies in involving the people at the grassroots/stakeholders level and those who are responsible for implementing these plans. The Administrative Reforms Commission in 1967 highlighted that planning needed to be focussed in those areas where local variations in pattern and process of development were likely to yield quick results. The Planning Commission issued guidelines to the state governments for formulating district plans in 1969. These guidelines provided details regarding the concept and methodology for drawing up these plans in a framework of annual, medium and perspective plans. The recommendations of several other Committees, namely, Danatwala (1978), Hanumantha Rao (1984) and GVK Rao 1985 were instrumental in the concretisation of the idea and concept of District Plans.

The preparation of these plans assumed special significance in the aftermath of the 73rd and 74th constitutional amendments which conferred constitutional status to panchayats at district and sub-district levels and local self-government in urban areas. Article 243 ZD of the constitution provides for the procedure for the constitution of District Planning Committee at the district level to consolidate the plans prepared by the panchayats and municipalities and prepare draft development plan for the whole district. The important functions proposed for the district planning committee include, *inter alia*, to (i) consolidate plans prepared by the panchayats at different levels of the rural local and urban bodies; (ii) assess the development disparity that exists between or among village panchayats, block panchayats and municipalities and identify the basic reasons for these disparities; (iii) identify and prioritise the schemes for the development of district conforming to the objectives of the state and central governments; (iv) formulate objectives and strategies for the identification and prioritisation of the schemes for the district. As per the guidelines, the preparation of district level plans has to precede, among others, by the complete assignment of the activities to be undertaken by different levels of local government, formation of District Planning Committees (DPCs).

The current crisis in agricultural sector has once again brought up the importance of preparing district agricultural plans taking into account myriad agro-climatic niches, problems and potentials in each of the district in the country. As is well known, performance of Indian economy has been a global success story. While it has been growing at a rate of 6 per cent per annum since 1993, the growth rate has been an astonishing 9 per cent during the last four years. This is in stark contrast to the growth rate in Indian agriculture which has witnessed sharp deceleration during the last decade or so. The growth rate has plummeted from a 3.62 per cent per annum during the period of 1984-85 to 1995-96 to less than 2 per cent in the subsequent period of 1995-96 to 2004-05. Agricultural growth was slightly above two per cent during 2006-07 but much lower than the target growth rate of 4 per cent. In brief, Indian agriculture is in a crisis which is unprecedented. The sordid state of affairs has been attributed, among others, technology fatigue versus policy fatigue and persistent neglect of agriculture and gradual withdrawal of state from active participation in development activities. It is evident from declining plan outlay, declining public sector capital formation, dwindling credit supply which is manifested in fact that the growth rate of institutional credit to agriculture has declined from about 6.64 per cent during 1981-91 to 2.16 per cent during 1991-99, decrease in the use of critical inputs, increase in the cost of production, faulty price policy in terms of mismatch between minimum support price (MSP) and cost of cultivation and coverage of commodities under MSP scheme. Likewise, neglect of agricultural research and extension, technology fatigue manifested in stagnation/deceleration in growth of yields of important crops like wheat, practically no increase in area under irrigation despite launching Accelerated Irrigation Benefit Programme (AIBP) in 1996-97. Between 1995-96 and 2003-04 both central and state governments have spent nearly Rs. 35,000 crores but the net irrigated area has remained static at around 53-55 million hectares, the poor growth in surface irrigation has obliged farmers to depend heavily on ground water exploitation thereby depleting ground water resources and increasing cost of production and fall in the rate of growth of employment opportunities. While the overall employment growth declined from 1.74 per cent between 1983-84 and 1993-94 to 1.08 per cent between 1993-94 and 2003-04, in agriculture it decreased from 1.41 per cent to 0.63 per cent. The net result has been dwindling income of the farmers culminating in increasing number of farmers' suicides.

The Eleventh Five -Year Plan (2007-2012) has set a target of 4 per cent for agricultural sector and 9 per cent for the economy as a whole. To accomplish this rate of growth, centre has emphasised fast and inclusive growth, especially of agricultural sector, so that the benefits of growth percolate down to the most vulnerable sections of the society like landless labour, marginal and small farmers, scheduled caste, scheduled tribes, women, and so on. A number of new initiatives have been launched to revive growth in agriculture. One of such important innovation that has been introduced in the Eleventh Five Year- Plan is Rashtriya Krishi Vikas Yojna (RKVY) with an outlay of Rs. 25,000 crores to give states more flexibility and autonomy in planning and executing programmes for agriculture, achieve goals of bridging the yield gaps in important crops, maximise returns to the farmers, incentivise them to spend more on agricultural sector and address the agriculture and allied sectors in an integrated manner. The funds under this scheme would be provided to the states as 100 per cent grant by the central government. An outlay of Rs. 1500 crores has been approved for 2007-08. The financial assistance provided to the state governments from this centrally sponsored scheme is subject to fulfilment of certain conditions. First, the expenditure on agriculture by the state governments is higher than the base period, which is defined as the moving average of the expenditure of the

preceding three years. Second, the preparation of district and state agricultural plans is mandatory. The areas like integrated development of food crops including coarse cereals, minor millets and pulses, agricultural mechanization, soil health and productivity, development of rain-fed farming systems, integrated pest management, market infrastructure, horticulture, animal husbandry, dairying and fisheries, completion of projects that have definite time lines, support to institutions that promote agriculture and horticulture, etc organic and bio-fertilisers are given priority. The District Agricultural Plan (DAP) should determine each district's final resource envelops its production plan and the associated input plan. It has also been emphasized to integrate these district level agricultural plans with the state plans.

Against above background, Himachal Pradesh State Department of Agriculture entrusted the task of preparing these plans to Agricultural University, Palampur as per the guidelines issued by the planning commission. The guidelines entail collection and analysis of data on parameters such as land utilisation, farming systems, cropping pattern, horticulture, inputs use, farm machinery, yield and input gaps, issues in livestock management, fisheries, livelihoods of local population, different ongoing irrigation and watershed programmes/schemes, potential for new schemes, women drudgery, post harvest operations, market infrastructure, and so on at the village/panchayats levels. The methodological framework to prepare these plans got evolved in a series of consultations with the officials of the line department like agriculture and horticulture and the scientists working at different KVKs and regional research stations. The details of the methodological framework have been provided in subsequent section.

1.2 Data and Methods

In the literature on methodologies in social sciences, there are five main approaches, namely, sample surveys, rapid appraisal, participant observation, case studies and participatory learning and action to conduct a research inquiry. The reliability and generalisability of the findings of any study hinges on the methodology followed to conduct the study. The adoption of a particular approach or amalgam of different approaches, however, is contingent on a variety of factors most notably, the objectives of the proposed research enquiry, the proposed use of the findings, the required level of reliability of results, complexity of the research area/programme and, of course, the availability of resources in terms of both money and time. The merits and demerits of different approaches have been described in Hulme, 2000, pp. 79-98¹. The present chapter is, therefore, devoted to explain methodological framework adopted to prepare district agricultural plans.

1.2.1 Sampling Plan

The state has been divided into 77 developmental blocks. Though all the developmental blocks in the state were taken, sampling approach was adopted to select the panchayats. The sample panchayats were selected in such a way so that variations in micro climatic niches, farming systems and cropping patterns in a particular block are captured. To meet this requirement, it was decided to select 10 per cent of the total panchayats from each of the block with a minimum of four panchayats in those districts, where number of panchayats was more than 200. In other districts, where number of panchayats was less than 200, 15 per cent of the panchayats were selected again with a minimum condition of selecting four panchayats in a block. Wherever 10

per cent or 15 per cent of the total panchayats from a block was not an integer (5.5 say) in those cases

the next higher integer (say 6) was taken. There are six blocks in Sirmaur district and following this methodology, the number of panchayats selected in this district was 28. The details of the sample panchayats selected from each block are provided in Table 1.1.

1.2.2 Survey Tools

Guided by the parameters given in guidelines issued by the Planning Commission for the preparation of these plans and discussions held with the officials of department of agriculture, different aspects on which data were to be collected had been divided in two parts. First, those on which data were to be collected at block level. Second, those on which data were to be collected at panchayats level. Accordingly, two questionnaires were developed which were discussed with different stakeholders and officials of line departments before finalising. These questionnaires were administered in all blocks and sample panchayats. The data were collected following participatory rural appraisal (PRA) approach for the agricultural year 2007-08. The officers of the line departments, namely, agriculture, horticulture and animal husbandry and panchayats pradhans including two-three progressive farmers participated in the data collection process.

Table 1.1 Sampling Plan for District Sirmaur

Blocks	No. of Selected Panchayats	Name of the selected Panchayats	Total Panchayats
Pachhad	4	Jaman Ki Ser, Wasni, Bag Pasog, Jaihar	30
Rajgarh	4	Dimber, Kothia jhajhar, Habban, Deedog	30
Nahan	4	Bankalan, Nehar Swar, Jamta, Palion	34
Sangrah	5	Shamar, Devana, Andheri, Ganog, Lana Palar	41
Shillai	4	Siri Kiyari, Asyasari, Kando Bhatnol, Naya Panjore	29
Paonta	7	Sarli Manpur, Danda Pagar, Kathwar, Bhagani, Bharog Baderi, Haripur Khol, Rampur Bharapur	64
Total District	28		228

1.2.3 Analytical Tools

The data were analysed following appropriate statistical tools. Since the data were collected from sample panchayats, the estimates arrived at from sample panchayats were required to be blown up for the block as a whole. For blowing up these estimates, the statistical tools like percentages, simple and weighted averages and standard deviations of different parameters were computed. The averages then were multiplied with the total number of panchayats in a particular block to arrive at the estimates for the whole block. In some cases, depending upon the nature of parameters, one standard deviation was added to the average to arrive at estimates at the block level. The problems, suggestions and interventions suggested by the grass root level functionaries were coded. Based upon these codes, frequency tables were generated and different problems and interventions were prioritised and five most important problems and interventions were considered for preparing plan estimates. The interventions required to solve different problems and to exploit the available potential in different areas, were divided into three categories namely, research, extension and development. The funds for these interventions were then worked out in consultation with the stakeholders. The financial requirements for other parameters like irrigation, watershed schemes, infrastructure, markets, and so on were prepared in consultation with the district level officials of the line departments like agriculture, horticulture, animal husbandry and irrigation. The state level plans were prepared on the basis of different district agricultural plans.

1.2.4 Limitations

For the preparation of the district agricultural plans strictly according to the guidelines issued by the Planning Commission, the data on different parameters should have been collected at the village level. This, however, could not be done due to time constraint. Currently, while most of the data are being collected and prepared at tehsil level, the developmental schemes are being implemented at block level whose geographical area seldom coincides with that of tehsil. This led to some problems in generating estimates for the whole block.

Note

- ¹ Hulme, David (2000). Impact Assessment Methodologies for Micro Finance, Theory, Experience and Better Practice. *World Development*, 28 (1): 79-98.

Chapter II

GENERAL DESCRIPTION OF THE DISTRICT

2.1 Background

2.1.1 Location

After attaining Independence in the year 1947, the erstwhile princely state of Sirmaur was merged into Himachal Pradesh on 15th April, 1948 and was given the status of a district by keeping the physical jurisdiction of the princely state intact. District Sirmaur is located in outer Himalayas, which is commonly known as Shivalik range. Like other parts of Himachal Pradesh, it has beautiful landscapes, and bracing climate. The District lies between 30° 22' 30" to 31° 01' 20" north latitudes and 77° 01' 12" to 77° 49' 40" east longitudes. The district is predominantly mountainous with deep valleys lying between Shivalik ranges of varying elevations. The River Giri, a tributary of the river Yamuna, is the biggest river in Sirmaur district. Flowing in the south-east direction, it bisects the district in two parts, namely, the Trans-Giri area and Cis-Giri area.

2.1.2 Boundaries

Located on the southern most portion of Himachal Pradesh, Sirmaur district is bounded by Shimla district in the north, Solan district in the north-west, state of Haryana in the south and west, while the state of Utrakkhand makes its eastern boundary.

2.2 Physiographic Features

2.2.1 Area

The district has a total area of 2,825 sq. km. which covers 5.07 percent area of the state. It has a total number of 968 villages; out of these 965 villages are inhabited. The total number of panchayats is 228.

Geographically, the district can be divided into three parts i.e. the Trans-Giri (Giri Par) region, Cis-Giri (Giri War) region and plains of Kiar-da-dun or Dun Valley. The Trans-Giri region consists of the wild mountains culminating into the Chur peak which is popularly called as Chur Chandni Ki Dhar (the hill of silver bangle). It has an altitude of 3,647 metres above the sea level. From this lofty mountain, two ranges emerge one in the north-west direction called Dhar Taproli-Jadol and the other Dhar Nohra which runs south-east direction towards Haripur Fort at an altitude of 2,677 metres above the sea level where from it is divided into two more ranges, one of which runs almost east to the valley of Tons. These ranges separate the district from the Nerua and Cheta Sub-tehsils and Chaupal tehsil of Shimla district. Two other ranges run north-west called Dudham Dhar and south-west with many minor spurs from them towards the Giri. The second range initially runs south-west under the name of Dhar Nigali and then turns to east under the name of Dhar Kamrau. The Dhar Shalai runs parallel to this Dhar in the northern side and both of them from the valleys of Nera river which ultimately falls in the Tons river.

The Cis-Giri region is intersected by three main ranges which run from north-west to south-west, the first is the Sain Dhar which runs parallel to the Giri river. The second is the Dharthi Dhar or what is called little range. Between these two Dhars flows river Jalal. The third is quite a low range which runs from Kala Amb area to south of Nahan tehsil and forms an open valley with Dharthi Dhar. In the western half of this range flows the Markanda river. Between eastern extreme of this Dharthi range lies an open wide valley known as Kiar-da-dun which borders the Yamuna and Giri rivers in the east and forms the boundary of the district with Uttar Pradesh. It also touches western portion of Nahan tehsil. The flat valley is irrigated by Bata river which flows from east to west originating from Dharthi ranges.

2.2.2 Seasons and Climate

The district possesses a variety of climate varying according to elevation. Summer months are exceedingly hot in Dun and water is scarce. The hilly areas have a temperate climate though the Dharthi range is hot. The Trans-Giri tract, Pajota and Sain range areas are comparatively cool even in summers. Snow falls regularly in winters in Trans-Giri areas, whereas in Sain ranges it is occasional, while in Dharthi ranges it is rarely noticed.

2.2.3 Rainfall and Snowfall

The rainfall pattern during different seasons of the year and total rainfall between 1990-91 and 2002-03 has been given in Table 2.1. The rainfall pattern shows wide fluctuations. During the monsoon period the amount of rainfall varied from as high as 1649.4 millimetres in 1995-97 to as low as 740.5 millimetres in 1991-92. More or less similar pattern was discernible in the amount of rainfall in other seasons too. Looking at the total amount of rainfall in all the four seasons it varied from as 924.9 millimetres in 1991-92 to as high as 1991.6 millimetres in 1990-91.

Table 2.1 Trends in Average Rainfall; 1990-91 to 2003-04 (Millimetres)

Year	Monsoon	Winter	Post monsoon	Pre-monsoon	Total
1990-91	1435.6	180.2	199.2	176.4	1991.6
1991-92	740.5	89.0	7.3	88.1	924.9
1992-93	1221.9	137.7	13.9	39.7	1413.2
1993-94	879.0	132.6	1.5	93.5	1186.5
1994-95	1306.4	132.6	32.0	93.5	1542.2
1995-96	1649.4	138.6	0.2	57.3	1845.5
1996-97	1612.7	109.5	27.9	136.0	1886.1
1997-98	1132.3	67.1	201.6	143.5	1544.5
1998-99	1260.6	79.7	190.9	72.2	1603.4
1999-2K	990.6	165.6	27.9	64.9	1249.0
2000-01	842.6	14.70	1.2	152.9	1011.4
2001-02	744.01	127.2	12.3	102.3	985.8
2002-03	819.2	108.2	16.3	45.2	989.3

Source: Annual season and crop reports, different issues, directorate of land records, Govt of Himachal Pradesh.

2.2.4 Soils

Soils are vital natural resources on whose proper use depend the life-supporting system and socio-economic development of any country. As per the recent soil survey by NBSS & LUP (1997), more than 75 per cent of the geographical area of the District is suffering from one or other soil degradation problem. The main degradation problems observed was water erosion including topsoil loss and terrain deformation, flooding and acidity. Therefore, major challenge before us is to reduce these problems up to the tolerance limits for the sustainable agricultural development of the district. This calls for scientific land use planning on watershed basis and its proper implementation with the active involvement of politicians, Government officials and local farming community. There is a need to select watersheds representing each of the agro-ecological situations of the district and develop these as models, which will act as wheels of agro-technology transfer for the development of the adjoining areas.

A large area of the district has brown hill soils (Hapludolls, Hapludalfs and Udorthents) in gently sloping lands of Lesser Himalayas and alluvial soils (Udifuvents and Eutrochrepts) in other areas. Rock outcrops on steep to very steep slopes are common.

The soils of district Sirmour are medium to high in available nitrogen, low to medium in available P & K. The organic carbon status of this district is medium to high. Most of the vegetable growing areas are showing the deficiency of micronutrients particularly zinc and boron. Rice growing areas in lower belt are also experiencing the deficiency of zinc. The soils of hilly terrain of the district are prone to water erosion.

2.2.5 Forests

In Sirmour district, the forests range between tropical and subtropical (scrub, Sal and Bamboo forests) near plains and Doon valley to the temperate (fir and alpine) at higher elevations. Lowest point of the southern boundary of the district is 427 metres above sea level and the highest range of Chur Dhar which is at an altitude of 3,647 metres in the north. The forests grown between these two extremes vary as the elevation itself. The chief factor effecting the distribution and quality of forest vegetation are rainfall and elevation aspect. The high level forests consist of oak, fir, spruce and chir pine. Apart from these, there are Deodar forests in the north of the Giri river mixed with kail and pine etc. These forests are very valuable and the timber extracted from these is sold in the plains at a very high price in the form of sleepers. In Dharthi range and Cis-Giri area, Chir pine forests are of great value for extraction of resin. Sal forests fall in the Dun valley and east of Nahan producing timber of great value. In the lower elevation, Bhabber grass grows which is of great value and so also bamboo forests though these are not of pure type but mixed with other species. *Shorea robusta*, *Terminalia spp*, *Acacia catechu*, *Dalbergia sisoo*, *Dendrocalamus strictus*, *Pinus lroxburghii*, *Pinus walllichiana*, *Quarcus incana*, *Cedrus deodara*, *Quarcus dilatata*, *Picea smithiana* and *Abies pindrow*, *Quarcus semicapifolia* are the major species of the trees found this district. *Jhingan*, *Chal*, *Harar*, *Behara*, *Sain*, *Poola*, *Siris*, *Chhal*, *Kainth*, *Kamal*, *walnut*, *Horse chestnut*, *Poplar*, *Maple*, *Betula* are the other important tree species found in the forests. The forests don't form the continuous and compact belt, but are interspersed in large areas of habitations, agricultural lands, grasslands, orchards. There is considerable influence of anthropogenic factors such as grazing, lopping, fires and forests felling upon their general health.

2.2.6 Flora and Fauna

Mallotus philipinensis, *Ardisia solonacea*, *Murraya koenigii*, *bauhunia spp*, *Carrisa spp*, *Flemengia spp*, *Butea monosperma*, *Ziziphus jujuba*, *Carrisa spinarum*, *Woodfordia floribunda*, *Adhatoda vasica*, *Dodonia viscosa*, *Lantana camara*, *Aegle marmelos*, *Berberis lycum*, *Rubus niveus*, *Rhododendron arboretum*, *Myrica spp* *Pyrus peshia*, *Sapium insigne*, *Festuca*, *agrostis*, *Calamagrostis*, *Dactylis*, *Bromus*, *Danthonia*, *Themeda*, *Heteropogon*, *Chrysopogon*, *Potentilla agrophylla*, *Rosa spp*, *Primula*, *Anemone*, *Gentiana*, etc., are important plant species found in canopy, middle and undergrowth of the forests.

The district, offering wide range in altitude and climatic situations, is endowed with variety of wild animals and birds. The thick wooded areas provide safe habitat for the wildlife, though due to increased poaching and indiscriminate lopping of the forests, there is decrease in the fauna in the district, and some of the species are almost at the verge of extinction. The Musk Deer, Serrow, Panther, Tragopan, and Monal are found in the highest altitude of Chur Peak in Pajoga, Chursa and Nohra forests. Likewise, lower areas are rich in Black Bear, Barking Deer, Sambhar, Wild Boar, Goral, Koklash, Kalij, Chakor, Partridge, Wolf, Red Fox, Jackal, Mongoose, Monkey, Langoor and Red Jungle Fowl. Most commonly seen animal is porcupine, which is found almost in the entire district. This animal mostly feeds on the forest nurseries, walnut plant, chir and deodar. The Himalayan goat (Ghoral) is found from 900 to 2700 metres elevation. It is a stocky goat like animal which is found in groups of 4 to 6 grazing on the hill side and in the forests. Another interesting animal is barking-deer (Kakar) which is found in the chir and ban forests of Sarahan, Rajgarh and Habban range. In the lower part of Sarahan, Renuka, Jamta and Rajgarh ranges, pigs are found which generally live on the crop roots, rubber, insects and snakes etc. They cause a considerable damage to the crops. The pigs are generally found in the herds of 2 to 15 or even more. Monkeys of Rhesus, Maigna and Langoors are quite common in the entire district.

In the Habban, Rajgarh and Sarahan ranges, beautiful birds like monal are found. The Koklas are found in the deodar and some time in the fir forests and prefer moist wooded forests with under growth. They are commonly found in parts of Habban, Rajgarh, Nohra and Sangrah ranges. The black partridge are found upto 1800 metres elevation and frequent in the grassy and scrub peaks. The hill partridge is found beyond chir forests mostly in ban and oak forests and occasionally in deodar forests. Chakor is another specie of the pigeon which is found generally between 1500 to 3000 metres elevation in Rajgarh, Sangrah and Shillai ranges.

2.2.7 Fishery

Fisheries play an important role in the rural economy by augmenting food supply, generating employment and raising nutritional contents of food. There is abundance of fishes in rivers and perennial streams. The important species are Mahasheer, Rohu, singhara, Baranguli, Kali Macchi, Kala banas, Bhareli, Mrigal, and Bhunga. Fishery activities in district Sirmour include riverine fisheries and aquaculture.

Department of Fisheries, Himachal Pradesh issues annual licence to the fishermen for fishing in riverine stretches using cast nets. Main rivers & their tributaries flowing through the district are Giri, Yamuna, Markanda, Roon Bata, Jalal, Nera & Tonnes. Presently 554 licensed fishermen are engaged in fishery profession catching approximately 706 metric tones of fish annually (Table 2.2). Culture of fish in ponds is called aquaculture. Although pisciculture is a non-

traditional activity, yet depletion of fish in rivers and increasing market demands have forced the Government as well as farmers to think on these lines. There is a vast scope of fishery development in the district. Paonta and to some extent Rajgarh areas are suitable for fish culture. There is also a good scope for running water fish culture in Shillai area.

Table 2.2 Fish Production in Sirmour

Particulars	2003-04	2004-05	2005-06	2006-07
Licensed fishermen (No.)	560	545	590	554
Fish production (MT)	555	665	711	706
Value of fish catch (Rs in lakh)	27725	33250	35550	35290

Source: Statistical Abstract of District Sirmour, 2007

2.3 Demographic Features

The population of the district increased from 3,79,695 in 1991 to 4,58,593 in 2001 recording a decadal growth rate of 20.72 per cent (Table 2.3). The district accounted for 7.54 per cent of the total population of the state. The density of population increased from 134 persons per square kilometres in 1991 to 162 persons per square kilometre in 2001.

Table 2.3 Demographic Features

Particulars	Year	Population (No)					Literacy (%)		
		Person	% to State	Dec. Growth	Density/ Sq Km	Sex Ratio	Male	Female	Overall
Sirmour	1991	379695	7.34	23.72	134	909	63.2	38.45	51.62
	2001	4588593	7.54	20.72	162	901	79.73	60.93	70.85
H. P.	1991	5170877	100.00	20.79	93	976	75.36	52.13	63.86
	2001	6077248	100.00	17.39	109	970	86.02	68.08	77.13

Source: Census of HP, 1991 & 2001

The literacy rate in the district increased from 51.62 per cent in 1991 to 70.85 per cent in 2001. The literacy rate in the district was lower than that of state average, but it has made remarkable improvement on this front as literacy during the last decade has increased by about 20 percentage points. The sex-wise distribution of population has been brought out in Table 2. Sex ratio of the district was 901 and in all tehsils sex ratio was unfavourable to females (< 1000). At the district level, the proportion of female population was 47.38 per cent. About 90 per cent of population lives in rural areas; among different tehsils the proportion of rural population varies from 64 per cent to 100 per cent.

Paonta Sahib is the most populated block of the district whereas Rajgarh has lowest population (Table 2.4). Same trend exists in population density of the blocks. Higher population of Paonta Sahib can be attributed to industrial establishments and unprecedented urban and industrial development around Paonta Sahib town. Sex ratio in all the development blocks was unfavourable (<1000) to females. It was highest in Sangrah and lowest in Paonta Sahib.

Table 2.4 Block-wise Demographic Features

Block	Total population	Male	Female	Sex ratio	Geo. area (sq.km)	Popu. density (/sq.km)	Total inhabited villages	Literacy rate (%)
Pacchad	46020	23842	22178	930	405.7	113	262	69.3
Rajgarh	41680	21296	20384	957	410.4	102	140	68.1
Nahan	61361	32331	29030	898	288.6	213	209	62.1
Sangrah	61158	31201	29957	960	486.4	126	121	52.7
Shillai	52544	27984	24560	878	272.1	193	50	47.4
P. Sahib	148160	79002	69158	875	371.1	399	184	55.5

Source: District Statistical Office, Nahan

Note: total population and literate population do not include 0-6 age group.

Paonta Sahib Block has highest number of educational institutes as it has higher proportion of district's population (Table 2.5). However, density of schools i.e. number of schools per 1000 of population was lower than other blocks and this may be one of the reasons for the low literacy rate of this block. Density of primary schools was highest in Shillai block whereas Middle and High/Sr Sec schools were higher in Rajgarh block.

Table 2.5 Block-wise Number of Educational Institutions

Block	Number of schools			Number of schools per 1000 of population		
	Primary	Middle	High/Sr Sec.	Primary	Middle	High/Sr Sec.
Pacchad	135	28	19	2.93	0.61	0.41
Rajgarh	108	23	15	2.59	0.55	0.36
Nahan	127	32	36	2.07	0.52	0.24
Paonta Sahib	253	49	23	1.71	0.33	0.37
Shilai	171	29	14	3.25	0.55	0.27
Sangrah	180	36	23	2.94	0.59	0.38

Source: District Statistical Office, Nahan

2.3.1 Occupational Distribution

The distribution of workers into main and marginal workers in district Sirmour and state of Himachal Pradesh has been presented in Table 2.6. The workers constituted nearly 40 per cent of the total population in the district and out of total workers nearly 72 per cent were main workers. Similar pattern was observed at the state level as well. Further, among male and female workers, while the proportion of total male workers was 48.84 per cent, in case of female the proportion of workers was around 27 per cent. Main workers were nearly two and half times higher than marginal workers. There was a different pattern in the distribution of male and female workers. For example, while in case of male workers the proportion of marginal workers was around 8 per cent; in respect of female was around 15 per cent. Table 2.7 further reveals distribution of total workers into main and marginal workers. It shows that out of the total workers, nearly 70 per cent were main workers and remaining were marginal workers. Among male and female workers, main workers accounted for more than three-fourths in case of the former and less than

fifty per cent in respect of the latter. The pattern was broadly similar for the state as a whole but with the notable exception that the per cent share of marginal workers was slightly higher than their main worker counterparts.

The distribution of main and marginal workers into different occupational categories has been brought out in Table 2.8. Among main workers, cultivators accounted for about 70 per cent of the total workers; among male and female the share of cultivators was about 60 and 90 per cent, respectively. The per cent share of workers in two occupational categories viz. agricultural labour and household industry was less than two per cent each. The workers in other occupations which included construction, transport and communication, services, etc accounted nearly 30 per cent of the total main workers. Proportion of female workers employed in other occupations was around 10 per cent. In a similar vein, the distribution of marginal workers into different occupational categories shows that a majority of such workers in both the sexes was engaged in cultivation both at the district and state level. Nonetheless, nearly 17 per cent of the male marginal workers in the district were also engaged in other occupations which included construction activities, transport and communication, hotel restaurant, etc.

Table 2.6 Proportion of Workers to Total Population, 2001

Particular	Person	Male	Female
Sirmour			
Population	458593	241299	217294
Total Workers	175913 (38.36)	117841 (48.84)	58072 (26.72)
Main Workers	125954 (27.46)	99653 (41.30)	26301 (12.10)
Marginal Workers	49959 (10.89)	18188 (7.54)	31771 (14.62)
Himachal Pradesh			
Population	6077900	3087940	2989960
Total Workers	2992461 (49.23)	1686658 (54.62)	1305803 (43.67)
Main Workers	1963882 (32.31)	1333361 (43.17)	630521 (21.09)
Marginal Workers	1028579 (16.92)	353297 (11.44)	675282 (22.58)

Note: Figures in parentheses are percentages

Source: Primary Census Abstract of Himachal Pradesh-Series 3, Census of India, Directorate of Census Operations, Himachal Pradesh Shimla

Table 2.7 Percent of Main and Marginal Workers, 2001

Particular	Persons	Male	Female
Sirmour			
Main Workers	71.60	84.57	45.29
Marginal Workers	28.40	15.43	54.71
All	100.00	100.00	100
Himachal Pradesh			
Main Workers	65.62	79.05	48.29
Marginal Workers	34.38	20.95	51.71
All	100.00	100.00	100

Source: Primary Census Abstract of Himachal Pradesh-

Table 2.8 Occupational Composition of Main and Marginal Workers, 2001

Particulars	Sirmour			Himachal Pradesh		
	Persons	Male	Female	Persons	Male	Female
I Main Workers	175913 (100.00)	117841' (100.00)	58072 (100.00)	1963882 (100.00)	1333361 (100.00)	630521 (100.00)
i. Cultivators	119585 (67.98)	68359 (58.01)	51226 (88.21)	1089124 (55.46)	578807 (43.40)	510317 (80.93)
ii. Agricultural Labour	2775 (1.58)	2111 (1.79)	664 (1.14)	36156 (1.84)	26499 (1.99)	9657 (1.53)
iii. Household Industry	2009 (1.14)	1738 (1.47)	271 (0.47)	34917 (1.74)	27671 (2.07)	7246 (1.15)
iv. Others	51544 (29.30)	45633 (38.72)	5911 (10.18)	803685 (40.92)	700384 (52.53)	103301 (16.38)
II Marginal Workers	49959 (100.00)	18188 (100.00)	31771 (100.00)	1028579 (100.00)	353297 (100.00)	675282 (100.00)
i. Cultivators	42013 (84.09)	13403 (73.69)	28610 (90.05)	865746 (84.16)	255505 (972.32)	610241 (90.36)
ii. Agricultural Labour	2992 (5.99)	1410 (7.75)	1582 (4.98)	58015 (5.64)	29159 (8.25)	28856 (4.27)
iii. Household Industry	586 (1.17)	220 (1.21)	366 (1.15)	17602 (2.03)	6363 (1.80)	11239 (1.66)
iv. Others	4368 (8.74)	3155 (17.35)	1213 (3.82)	87216 (8.48)	62270 (1.76)	24946 (3.69)

Note: Figures in parentheses are percentages

Source: Primary Census Abstract of Himachal Pradesh-

2.4 Agriculture Status

2.4.1 Land Utilization Pattern

The changes in the land utilization pattern have been brought in Table 2.9. The table suggests that the area under forests in the district remained stagnant around 22 per cent between 1990-91 and 2004-05. Further, while there was a marginal decline in the proportion of area under pastures, the proportion of area put to barren lands, non-agricultural uses; current fallow and other fallows registered an increase of varying degree. The net sown area, however, declined by nearly two percentage points. The pattern of change in land utilization for the state was, however, different. The proportion of forests, culturable waste and net sown area declined by varying degrees between 1995-96 and 2004-05. The area put to non-agricultural uses, however, recorded a significant increase, particularly between 2000-01 and 2004-05.

2.4.2 Distribution of Landholdings

Table 2.10 brings out the changing distribution of landholdings in terms of proportion of different categories of holdings and area accounted for by them. The table shows that consistent with overall pattern noted at the All-India level and other states, the process of fragmentation of holdings was evident both for the district and state since 1980-81. Between 1980-81 and 1995-96, the proportion of marginal holdings increased from nearly 38 per cent to 44 per cent while that of small holdings remained nearly unchanged at one-fifth level. The proportion of remaining two categories of holdings i.e. medium and large ones, however, recorded a decline of about 3 per cent each. On the other hand, the proportion of operated area accounted for by these holdings

brings out highly un-equal distribution pattern. It was evident from the fact that about half of the marginal holdings accounted for around one-tenth of the total operated area in comparison to large and medium size holdings whose numerical proportion was around 35 per cent accounting for nearly 75 per cent of the total operated area. More or less similar pattern was in evidence for the state as a whole. While the proportion of marginal holdings increased from around 55 per cent in 1980-81 to more than two-thirds of the total holdings, the extent of small holdings decreased from 22.03 per cent to around 19 per cent. The large and medium holdings also recorded a continuous decrease. Insofar as distribution of operated area was concerned, the category of medium holdings and large holdings each accounted for around one-fourth of the total operated area. The proliferation of holdings due to sub-division coupled with lack of alternative employment opportunities in non-farm sector resulted in persistent decrease in the average size of holdings of all size categories both at the district and state level (Table 2.11).

Table 2.9 Changing Land Utilization Pattern (Per Cent)

Particulars	Year	Forest land	Barren land	Non-agri. uses	Culturable waste	Pasture	Misc trees/groves	Current fallow	Other fallow	Net sown area
Sirmour	1990-91	21.61	3.43	4.19	5.77	27.08	16.58	1.69	0.43	19.23
	1995-96	21.56	3.46	4.44	5.81	27.00	16.50	1.89	0.40	18.94
	2000-01	21.54	3.77	4.66	6.58	25.70	16.72	1.54	0.77	18.73
	2002-03	21.51	3.78	4.74	7.03	25.31	16.54	2.31	1.07	17.71
H.P.	1990-91	30.85	5.46	5.74	3.72	33.72	1.43	1.33	0.46	17.31
	1995-96	31.10	4.07	5.66	3.64	35.44	1.35	1.55	0.76	16.43
	2000-01	24.05	17.75	6.90	2.74	33.63	1.25	1.19	0.30	12.20
	2004-05	24.22	14.78	10.08	2.80	33.02	1.51	1.32	0.31	11.94

Source: District Statistical Office, Nahan

Table 2.10 Changing Pattern of Land Holdings, 1980-81 to 2000-01 (Per Cent)

Particulars	Census Year	Marginal <1 ha		Small 1-2 ha		Medium 2-4 ha		Large >4 ha		Total	
		No.	Area	No.	Area	No.	Area	No.	Area	No.	Area (ha)
Sirmour	1980-81	38.29	6.61	21.20	11.91	21.38	22.34	19.12	59.14	35102	95328
	1985-86	42.86	8.46	21.30	12.54	19.12	22.01	16.72	56.99	41265	102053
	1990-91	43.83	8.55	21.39	13.05	19.86	21.02	14.93	57.38	43812	103064
	1995-96	44.19	9.22	21.68	13.61	18.44	22.73	15.69	54.44	45048	102510
	2000-01	46.63	10.12	21.23	14.15	17.78	23.43	14.36	52.31	48066	102682
H. P.	1980-81	55.30	14.92	22.03	20.43	29.42	66.06	2.72	19.68	637081	980425
	1985-86	61.55	20.46	20.63	22.71	12.24	25.97	5.58	30.86	752882	980240
	1990-91	63.82	21.26	19.96	23.29	11.26	25.51	4.96	29.94	833793	1009766
	1995-96	62.85	23.05	19.61	24.07	10.74	25.54	6.80	27.34	884492	999099
	2000-01	67.30	25.70	19.10	25.00	9.80	24.80	3.80	24.50	913914	978756

Source: District Statistical Office, Nahan

Table 2.11 Changes in Average Size of Holdings, 1980-81 to 1995-96

Particulars	Year	Marginal (<1 ha)	Small (1-2 ha)	Medium (2-4 ha)	Large (> 4 ha)	Overall (ha)
Sirmour	1980-81	0.47	1.53	2.84	8.40	2.72
	1985-86	0.49	1.46	2.85	8.43	2.47
	1990-91	0.46	1.44	2.49	9.04	2.35
	1995-96	0.47	1.43	2.80	7.90	2.28
H. P.	1980-81	0.42	1.43	2.75	7.70	1.54
	1985-86	0.43	1.43	2.76	7.20	1.30
	1990-91	0.40	1.41	2.74	7.31	1.21
	1995-96	0.41	1.39	2.69	7.03	1.13
	2000-01	0.41	1.40	2.71	6.85	1.07

Note: Medium includes semi-medium holdings also

Total number of inhabited village in District Sirmour was 966 (Table 2.12). Pacchad had maximum number of villages followed by Nahan and Paonta Sahib. Geographic area of Sangraha block was largest followed by Rajgarh and Pacchad, however, net sown area was largest in Paonta block. It was 2 to 3 times larger than other blocks. Topography of Paonta & Nahan block is comparatively plain and lands can be easily cultivated, whereas in other blocks lands are sloppy and are difficult to cultivate. Therefore, proportion of arable lands in total geographical area was higher in these blocks. Net area handled by each agricultural worker was also higher in Paonta and Nahan block for the same reason. Irrigation facilities were also better in these two blocks and they alone accounted for 60 % of the net irrigated area of the district. Tube wells were the preferred mean of irrigation in Paonta and Nahan blocks, whereas in other blocks rivulet fed gravity flow irrigation channels were the only option. There are many perennial streams in the district and they meet the irrigation needs of farmers in hilly areas of the district. Cropping intensity of the district was 184 and it was highest in Shillai and lowest in Rajgarh block.

Table 2.12 Distribution of Villages Net Sown Area and Irrigated Area)

Block	Total inhabited villages	Geo area (ha)	Net sown area (ha)	Net sown area (ha/ag worker)	Net irrigated area (ha)	Total cropped area (ha)	Cropping intensity	Irrigation intensity
Pacchad	262	40567	4832	0.17	1103	9011	180	22.83
Rajgarh	140	41044	5061	0.16	1516	8515	168	29.95
Nahan	209	28860	6069	0.24	1772	11339	187	29.20
Paonta Sahib	184	37105	14572	0.33	6784	27123	186	46.56
Shillai	50	27209	4622	0.19	1222	8800	190	26.44
Sangraha	121	48635	6066	0.15	1723	10960	181	28.40
District	966	223420	41222	0.21	14120	75748	184	34.25

Source: District Statistical Office, Nahan

2.4.3 Cropping Pattern and Crop Production

The changes in the cropping pattern, brought out in Table 2.13, indicate that among different foodgrain crops in the district the area under rice and wheat recorded increase but the area under maize, pulses and barley decreased. However, the area under all foodgrain crops decreased significantly from around 88 per cent to around 81 per cent. On the other hand, at the state level the area under foodgrain crops decreased from around 89 per cent in 1990-91 to 84 per cent 2005-06. In case of important crops like maize, rice and wheat, the per cent of area under these crops witnessed decrease implying some shift in area from these crops to other commercial crops mainly vegetable crops.

Table 2.13 Changes in Cropping Pattern (Per Cent)

Particulars	Year	Maize	Rice	Wheat	Barley	Pulses	Foodgrains	Cropped area (000 ha)
Sirmour	1990-91	33.17	6.40	37.11	3.58	6.09	87.63	78.29
	1995-96	33.88	6.79	35.59	3.67	5.93	86.99	77.89
	2000-01	31.31	7.79	35.25	3.32	5.63	84.18	76.73
	2005-06	30.66	7.29	34.92	3.36	4.80	81.27	74.56
H.P.	1990-91	32.44	8.63	38.26	2.98	3.69	88.59	983.60
	1995-96	32.58	8.74	38.04	2.84	3.8	87.43	949.89
	2000-01	31.46	8.65	38.27	2.71	3.28	85.98	947.54
	2005-06	30.98	8.32	37.59	2.65	2.88	83.66	953.60

Note: Percentages have been worked out on the basis of total cropped area in each district.

The changes in the production of different crops including total foodgrains have been given in Table 2.14. The table shows that the production of foodgrains in the district decreased from 132.28 thousand tonnes in 1990-91 to 99.93 thousand tonnes in 2005-06. Among different crops, ignoring the year 2000-01 which was a drought year, the maximum decline was noted in case of wheat mainly because the production largely depends upon winter rainfall. Similar pattern was discernible at the state level as well. The production of foodgrains in the state decreased from 1368.66 thousand tonnes in 1990-91 to 1079.15 thousand tonnes in 2005-06. Likewise, among different crops, while production of maize decreased from 669.2 thousand tonnes in 1990-91 to 543.06 thousand tonnes in 2005-06, that of rice plummeted from 945.32 thousand tonnes to as low as 112.14 thousand tonnes. More importantly, however, the production of pulses nearly doubled during the period; it increased from about 11 thousand tonnes to 19.63 thousand tonnes.

2.4.4 Crop Yields

The yield levels of main crops, including foodgrains, have been shown in Table 2.15. As may be seen from the table, the yield levels of all crops have recorded decrease of varying degrees between 1990-91 and 2005-06 both at the district and state level.

Table 2.14 Changes in Production of Major Crops and Total Foodgrains Production, 1990-91 to 2002-03 (000 tonnes)

Particulars	Year	Maize	Rice	Wheat	Barley	Pulses	Foodgrains
Sirmaur	1990-91	60.05	8.53	51.86	3.47	1.69	132.28
	1995-96	68.42	7.60	34.172	3.45	1.25	115.11
	2000-01	69.55	9.83	23.80	1.39	2.2	107.22
	2005-06	56.24	7.22	34.51	0.45	1.51	99.93
H.P.	1990-91	669.20	945.32	543.69	3.71	10.87	1368.66
	1995-96	663.44	111.76	502.01	3.42	18.61	1336.29
	2000-01	683.64	124.98	251.32	21.41	20.46	1108.41
	2005-06	543.06	112.14	365.89	29.36	19.63	1079.15

Source: Annual Season and Crop Reports, Directorate of Land Reforms, Government of Himachal Pradesh

Table 2.15 Changes in Yields of Major Foodgrain Crops, 1990-91 to 2002-03 (q/ha)

Particulars	Year	Maize	Rice	Wheat	Barley	Pulses	Foodgrains
Sirmour	1990-91	25.44	17.02	17.85	12.41	3.54	19.28
	1995-96	25.95	14.36	12.32	12.08	2.71	16.99
	2000-01	28.94	16.45	8.79	3.44	5.09	16.60
	2005-06	23.27	10.01	13.46	8.41	4.22	16.49
H.P.	1990-91	18.76	9.87	15.99	14.70	2.31	16.54
	1995-96	19.90	13.46	13.89	12.69	5.16	16.09
	2000-01	22.94	15.24	7.21	8.33	6.58	14.59
	2005-06	18.39	14.13	10.21	11.64	7.14	13.52

Source: Annual Season and Crop Reports, Directorate of Land Reforms, Government of Himachal Pradesh

2.4.5 Vegetable Production

The data on area and production of different vegetable and spice crops both in the district and state during the year 2005-06 have been presented in Table 2.16. The table reveals that in the district tomato, pea, garlic and ginger were important vegetable & spice crops both in terms of area and production. The cucurbits, bhindi and brinjal were other important vegetable crops covering 675 hectares of land and contributed about 12,000 tonnes of vegetable production. The average yield levels of vegetable crops in the district was higher (224.24 q/ha) as compared to state level yields 186.47 q/ha). Productivity of peas was quite higher than state average, while that of tomato and ginger was almost equal. Yield varied from as low as 103.96 quintal per hectare in case of beans to as high as 324 quintals per hectare of tomato. Sirmour is identified as the spice district of the state as it alone accounts for 43 per cent of acreage under condiments & spices in the state. Ginger was the main spice crop of the district and it was the main cash crop of the district. Owing to rhizome rot disease, the acreage under ginger has declined and it is being replaced by other vegetable crops like tomato, capsicum etc. Likewise, at the state level, pea was the most important crop that covered 15,348 hectares of area followed by tomato with an area of 9,211 hectares. Onion & garlic, cabbage and cauliflower were other important crops both in terms of area and production. The state level average yield of different crops ranged from 104.61 quintals per hectare in case of beans to 327.05 quintals per hectare of tomato.

Table 2.16 Area, Production and Yield of Different Vegetables and Spices, 2005-06

Crops	Sirmour			H.P.		
	Area (ha)	Production (tonnes)	Yield (q/ha)	Area (ha)	Production (tonnes)	Yield (q/ha)
Peas (Green)	846	17537	207.29	15348	177036	115.35
Tomato	1529	49535	323.97	9211	301249	327.05
Beans	192	1996	103.96	2674	27973	104.61
Onion & Garlic	883	9993	113.17	3735	49622	132.86
Cabbage	125	5175	414	3677	115920	315.26
Cauliflower	116	2378	205	2263	53103	234.66
Radish, Turnip & Carrot	98	1078	110	1571	32675	207.99
Bhindi	250	6250	250	1728	19659	113.77
Cucurbits	252	3276	130	2082	43845	210.59
Capsicum & Chillies	41	720	175.61	2081	30876	148.37
Brinjal	123	2418	196.59	772	14267	184.81
Other Vegetables	54	756	140	3715	63817	171.78
Ginger	1446	10067	69.62	2455	17051	69.45
Coriander (dry)	93	30	3.23	263	84	3.19
Chillies (dry)	311	12	0.39	837	87	1.04
Total	6359	111221	174.90	52412	947264	186.47

Source: Directorate of Agriculture, Shimla

2.4.6 Fruit Production

The changes in area and production of total fruit crops in district Sirmour and the state as a whole have been presented in Table 2.17. The table reveals that in district Sirmour both the area under fruit crops and fruit production fluctuated widely between 1990-91 and 2005-06. However, taking a long period view, both the area and production decreased; while during the period the area under fruit crops declined from 7,628 hectares to 6,232 hectares, the production decreased from 4,820 tonnes to 4,297 tonnes. At the state level, both the area and production increased significantly; the area under fruit increased from 1,63,330 hectares to 1,91,668 hectares and fruit production rose from 3,86,314 tonnes to 6,95,520 tonnes.

Among different fruit crops, most of the area in the district was under other fruit crops, of which peach was the most important one (Table 2.18). The per cent share of different fruit crops in area and production (Table 2.19) shows that around 53 per cent of area and 85 per cent of the total fruit production was contributed by other fruit crops, of which, peach, mango and strawberry were the most important crops. Apple and Citrus group particularly kinnow constitute important fruit crops accounting for 23 and 12 per cent of the total area, respectively. Production-wise dry fruits particularly walnut was important crop and constituted about 7 per cent of total fruit production. At the state level, apple was important fruit crop accounting for around 46 per cent of the total area under fruits and more than three-fourths of the total fruit production. Other fruit crops were contributing more than one-third of the total area under fruits and nearly 18 per cent of the total fruit production.

Table 2.17 Trends in Area, Production and Yield of Fruits; 1990-91 to 2005-06

Particulars	Year	Area (ha)	Production (tonnes)
Sirmour	1990-91		
	1995-96	15792	3043
	1999-00	16249	18398
	2005-06	13006	13812
H.P.	1990-91	163330	386314
	1995-96	195684	311889
	1999-00	217319	428049
	2005-06	191668	695520

Source: Directorate of Horticulture, Government of Himachal Pradesh, Shimla

Table 2.18 Area and Production of Different Fruits, 2005-06

Fruit crops	Sirmour		H.P.	
	Area(Ha)	Production (T)	Area(Ha)	Production (T)
Apple	3052	597	88560	540360
Citrus	1599	585	20729	29160
Dry Fruits	1485	947	11210	3920
Other Fruits	6870	11683	71169	122080
Total Fruits	13006	13812	191668	695520

Source: Directorate of Horticulture, Government of Himachal Pradesh, Shimla

Table 2.19 Share of Different Fruits in Area and Production, 2005-06 (Per Cent)

Fruit crops	Sirmour		H.P.	
	Area	Production	Area	Production
Apple	23.47	4.32	46.20	77.69
Citrus	12.29	4.23	10.82	4.19
Dry Fruits	11.41	6.85	5.85	0.56
Other Fruit	52.82	84.58	37.13	17.55
Total Fruits	100	100	100.00	100.00

Source: District Statistical Office, Nahan

2.4.7 Input Use in Crops

The proportion of area under irrigation in main crops like maize, wheat and paddy is given in Table 2.20. The table shows that per cent irrigated area to net sown area in the district has remained practically constant at around 35 per cent. In respect of different crops, only around 25 per cent of total area under maize was irrigated while this proportion was as high as around 75 per cent in case of paddy. In case of wheat, the proportion of irrigated area was around 35 per cent. The table further reveals that the irrigated area remained constant at around 19 per cent at state level. In case of main crops, less than one-tenth of the area under maize was irrigated whereas this proportion in case of paddy was nearly 6 per cent. The proportion of irrigated area under wheat was 20 per cent.

Table 2.21 presents the proportion of area under high yielding varieties (HYV) for three major crops, namely, maize, paddy and wheat both at the district and state level. The table shows that during the fifteen years period since 1980-81, the area under high yielding varieties of maize increased from 19.66 per cent to as high as 63.90 per cent. The respective figures for wheat and

barley were 35 per cent and 68 per cent. At the state level, while the proportion of area under HYV of maize increased from around 15 per cent in 1980-81 to nearly 62 per cent during 1999-00, the respective figures for wheat were 33.85 per cent and 61.05 per cent.

Table 2.20 Area under Irrigation, Major Crops (Per Cent).

Particulars	Triennium	Maize	Paddy	Wheat	% Irrigated area to net sown area
Sirmour	1990-91	25.90	75.95	34.08	33.59
	1995-96	24.96	75.46	33.22	33.75
	2000-01	25.19	74.92	34.10	34.92
	2002-03	24.38	74.95	35.86	34.40
H P	1990-91	6.78	57.79	17.31	17.00
	1995-96	7.77	60.41	18.90	18.79
	2000-01	8.28	63.21	18.46	19.13
	2002-03	9.43	60.39	20.33	18.80

Source: District Statistical Office, Nahan

The changes in fertiliser consumption given in Table 2.22, show that while the consumption of all fertilisers in the district increased by more than fivefold during 1980-81 to 2005-06, while it was less than four times in state. Fertiliser consumption at the state level and district level in the year 2005-06 was 47,973 and 2,948 MT, respectively. In terms of fertiliser consumption per hectare, it increased from 7.49 kilogram per hectare in 1980-81 to 40.39 kilogram per hectare in 2005-06 in the district and from 14.74 kilogram per hectare to 50.78 kilogram per hectare at the state level. Per hectare fertilizer consumption during kharif season was almost equal to state level, while during rabi season, state average was one and half times higher than district figures.

Table 2.21 Area under High Yielding Varieties of Major Crops (Per Cent).

Particulars	Year	Maize	Paddy	Wheat
Sirmour	1980-81	19.66	NA	35.07
	1999-2000	63.90	76.56	68.29
H P	1980-81	14.83	NA	33.85
	1999-2000	61.63	41.61	61.05

Source: Annual Season and Crop Reports

NA = Area not available for 1980-81

Table 2.22 Fertiliser Consumption, 1980-81 to 2005-06

Particulars	Year	NPK (Metric Tonnes)			NPK (kg/ha)		
		Kharif	Rabi	Total	Kharif	Rabi	Overall
Sirmour	1980-81	315	255	570	7.49	6.50	7.02
	1991-92	1166	811	1977	27.30	22.77	25.24
	1998-99	1108	982	2090	26.25	27.10	26.65
	2005-06	1548	1400	2948	38.90	42.18	40.39
H. P.	1980-81	8155	5795	13950	15.93	13.33	14.74
	1991-92	15599	15006	30605	29.12	34.36	31.47
	1998-99	15318	19534	34852	28.88	42.85	35.33
	2005-06	19197	28776	47973	37.28	66.69	50.78

The use of machinery is yet another important input of production of different crops as it helps in timely completion of different agricultural operations thereby boosting the production and productivity levels. The extent of use of different farm machinery in the district and state reveals substantial increase in the number of electric pumps from 88 in 1992 to 773 in 2003 (Table 2.23). Likewise, the number of oil engines during the period increased from 32 to 218. The number of tractors increased from 368 to 902 between 1992-2003. The number of cane crushers also declined from 280 to 207 thereby hinting at replacement of sugarcane with other crops. The pattern is broadly similar at the state. For example, the number of ploughs decreased over the period suggesting the replacement of plough with tractors whose use has recorded significant increase in recent times because of increased practice of custom hiring. Further, the number of cane crushers and carts declined while that of tractors nearly doubled and oil engines tripled during the period between 1992 and 2003. The maximum increase was, however, noticed in the number of electric pumps which increased from 1,222 in 1992 to 7,325 in 2003. These changes in the number of electric and oil engines are consistent with the ongoing process of crop diversification towards vegetable, horticulture and floriculture in the state.

Table 2.23 Extent of Mechanization (No.)

Type of implement	Sirmour			H. P.		
	1992	1997	2003	1992	1997	2003
Ploughs	46068	NA	47494	710349	462439	631470
Carts	393	NA	213	1128	1807	240
Cane crushers	280	NA	207	1878	1213	1135
Tractors	368	NA	902	3466	4205	6966
Oil engines	32	NA	218	1299	1295	3664
Electric pumps	88	NA	773	1222	2530	7325
Threshers	142	NA	1651	19221	14048	19458

Source: Agricultural Census

2.4.8 Livestock, Poultry and Fisheries

The livestock is an integral part of agriculture, especially in hill and mountain agriculture. It is, therefore, important to examine important issues related to livestock. To begin with, we discuss the changes in livestock population. Table 2.24 reveals that the total livestock population in district increased from 4,12,795 in 1977 to 4,59,990 in 2003 recording an increase of about 11 per cent. The increase was observed in all type of livestock except sheep which declined from

42,468 in 1992 to 17,758 in 2003. The number of cattle, buffaloes, however, increased from 2,29,150 and 32,622 to 2,48,045 and 50,656, respectively. At the state level, the livestock population increased between 1977 and 1992 but declined marginally during the subsequent period from around 51 lakh to 50 lakh. Further, there was an increase in the population of both cattle and buffalo but a huge decrease in the population of sheep. There was also a more than five times increase in poultry birds between 1977 and 2003.

Table 2.25 presents the changes in livestock production. The table reveals that in district Sirmour, milk production increased 44.707 thousand metric tonnes in 1990-91 to 72.9 thousand metric tonnes in 2006-07. In the total milk production, the share of cow milk was about two third. Coming to the milk production at the state level the data shows that it increased from 572.605 thousand tones to 872.0114 thousand tonnes. However, in the beginning the share of cow and buffalo milk in the total milk production was around 45 per cent 53 per cent respectively which changed to 53 per cent and 39 per cent in 2003. This huge change in the relative contribution of cow and buffalo milk could be explained in terms of ongoing process of replacing indigenous cows with improved ones and the spread of artificial insemination facilities in the rural areas. Insofar as changes in wool production were concerned, while the wool production in the district increased from 43.229 metric tonnes in 1990-91 to 358.3 metric tonnes in 2003, at state level it increased from 1452.10 metric tonnes to 1605.33 metric tonnes. The production of meat in the district decreased from 529.24 metric tonnes to 190.29 metric tonnes in the district whereas at the state level it decreased from 4049.00 metric tonnes to 2934.23 metric tonnes. The production of eggs also decreased in the district while state level figure showed increase. While in the former case it decreased from 30.616 lakh to 25.78 lakh, in the latter the increase was from 531.70 lakh to 771.98 lakh.

Table 2.24 Changes in Livestock Population, 1977 to 2003

Districts	Census	Cattle	Buffaloes	Sheep	Goats	Total livestock	Poultry	Bovine Density (No/Ha)	
								Geog. area	Operational Holding
Sirmour	1977	229150	32622	42468	104827	412795	20167	1.46	4.23
	1992	235557	40108	27616	115215	422813	39475	1.50	4.14
	2003	248045	50656	17758	138826	459990	20411	2.04	11.56
H. P.	1977	2106229	560006	1055005	1035337	4795226	329561	0.86	4.75
	1992	2151616	700923	1074345	1115591	5116933	664039	0.92	5.04
	2003	2196538	773229	906027	1115587	5046044	763820	0.91	5.52

Source: Livestock Censuses 1977 & 1992 and 2003

About 160 veterinary institutions are providing health care services to the people of the district (Table 2.26). Highest concentration of these institutes was in Paonta Block followed by Nahan and Sangrah Block. Each institute was serving 3,003 heads of animals.

Table 2.25 Changes in Livestock Production, 1990-91 to 2006-07

Year	Milk (000 MT)				Wool (MT)	Meat (MT)				Eggs (Lac)
	Cow	Buffalo	Goat	Total		Goat	Sheep	Pig	Total	
Sirmour										
1990-91	28.034	16.202	0.471	44.707	43.229	244.590	99.190	185.460	529.240	30.618
1995-96	30.480	15.185	1.052	46.717	54.639	75.724	14.322	9.427	132.982	27.736
2000-01	43.675	19.864	2.567	66.106	123.177	123.177	29.657	43.369	196.203	22.839
2006-07	51.000	19.400	2.300	72.900	358.300	107.810	65.640	16.830	190.290	25.780
Himachal Pradesh										
1990-91	257.563	300.843	14.199	572.605	1452.10	2332.00	1432.00	285.00	4049.00	531.70
1995-96	302.842	344.635	28.795	676.272	1548.13	2283.07	1159.39	150.82	3593.28	720.81
2000-01	349.620	377.032	33.759	760.411	1586.11	2248.61	955.19	221.61	3425.41	815.68
2006-07	500.005	345.186	27.204	872.014	1605.33	1869.60	799.85	264.77	2934.23	771.98

Source: Directorate of Animal Husbandry, Government of Himachal Pradesh

Table 2.26 Veterinary Institutions and Livestock per Institute at Block Level

Block	Total livestock	Veterinary institutes	Livestock per veterinary institutes
Pacchad	69017	21	3287
Rajgarh	55797	18	3100
Nahan	81146	28	2898
Paonta Sahib	114105	50	2282
Shilai	67732	17	3984
Sangrah	92616	26	3562
District	480413	160	3003

Source: Directorate of Animal Husbandry, Government of Himachal Pradesh

The changes in fishery production in the district and state are given in Table 2.27. The table shows that district followed state's trend and number of registered fishermen in the district declined from 803 in 1990-91 to 554 in 2006-07. At state level, the number of fishermen declined from 12,109 to 10,536. Despite declining fishermen population, the fish production in the district increased from 567 metric tonnes in 1990-91 to 706 metric tonnes in 2006-07. Fish catch for the state as a whole increased from 5,132 metric tonnes to 6,886 metric tonnes.

Table 2.27 Trends in Fishery Production, 1990-91 to 2006-07

Year	Registered Fishermen	Production (MT)
Sirmour		
1990-91	803	567
1995-96	613	469
1999-00	737	804
2006-07	554	706
Himachal Pradesh		
1990-91	12109	5132
1995-96	8162	6002
1999-00	9698	6995
2006-07	10536	6886

2.5 General Infrastructural Facilities

The infrastructural facilities available in the district have been presented in this section. Over the years there have been marked improvements in transport and communication networks. The health and veterinary institutions have also improved. However, the rural markets and enterprises/ industries are still scanty that need special attention.

Total length of the roads was 2,513 km. out of which 2,261 km. was motorable (Table 2.28). Road network was far better than the state average as motorable road per 100 sq km was 80.53 km. in district against state figure of 49.54 km.. However network of post offices (37) was not better than the state average (46). It may be attributed to the tough topography of upper part of district. Similarly 69 banks were providing credit services to the people of the district (Table 2.29). Each branch of bank and post office was serving 5,707 and 2,521 persons, respectively. Whole population of district was having access to the drinking water and all the villages have been electrified (Table 2.30).

Table 2.28 Transport and Communication as on 31.03.2007

Particulars	Total road length (km.)	Motorable road length (km.)	Motorable road per '00' km of area	Post offices (No.)	Post offices per lakh of population
Sirmour	2513	2261	80.53	169	37
H P	30264	27584	49.54	2779	46

Source: Statistical Outline of H.P, 2006-07

Table 2.29 Number of Fair Price Shops, Banks and Post Offices as on 31.03.2007

Block	Total population	No. of banks	No. of post offices	No. of persons served per bank	No. of persons served per post office
Pacchad	46020	9	20	5113	1704
Rajgarh	41680	7	21	5954	2084
Nahan	61361	15	20	4091	3409
P. Sahib	148160	24	41	6173	3799
Shilai	52544	5	20	10519	2627
Sangrah	61158	12	39	5097	1568
District	410923	72	169	5707	2521

Source: Statistical Abstract of District Sirmour, 2007

Table 2.30 Rural Electrification and Drinking Water Facilities

Name of block	Inhabited villages (No.)	Per cent electrified villages	Per cent villages with drinking water facility
Pacchad	262	100	100
Rajgarh	140	100	100
Nahan	209	100	100
Paonta Sahib	184	100	100
Shilai	50	100	100
Sangrah	121	100	100
District	966	100	100

Source: Block Level Indicators and Statistical Abstract of District Sirmour, 2007

Chapter III

SWOT ANALYSIS OF THE DISTRICT

Sirmour district is one of the most backward districts of the country and it can be attributed to tough topography, illiteracy, small land holdings and traditional farming systems. Some parts of this district have achieved astonishing progress on agricultural and industrial fronts. This district is blessed with diverse climatic conditions varying from sub-tropical to temperate. This district is rich in natural resources which need to be harnessed scientifically to improve economic condition of the people. Cereal crops dominate the cropping pattern, but lately, diversification of agriculture is picking up in many pockets of this district. Adoption of off-season vegetable and temperate horticulture production has led to positive socio-economic impact and it needs to be spread to the remaining areas of the district. Some institutional mechanisms are required for motivating the people for adopting ecologically sound and sustainable agricultural development practices on their fields. The main strengths, weaknesses, opportunities and threats (SWOT) of the district are given below.

3.1 SWOT Analysis for Improving Agricultural and Allied Sectors

3.1.1 Strengths:

- Land resources of the district in general and Paonta Sahib block in particular are very productive and can be compared with the neighbouring states of Punjab and Haryana. These lands are suitable for production of wide variety of crops ranging from sugarcane to apple.
- Farmers of this district are very progressive and are eager to adopt modern agricultural production technologies. Wide ranges of agricultural, horticultural and vegetable crops are being produced by them through adoption of scientific methods.
- District has wide range of altitudinal, climatic and ecological conditions and, thus, very wide range of crops can be produced here. Climatic conditions are suitable for the production of remunerative off-season vegetables and temperate horticulture crops. This district is spice bowl of the state and known for its ginger, garlic and chilly crops.
- Mountains of the district are a source of many perennial rivulets that feed irrigation schemes of the district. Potential of these rivulets needs to be harnessed further through creation of new irrigation schemes as well as efficient use of water in the existing irrigation schemes.
- District has wide network of the roads, dependable research & extension institutions, and ample transportation facilities to carry the farm produce to nearby markets exists.

3.1.2 Weakness

- Small and marginal land holdings account for the 65 per cent holdings of district and fragmentation of the existing holdings is on the rise. Low holding size makes farming uneconomical and acts as an impediment for the adoption of newer technologies.

- Farming in the district is still dependent upon rains as 65 per cent lands are rainfed. These lands have lower productivity and farmers avoid adoption of modern farming practices on such lands.
- Modern agricultural practices have made inroads in cash crop cultivation but food grain production in general and rainfed farming in particular is still dominated by traditional farming practices. This results in non-realisation of the productivity potential of the land resources
- Lower productivity of crops is another weakness of the farming systems of this district. It can be attributed to non-use of recommended varieties, rainfed farming, incidence of pest and diseases, partial or non-adoption of scientific crop management practices.
- Cereal dominate cropping pattern of the district as these account for about 80 per cent of the gross cultivated area of the district. This makes farming unviable employment and investment option. There is need to diversify the cropping pattern towards cash crops like off-season vegetables, fruit crops, floriculture, etc.

3.1.3 Opportunities

- Diverse climatic conditions of the district offer ample scope for the diversification of the agriculture through cash crops like off-season vegetables, fruit crops, floriculture, etc. Though people have already started moving in this direction but full potential is yet to be tapped to make the agriculture viable and vibrant.
- This district receives ample rainfall during rainy season but this water goes waste. Rain water harvesting can help in solving the irrigation problems of the crops. Stored rain water can be used to meet the critical water needs of cash crops.
- Large tracts of pastures and grasslands offer opportunities for strengthening of animal husbandry sector in the district. There is huge gap between demand and supply of animal products and this gap is being filled by supplies from the neighbouring states. So this sector has ample scope for expanding without any marketing constraint.
- Fragmented land holdings are rendering farming an uneconomical option and this is the major cause for the non-realisation of the agricultural production potential of the district. Protected cultivation offers ray of hope in such scenario since it makes small lands an attractive employment and investment option.
- Organic agriculture, mushroom cultivation, floriculture, apiculture, fisheries, sericulture are other untapped enterprises that need to be supported for economically viable and ecologically sustainable development of agriculture in the district.

3.1.4 Threats

- Changing climatic factors are emerging as a new threat to the farming sector and it is manifesting itself in the form of frost injuries to the crops during winters, declining and erratic winter rainfall, hail storms, increasing disease and insect pest incidence, etc.

- Wild animal menace, particularly monkeys, wild boar, birds etc, has emerged as another threat to farming and all the crops without any exception have become vulnerable to it. In some pockets, farmers have been forced to abandon farming.
- Spurious inputs like seed, plant protection chemicals, animal feed and medicines cause huge losses to the farmers in different parts of the district. These threaten the crop diversification efforts and needs to be checked.
- Soil erosion, declining forest cover, undesirable plant growth, unscientific mining, etc., are leading to degradation of various natural resources particularly land and water and need to be checked immediately.

3.2 Issues Emerging out of SWOT Analysis

The important issues that emerge from the detailed SWOT analysis of the district are given below.

- To demonstrate the viable rainwater harvesting technology package to the farmers for mitigating the irrigation crisis.
- To diversify the agriculture production system through cash crop cultivation.
- To strengthen the animal husbandry sector for improving the economic and ecological condition of the farming systems.
- To encourage new enterprises like protected cultivation, organic agriculture, mushroom cultivation, floriculture, apiculture, fisheries, sericulture for generating income and employment in the rural areas.
- To ensure the quality inputs to the farmers for realisation of the productivity potential of the agriculture sector.
- To ensure the sustainable management of the natural resources particularly land and water.
- To evolve viable and socially acceptable solution to the wild animal menace.

3.3 Sectoral Growth Drivers. Climatic niche for cash crops cultivation, perennial rivers and rivulets, extensive network of roads, nearness to local and national agricultural markets, progressive farmers, R&D support and various institutional infrastructures are some of the important growth drivers of the agrarian economy of the district.

Chapter IV

DEVELOPMENT OF AGRICULTURE SECTOR

4.1 Land Use Pattern and Soil Health

The total geographical area of the district as per statistics presented in Table 4.1 was 2,24,746 ha, of which 22% was under forest cover. Maximum forest cover (37%) existed in Rajgarh block and minimum (5%) in Paonta block, which has plain topography and lands are most suitable for the agricultural crops. At the district level, more than 24% of the geographical area was under permanent pastures and other grazing lands category with the maximum of 35% in Nahan. The area under fallow lands and culturable waste together accounted for about 10 %. This area can be brought under cultivation if irrigation facilities and other inputs including technical know-how are extended. Area under cultivation was 18 % of the geographical area and Paonta Sahib and Nahan block had higher proportion of area under cultivation as lands in these blocks have gentle slope, whereas other blocks have very steep slopes and difficult topography. More than 80% of the area in the district was sloppy and prone to soil erosion. The problems and interventions regarding land development have been highlighted in Table 4.2. Water scarcity, soil erosion, forest degradation, weed infestation, etc., were the common problems reported by majority of panchayats. The physical estimates of farmers' land to be improved by levelling, raising contour bunding & terracing as well as meant for reclamation through check dam etc are given in Table 4.3. The financial estimates for the improvement of such lands and support lands including private grasslands and tackling monkey menace are given in Table 4.4

4.2 Water Resources and Management

The important water resources of the district can be categorised into rivers and ground water. These water resources have been presented in the Figure: 4.1

4.2.1 River and *Khads* (Tributaries)

The district is drained by a number of rivers, rivulets and streams, of these; river Giri is the biggest river in the district which is a tributary of river Yamuna.

The Giri- River Giri is the biggest river in the district which originates at Kupar Tibba in Jubbal tehsil of Shimla district. It enters the Sirmaur district at village Mariog from the north side of the district. It flows for a distance of 84 kms. in the district before merging with the Yamuna river at Rampur Ghat. It drains out the maximum quantity of water of this district with the help of its tributaries. It runs for some distance by forming boundary of the district with Solan district and then takes a turn towards east dividing the district into two almost equal parts. The Rampur Giri canal has been constructed which irrigates the land of Paonta valley. Important tributaries of Giri are Jalal, Nait, Palar, Bajhethy, Terui, Kohal and Joggar.

The Tons- Another important river which forms the eastern border of the district is the river Tons. The source of this river lies in the Jamnotri Mountain and after coursing through the territories of Jaunsar area of Dehradun district, it enters the district near village Kot of Shalai tehsil separating it from Jaunsar area. After flowing for about 80 kms, it joins the river Yamuna near Khodar Majri. It is one of the most considerable of the mountain torrents. The principal tributaries of the Tons are Bhangal, Neweli or Nera and Sainj. The current of this river is very swift and the course of the river is full of stones.

The Jalal- This small, shallow and narrow river rises near village Bani below Nehi in tehsil Pachhad and forms a dividing line between the Sain and the Dharthi ranges. It falls into the Giri river at Dadahu losing its entity.

The Markanda- It rises at Baraban R.F. in the hill of Katasan and passes below the temple of Katasan Devi. After flowing for a distance of about 24 kms from south-east to south-west in the district, it passes in to the Ambala district at Kala-Amb when it becomes more wide and plain. It is joined by a streamlet named Salani at village Dewani. Area of Kala-amb, Shambhuwala, Rukhri, Bir Bikrambag and the Khadar-Ka-Bag are irrigated by it and a few water mills also run with the waters of this river. This river is also considered sacred.

The Bata- River Bata rises from Siori spring in the Dharthi range located in village Bagna of Nahan tehsil. After taking an easterly direction, reverse to the course of Markanda and dividing Kiar-da-dun valley into two parts, it joins the river Yamuna at Bata Sirmour losing its separate entity. Dun area of the district is irrigated by its water. It is a perennial stream usually formidable.

The Ghaggar- This river rises near Lowasa in the district and flows in the westerly direction. The whole of southern slope of the Dharthi Dhar upto Lowasa range drains out in this river. It flows for about 13 kms. in Pachhad tehsil of the district before it enters the state of Haryana near Prit Nagar. Before sufficient water is collected in this river, it crosses the limits of the district. It has only two main tributaries viz., the Lah which runs throughout Ghinni tract and Deh which drains out Ghar portion of the Ponwala Jagir. Near its source, and for a number of Kilometers further on, it has a well defined boulder-stream bed which is never dry.

4.2.2 Lakes and Tanks- The Renuka lake which is regarded as the embodiment of Renuka Ji, the wife of sage Jamadagni and mother of Parshurama, is a sacred place for the Hindus. This placid stretch of water is the largest lake in Himachal Pradesh.

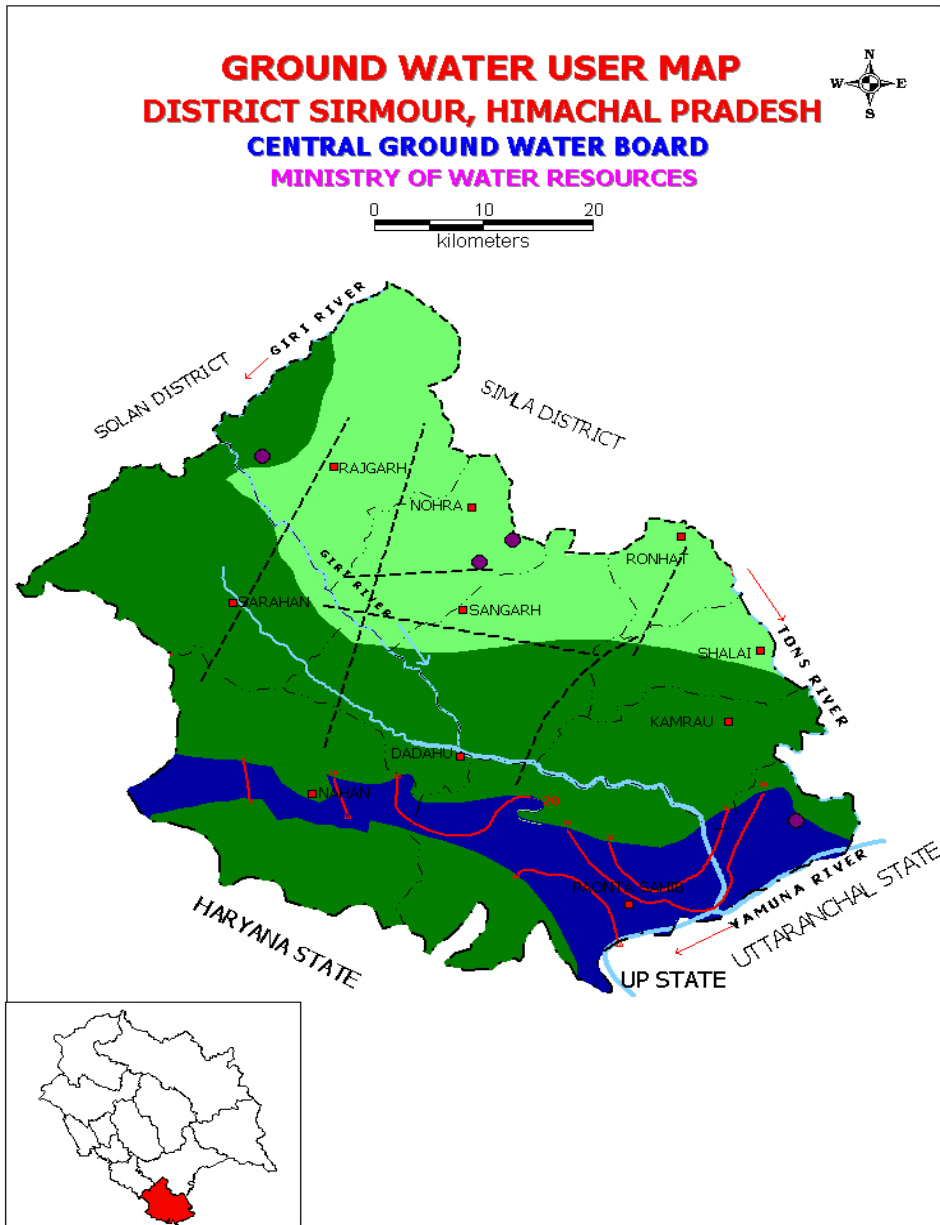
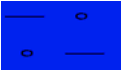









Fig. 4.1 : Ground Water User Map of Sirmour District

GROUND WATER USER MAP LEGEND

DISTRICT SIRMAUR

	Wells feasible	Rigs suitable	Depth of Well (m)	Discharge (lpm)	Suitable artificial Recharge structures
 Soft rock aquifers	Tube well	Percussion & Percussion cum Rotary Manual	100-150	1200-2500	Check dam, Check dam cum ground water dam, Recharge shaft
	Dug well		10-20	300-500	
 Hard rock aquifers	Dug well	Manual	10-20	300-500	
	Bore well	DTH with Odex	100-200	1000-2000	
	Spring development			30-2000	
<ul style="list-style-type: none"> • Spring 			 Fault/Lineament		
 Major drainage			 Tehsil boundary		
 Water level contour (Pre monsoon decadal mean, 1993-2002)			 District boundary		
			 State boundary		

OTHER INFORMATION

Ground Water quality	Good, EC <750 mhos/cm at 25 ⁰ C
Utilizable ground water resources	42.96 mcm (Paonta valley)
Stage of ground water development	19.55 % (Paonta valley)
Water shed/tehsil showing intensive ground water development	Nil

The Yamuna-The river originates from the Yamnotri Glacier in the Himalayas lying in Uttarkashi district of Uttrakhand it flows along the south eastern boundary of the district at village Khodar Majri and travelling a distance of about 22 kms it leaves the district at village Kaunch before entering again into the state of Uttrakhand. Since this river flows at a lower level than the plateau of the Kiar-da-dun, its water cannot be used for irrigating the area. The notable tributaries of the river in the district are the Tonnes meeting it at Khodar Majri, the Giri joining it near Rampur Ghat and the Bata mingling its water with it at Bata Sirmour.

4.3 Cropping Systems and Cropping Pattern

Maize-wheat, Paddy-Wheat, Maize + pulses-wheat, Maize-toria-wheat, Pulses (Mash) based, oilseed (toria, sarson) based, vegetables (tomato, potato and garden peas), spices (ginger, garlic, chilly, coriander), etc., were the important cropping systems being followed in the district under unirrigated and irrigated conditions (Table 4.5). In most of the cultivated lands, double cropping season was followed. Rabi season crop was mainly dependent upon timely rainfall in November and December months.

Block-wise cropping pattern presented in Table 4.6 reveals that wheat, maize, paddy, and barley were the cereals grown by farmers. Maize and wheat collectively accounted for about 95 % of area under cereals. Paddy is mainly grown in Paonta block while barley is cultivated more in hilly areas. Among pulses, *mash* occupied the first position accounting for about 60% of the area under pulses. Toria in plain areas and mustard (sarson) in hilly areas were the main oilseed crops. Among vegetables tomato, potato and garden peas were the important. Area under vegetables was higher in hilly blocks as they have advantage of producing off-season vegetables, which fetch better returns. Apple, peach, kinnow and mango are the main fruit crops of this district. Rajgarh has taken lead in the fruit production and is known for its peaches and apples. Kinnows grown in Paonta area have special place in the neighbouring markets. This district is known as spice bowl of the state. Ginger and recently garlic are the major spices grown in this district. Sugarcane cultivation was prevalent mainly in Paonta block.

4.4 Input Use and Gaps

The use of seed per unit of land shown in Table 4.7 reveals that in most of crops it was on the higher sides than the requirement as per recommendations in all the blocks. This can be attributed to the lower quality of seed. So farmers have a tendency to sow more seed to obtain proper plant population. However, in paddy, potato and beans it was on the lower side. Lower seed use was mainly due to their higher cost. Chemical fertilizers use, requirement and gaps have been given in Table 4.8. It can be seen from the table that the requirement of fertilizers was on the higher side than its supply to the blocks and district as a whole.

4.5 Yield Gap Analysis

Output gaps were also estimated, the results of which for different crops are shown in Table 4.9. All the crops have lower yield than the progressive farmers of the respective areas. It can be seen from the table that the average yields of cereals was 8 to 12 quintals lower than the yields obtained by the progressive farmers of the same locations. At the district level the gap was to the extent of 75 q/ha in case of tomato and ginger. In other vegetable and spice crops there exists a huge gap.

4.6 Reasons for Gap

The reasons cited for the gaps include use of old and outdated varieties, inadequate inputs use such as fertilizers and plant protection material, lack of technical know-how, inadequate and untimely supply of inputs and spurious pesticides. In case of seeds, use was on the higher side than the recommended levels. It was done deliberately by the farmers to avoid the risk of

germination, the drought effect and partially due to the practice of thinning the crop at the later stage to use it as a fodder.

4.7 Farm Mechanisation

The use of farm machinery despite hilly conditions was quite good. Extent of mechanisation was far better in Paonta block where it is easy to transport machinery due to plain fields. Iron plough was used by more than 50% of the cultivators (Table 4.10). Spray pumps use was common since these are required in field, and fruit crops. Tractor and power tillers were seldom used for ploughing in hilly areas due to smaller holding and difficulty in moving from one field to another. Chaff cutters were used by one sixth of farmers' population in all the villages. Letting animals loose for grazing was very common. Use of metal grain store bins was also popular.

4.8 Ongoing Schemes for Agriculture Development

Table 4.11 shows that water harvesting, soil conservation and land conservation, horticulture technology mission, livestock improvement schemes, and feeds and fodder development through grasslands and at the farmers fields were the important schemes operative in all the blocks of the district. In Paonta Sahib, maximum cultivable area was under irrigation as digging of tube wells is feasible here. Flow irrigation channels from Giri Bata river are other source of irrigation in this block. In other blocks, flow irrigation was supplemented by tank irrigation. The major irrigation projects were handled by the IPH Department and minor irrigation schemes were run by the State Department of Agriculture. The status of existing irrigation schemes and funds required for their repair and maintenance are shown in Tables 4.12 and 4.13. Various research projects being run by both the Agricultural and Horticultural Universities on field crops, fruits, forestry and spices were common for the development of the area.

4.9 Interventions for District and Financial Estimates

The major problems encountered in the cultivation of cereals, pulses and vegetables have been given in Tables 4.14 and 4.15. The required interventions for these crops to tackle their problems are also highlighted in the table.

4.10 Interventions

In order to abridge the gaps between the average yields of crops of the average farmer from the progressive farmers the following interventions are needed.

- To make certain availability of quality inputs like improved seeds, fertilizers, plant protection material by improving and strengthening delivery system
- Improvement of physical, chemical and biological parameters on the basis of soil health cards proposed to be given to all farmers
- To ensure judicious and balanced nutrients application through an optimum mix of chemical, organic and bio-fertilisers.
- Promotion of rain water harvesting for meeting the critical water needs of the cash crops.

- Reduction of drudgery of farmers particularly women through promotion of mechanization conducive to hill farming.
- To ensure quality of inputs by strengthening and improving of quality control infrastructure (seed, pesticides and fertilizer testing laboratories)
- Promotion of protected cultivation along with supporting infrastructure for quality production of high value cash crops
- To take effective steps (creation of monkey sanctuaries, planting of wild fruit species in the forests and sterilization) to check the monkey menace
- Construction of adequate number of CAS (Control Atmosphere Storage) at critical points
- To take measures to check the damage caused by frost and hailing

4.11 Researchable Issues

Crop production

- Characterization and classification of soils of different ecological zones of Sirmour district.
- Delineation of the Acid Soil Regions (ASR)
- Integrated nutrient management technology demonstration on farm fields.
- Issues in solid waste management for organic farming in major cash crops of respective region
- Evaluation of resource conservation technologies (like conservation tillage, deficit water management, pressurized irrigation systems, nutrient-water interaction studies, recycling of waste organic residues, etc.) for irrigated and rain fed areas
- Issues related to increasing water productivity of stored water through crop diversification and soil and water management practices
- Nutrient indexing and improvement of soil health
- Development of practices for organic farming under different cropping systems
- Protected cultivation technology and monitoring soil health in poly houses
- Development of high yielding varieties of various crops having wider adaptability and resistance to various biotic and abiotic stresses, through exploitation of land races, agronomic basis and alien species using conventional as well as non-conventional breeding approaches (common to all districts). The focus will be on the development of improved varieties of various nich based crops e.g.:i) Scented basmati rice (low hills), red rice (mid hills), special purpose corn e.g. baby corn, sweet corn, pop corn in all maize growing districts
- Remunerative pulses like rajmash in high hills; mash in low and mid hills; green soybean and dual purpose linseed in low and mid hills

- Under utilized but highly nutritive crops like rice bean, fababean and adzuki beans in low and mid hills; pseudo cereals like amaranths
- Development of hybrid varieties of maize and rice to raise overall productivity of these two important crops.
- Concerted efforts on ensuring effective selection, conservation, evaluation, documentation and utilization of genetic resources.
- Ensuring wider coverage under improved crop varieties with major emphasis on quality seed production
- Demonstration of effective technologies for eradication of obnoxious weed from crop and non-crop lands.
- Identification of remunerative cropping sequences for various ecological and farming situation in Sirmour.
- Mechanisation of the farm practices for reduction of farmers' drudgery.
- Water harvesting and efficient use of stored water for meeting the critical water needs of the crops.
- Development/identification of hybrids and varieties of potential vegetable crops
- Development of hybrids and production technology for protected cultivation
- Identification of vegetable based promising cropping sequences
- Identification of cereal based promising cropping sequences
- Standardization of agro-technology for organic vegetable production
- Development of leaf curl resistant varieties in tomato
- Evaluation and assessment of white rust resistant varieties in pea
- Development/refinement of production technology in ginger
- Identification/development of potential varieties of under ground vegetables viz., elephant foot yam, turmeric and colocasia especially in monkey menace areas
- Weed management studies in potential vegetables
- Standardization of production technology of hybrids
- Standardization of production technology for rainfed cultivation of potential vegetable crops
- Development of pest forecasting modules for Rice leaf folder.
- Formulation of bio-intensive IPM strategies for the management of *Helicoverpa armigera* (tomato and gram), fruit flies (cucurbits and tomatoes), white grubs (potato, maize, peas, ginger, cabbage etc), cut worms (cereals and vegetables), Leaf miner and pod borer (peas), Hairy caterpillar (mash, til, soybean), termites (cereals and vegetables), stem borer and aphids (maize), plant parasitic nematodes (cereals and vegetables).

- Insect pest and nematode management under protected cultivation situations.
- Management of insecticide resistance in field populations of *Plutella xylostella*, *Leucinodes orbonalis* and *Trialeurodes vaporariorum* (polyhouses).
- Collection and utilization of local strains of entomopathogenic organisms for insect pest management under organic farming situations.
- Identification and utilization of native botanicals for eco-friendly pest management.
- Pesticide residue analysis in vegetables and determination of MRL's for consumer safety.
- Germplasm screening for resistance against major insect pests (cereals, pulses, oilseeds and vegetables).
- Survey and surveillance for identification of new invasion of insect pests.
- Safe management alternatives for the stored grain pests.
- Disease and pest management in honey bees; management of bee colonies for pollination in different crops for higher productivity; management practices for migratory beekeeping for better economic returns; quality analysis of honey from different sources for value addition.
- Survey and surveillance of major diseases in important crops
- Pathogenic and genetic diversity in pathogens associated with rhizome rot of ginger, major crop (rice (blast), wheat (rusts and smuts), rajmash (anthracnose, BCMV, angular leaf spot), bacterial wilt of solanaceous vegetables, linseed rust)
- Development of disease forecasting modules for rice blast, potato blight
- Identification of resistant sources and study of genetics of resistance in all crops
- Marker assisted selection of resistance genes using molecular markers and their use in gene pyramiding for resistance in commercial varieties
- Development of integrated disease management modules suitable for organic and protected agriculture conditions
- Development of detection techniques for pathogens of quarantine importance and certification purposes for important seed and soil borne diseases (Pea root rot and wilt complex, bacterial wilt, bean mosaic, urdbean leaf crinkle, bacterial blight, potato viruses etc.)
- Development of IDM module important diseases of major crops

Socio-economic issues

- Analysing trends and patterns of demand, prices and markets of emerging crops and enterprises in the context of ongoing process of globalisation
- Understanding economic implications of climate change towards cropping systems, cropping patterns and livelihoods of the farmers

- Assessing impact of the ongoing process of commercialisation of agriculture on natural resource base (soil, water and environment) and its implications towards livelihoods of the farmers
- Studies on impact assessment and policy implications of various developmental programmes/schemes
- Study of the labour migration in Sirmour and suggest various measures to check this problem.
- Dynamics of the farming systems in Sirmour district and its impact on the socio-economic conditions of the farmers.

Table 4.1: Block wise Land Utilization Pattern (ha)

Sr No	Particulars	Pachhad	Rajgarh	Nahan	Sangrah	Shillai	Paonta	District
1	Total geographical area	40649	41243	29763	48627	27209	37255	224746
		(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)
2	Forests	8374	15207	3101	13158	6639	1854	48333
		(20.6)	(36.9)	(10.4)	(27.1)	(24.4)	(5.0)	(21.5)
	Productive	5862	9124	1706	5263	2656	1112	25723
		(14.4)	(22.1)	(5.7)	(10.8)	(9.8)	(3.0)	(11.4)
	Degraded	2512	6083	1395	7895	3983	742	22610
		(6.2)	(14.7)	(4.7)	(16.2)	(14.6)	(2.0)	(10.1)
3	Barren and uncultivable land	1605	580	1113	1181	582	3471	8532
		(3.9)	(1.4)	(3.7)	(2.4)	(2.1)	(9.3)	(3.8)
	Rocky	789	285	540	666	302	1810	4392
		(1.9)	(0.7)	(1.8)	(1.4)	(1.1)	(4.9)	(2.0)
	Stony	816	295	573	515	280	1661	4140
		(2.0)	(0.7)	(1.9)	(1.1)	(1.0)	(4.5)	(1.8)
	Slopy	90	100	75	100	100	50	80
4	Land put to non-agricultural uses	566	1229	2326	1328	1057	3959	10465
		(1.4)	(3.0)	(7.8)	(2.7)	(3.9)	(10.6)	(4.7)
	Buildings	200	300	450	300	250	900	2400
		(0.5)	(0.7)	(1.5)	(0.6)	(0.9)	(2.4)	(1.1)
	Roads/paths/channels etc	366	929	1876	1028	807	3059	8065
		(0.9)	(2.3)	(6.3)	(2.1)	(3.0)	(8.2)	(3.6)
5	Culturable waste	4616	3522	1700	2803	840	2259	15740
		(11.4)	(8.5)	(5.7)	(5.8)	(3.1)	(6.1)	(7.0)

	Weed/bush infested	3567	2578	817	1978	456	1289	10685
		(8.8)	(6.3)	(2.7)	(4.1)	(1.7)	(3.5)	(4.8)
	Area prone to animal menace	1000	900	900	825	400	1000	5025
		(2.5)	(2.2)	(3.0)	(1.7)	(1.5)	(2.7)	(2.2)
6	Permanent pastures and other grazing lands	8924	8186	10580	14365	8357	3893	54305
		(22.0)	(19.8)	(35.5)	(29.5)	(30.7)	(10.4)	(24.2)
	Productive	3570	3274	4232	5746	3343	1557	21722
		(8.8)	(7.9)	(14.2)	(11.8)	(12.3)	(4.2)	(9.7)
	Degraded	5354	4912	6348	8619	5014	2336	32583
		(13.2)	(11.9)	(21.3)	(17.7)	(18.4)	(6.3)	(14.5)
7	Land under miscellaneous tree crops and groves	10264	6555	4094	8680	4526	3178	37297
		(25.3)	(15.9)	(13.8)	(17.9)	(16.6)	(8.5)	(16.6)
8	Fallow land	1512	923	831	1572	689	1344	6871
		(3.7)	(2.2)	(2.8)	(3.2)	(2.5)	(3.6)	(3.1)
	Current fallow	717	595	571	1245	427	1015	4570
		(1.8)	(1.4)	(1.9)	(2.6)	(1.6)	(2.7)	(2.0)
	Other fallow	795	328	260	327	262	329	2301
		(2.0)	(0.8)	(0.9)	(0.7)	(1.0)	(0.9)	(1.0)
9	Cultivated land	4788	5041	6018	5540	4519	14597	40503
		(11.8)	(12.2)	(20.2)	(11.4)	(16.6)	(39.2)	(18.0)

Note: Figures in parentheses are percentages of total

Source: Field Survey, 2007-08

Table 4.2 Problems and Interventions for Land Development (Per Cent of Panchayats)

Problems	Pachhad	Rajgarh	Nahan	Sangrah	Shillai	Paonta	Interventions
Water scarcity	100	100	100	100	100	80	Irrigation
							Rainwater harvesting
							Moisture conservation
							moisture conservation
Soil erosion	89	90	76	95	90	85	Soil conservation tech
							Terracing
Declining tree cover	100	100	100	100	100	100	Plantations
							Agro-forestry practices
							people participation
Weed infestation	74	56	67	70	66	72	Weed removal
							Plantation
Rocky sloppy	45	61	34	65	65	25	Agro-forestry practices
							Terracing
Degraded pasture land	39	35	48	55	60	38	Eradicate of weeds
							Improvement of grazing land

Source: Field Survey, 2007-08

Table 4.3 Improvement Needed to Increase the Productivity of Land (Ha)

Particulars	Pachhad	Rajgarh	Nahan	Sangrah	Shillai	Paonta	District
Land leveling	1614	2077	2524	1157	530	7168	15071
Contour bunding and terracing	1346	644	896	776	228	1787	5677
Fencing (length in m)	1155	1316	1575	1208	1143	1508	7905
Check dam (Length in m)	321	536	102	413	332	122	1826

Source: Field Survey, 2007-08

Table 4.4 Financial Estimates for Land Development (Lakh Rs)

Sr No	Particulars	Pachhad	Rajgarh	Nahan	Sangrah	Shillai	Paonta	District
1	Agricultural land improvement	299.7	310.0	357.7	210.3	94.6	947.0	2219.4
	i.) Land levelling	181.3	233.2	283.4	129.9	59.5	805.0	1692.5
	ii.) Contour bunding and terracing	101.0	48.3	67.2	58.2	17.1	134.0	425.8
	iii.) Fencing	1.4	1.6	2.0	1.5	1.4	1.9	9.9
	iv.) River embankment/ check dams	16.1	26.8	5.1	20.7	16.6	6.1	91.3
2	Improvement of support lands and private grasslands	75.0	75.0	75.0	75.0	75.0	75.0	75.0
3	Tackling monkey menace and problems of wild/stray animals	50.0	50.0	50.0	50.0	50.0	50.0	50.0
	Total (1+2+3)	424.7	435.0	482.7	335.3	219.6	1072.0	2344.4

Source: Field Survey, 2007-08

Table 4.5 Major Cropping Systems

Cropping sequences	Pachhad	Rajgarh	Nahan	Sangrah	Shillai	Paonta
Rainfed						
Maize-wheat	√	√	√	√	√	√
Maize+pulses-wheat	√	√		√	√	
Maize-barley		√		√		√
Maize-pea	√	√		√	√	
Maize-potato	√	√	√	√	√	
Potato-fallow-wheat (biennial)				√		
Maize-toria-wheat			√		√	√
Paddy-wheat	√		√			√
Pulses based	√	√	√	√	√	√
Oilseed based	√	√	√	√	√	√
Vegetable based	√		√		√	
Sugarcane based						√
Spices based	√	√	√	√	√	√
Irrigated						
Maize-wheat	√	√	√	√	√	√
Maize+pulses-wheat	√	√			√	
Maize-barley	√	√		√		√
Maize-pea	√	√		√	√	√
Maize-potato	√	√		√	√	√
Potato-fallow-wheat (biennial)	√	√				
Maize-toria-wheat	√			√		√
Paddy-wheat	√		√	√		√
Paddy-barley	√					
Pulses based	√					√
Oilseed based	√	√	√	√	√	√
Vegetable based	√	√	√	√	√	√
Sugarcane based						√
Spices based	√	√	√	√	√	√

Source: Field Survey, 2007-08

Table 4.6 Cropping Pattern (Ha)

Crops	Pachhad	Rajgarh	Nahan	Sangrah	Shillai	Paonta	District
Cereal							
Maize	1600	1990	8664	5071	2375	17502	37201
Paddy	188		1766			2920	4874
Wheat	1448	1239	10244	4480	1407	16703	35521
Barley		94		600	175	423	1292
Pulses							
Mash	156	218	136	215	130	230	1085
Rajmash				131	129		260
Others	56	38	64	164	77	52	293
Oilseeds							
Toria			123	246		460	829
Sarson	120	105		103	23	235	586
Others	19	25	32	19	16	26	137
Vegetables							
Potato		381	68	347	320	22	1138
Peas	138	374		245	143	178	1078
Tomato	289	455	158	248	228	143	1521
Cauliflower					46		46
Beans	62	118			217		397
Capsicum	32	156			28	26	242
Fruit plants							
Apple	0	750	0	264	450	0	1463
Citrus	36	30	50	20	24	112	272
Mango	0	0	196	0	0	252	448
Stone fruits	256	847	72	252	228	98	1753
Strawberry						135	135
Spices							
Ginger	295	110	172	321	441	237	1576
Garlic	360	468	58	252	150	68	1356
Onion				369		222	591
Sugarcane						1750	1750

Source: Field Survey, 2007-08

Table 4.7 Seed Use, Requirement and Gap (kg/ha)

Crops	Required	Pachhad		Rajgarh		Nahan		Sangrah		Shillai		Paonta		District	
		Used	Gap	Used	Gap	Used	Gap	Used	Gap	Used	Gap	Used	Gap	Used	Gap
Cereals															
Maize	20 kg	34.47	14.47	60.40	40.40	25.35	5.35	27.43	7.43	46.07	26.07	30.75	10.75	37.41	17.41
Paddy	30 kg	28.29	-1.71			21.22	-8.78					19.84	-10.16	11.56	-3.44
Wheat	100 kg	117.56	17.56	143.92	43.92	90.51	-9.49	113.44	13.44	150.00	50.00	169.60	69.60	130.84	30.84
Barley	100 kg			137.50	37.50			56.96	-43.04	160.68	60.68	210.00	110.00	94.19	27.52
Pulses														0.00	0.00
Mash	20 kg	24.13	4.13	23.17	3.17	24.00	4.00	22.78	2.78	33.63	13.63	25.00	5.00	25.45	5.45
Rajmash	100 kg							156.90	56.90	171.90	71.90			54.80	21.47
Oilseeds														0.00	0.00
Toria	15 kg					16.95	1.95	18.00	3.00			17.00	2.00	8.66	1.16
Sarson	6 kg	7.00	1.00	8.15	2.15	9.00	3.00	8.36	2.36	8.88	2.88	8.45	2.45	8.31	2.31
Vegetables														0.00	0.00
Potato	25 qt			20.60	-4.40	31.25	6.25	26.29	1.29	23.29	-1.71	23.33	-1.67	20.79	-0.04
Peas	130 kg	165.00	35.00	158.48	28.48			227.44	97.44	208.71	78.71	125.00	-5.00	147.44	39.11
Tomato	0.15 kg	0.14	-0.01	0.16	0.01	0.13	-0.02	0.10	-0.05	0.25	0.10	0.13	-0.02	0.15	0.00
Cauliflower	0.75 kg									0.31	-0.44			0.05	-0.07
Beans	30 kg	16.00	-14.00	19.90	-10.10					16.75	-13.25			8.78	-6.23
Capsicum	0.25 kg	0.21	-0.04	0.22	-0.03					0.31	0.06	0.25	0.00	0.17	0.00
Ginger	20 qt	19.05	-0.95	25.00	5.00	30.68	10.68	21.93	1.93	25.00	5.00	31.82	11.82	25.58	5.58
Garlic	6 qt	7.50	1.50	11.57	5.57	9.00	3.00	7.80	1.80	13.90	7.90	6.25	0.25	9.34	3.34

U= Use, R= Requirement, G= Gap

Source: Field Survey, 2007-08

Table 4.8 Fertilizers Use, Requirement and Gaps, 2007-08 (Tonnes)

Fertilizer	Pachhad			Rajgarh			Nahan			Sangrah			Shillai			Paonta			District		
	R	U	G	R	U	G	R	U	G	R	U	G	R	U	G	R	U	G	R	U	G
Urea	491	391	100	698	371	327	944	569	375	633	365	268	835	337	498	1579	889	690	5180	2922	2258
IFFCO	285	140	145	391	159	232	582	212	370	442	172	270	365	183	182	824	351	473	2890	1217	1673
MOP	181	4	177	190	4	186	266	8	258	181	5	176	189	4	185	373	17	356	1379	42	1337
SSP	171	3	168	163	3	160	214	4	210	165	3	162	172	4	168	311	10	301	1196	27	1169
FYM	54	23	31	81	16	65	219	43	176	139	31	108	72	34	38	419	67	352	984	214	770

On the basis of actual use and requirement of Panchayats

U: use; R: requirement, G (R-U) gap in physical values

Source: Field Survey, 2007-08

Table 4.9 Yield Gaps in Important Crops (q/ha)

Crops	Pachhad		Raigarh		Nahan		Sangraha		Shillai		Paonta		District								
	A	P	A	P	A	P	A	P	A	P	A	P	A	P							
Cereal																					
Maize	21.0	37.5	-16.5	29.1	35.0	-5.9	19.7	35.0	-15.3	20.8	32.0	-11.2	24.1	35.0	-10.9	25.9	37.5	-11.6	23.4	35.3	-11.9
Paddy	9.1	18.8	-9.7			0.0	16.5	35.0	-18.5			0.0	37.1	60.0	-23.0	10.4	19.0	-8.5			
Wheat	9.5	25.0	-15.5	31.7	37.5	-5.8	19.8	31.3	-11.4	17.8	30.0	-12.2	17.7	31.3	-13.6	26.2	43.8	-17.6	20.4	33.1	-12.7
Berley				17.5	26.0	-8.5				13.1	32.0	-18.9	17.0	31.3	-14.3	13.8	22.0	-8.3	10.2	18.5	-8.3
Pulses																					
Mash	7.2	10.0	-2.8	7.9	10.0	-2.1	10.3	11.0	-0.8	8.2	9.0	-0.8	5.3	9.0	-3.7	8.5	12.5	-4.0	7.9	10.3	-2.4
Rajmash					6.9	-6.9				6.0	8.0	-2.0	5.0	11.3	-6.2				1.8	4.4	-2.5
Oilseeds																					
Toria							7.7	11.0	-3.4	10.0	12.0	-2.0			0.0	8.8	12.5	-3.8	4.4	5.9	-1.5
Sarson	6.3	10.0	-3.8	5.5	10.0	-4.6				7.2	10.0	-2.8	6.9	10.0	-3.2	7.5	12.0	-4.5	5.5	8.7	-3.1
Vegetables																					
Potato				160.3	250.0	-89.7	125.0	187.5	-62.5	142.2	190.0	-47.8	113.3	187.5	-74.2	45.8	100.0	-54.2	97.8	152.5	-54.7
Peas				42.4	68.8	-26.3			38.9	65.0	-26.1	69.3	100.0	-30.7	18.8	31.3	-12.5	28.2	44.2	44.2	-15.9
Tomato	290.2	375.0	-84.8	308.0	375.0	-67.0	275.0	350.0	-75.0	164.8	250.0	-85.2	177.2	250.0	-72.8	187.5	250.0	-62.5	233.8	308.3	-74.5
Cauliflower													187.5	231.3	-43.8				31.3	38.5	-7.3
Beans	88.0	120.0	-32.0	85.1	125.0	-39.9							58.6	81.3	-22.6				38.6	54.4	-15.8
Capsicum	88.3	110.0	-21.7	94.1	120.0	-25.9							68.8	100.0	-31.3	55.0	90.0	-35.0	51.0	70.0	-19.0
Fruits																					
Apple				45.6	60.0	-14.4				32.6	60.0	-27.4	30.3	60.0	-29.7				18.1	30.0	-11.9
Citrus	23.2	40.0	-16.8	27.6	40.0	-12.4	30.2	40.0	-9.8	28.1	40.0	-11.9	26.9	40.0	-13.1	31.6	40.0	-8.4	27.9	40.0	-12.1
Mango						0.0	38.0	50.0	-12.0			0.0			0.0	37.0	50.0	-13.0	12.5	16.7	-4.2
Stone fruits	21.2	40.0	-18.8	27.6	40.0	-12.4	30.2	40.0	-9.8	28.1	40.0	-11.9	26.9	40.0	-13.1	31.6	40.0	-8.4	27.6	40.0	-12.4
Strawberry																7.2	12.0	-4.8	1.2	2.0	-0.8
Spices																					
Ginger	82.7	175.0	-92.3	96.7	175.0	-78.3	122.7	175.0	-52.3	135.1	200.0	-64.9	127.0	200.0	-73.0	95.5	175.0	-79.6	110.0	183.3	-73.4
Garlic	62.5	100.0	-37.5	96.4	150.0	-53.6	75.0	112.5	-37.5	74.9	150.0	-75.1	112.4	150.0	-37.6	25.0	43.8	-18.8	74.4	117.7	-43.3
Onion										150.0	175.0	-25.0				153.6	200.0	-46.4	50.6	62.5	-11.9
Sugarcane																625.0	950.0	-325	104.2	158.3	-54.2

A= Actual, P= Progressive farmers' yield and G= Gap

Source: Field Survey, 2007-08

Table 4.10 Farm Machinery Use and Gap

Machinery	Pachhad				Rajgarh				Nahan			
	Number				Number				Number			
	% users	E	R	G	% users	E	R	G	% users	E	R	G
Maize sheller	12.81	260	400	140	11.6	185	400	215.5	46.63	374	500	126
Thresher	86.02	360	500	140	29.33	153	500	347	85.52	400	700	300.5
Iron plough	76.96	4050	8250	4200	90.57	3510	4280	770	90	5345	7750	2405
Spray pump	78.27	5900	7500	1600	16.43	5400	8000	2600	30.46	3683	5000	1316.67
Chaff cutter	2.05	150	3000	2850	4.82	78	2495	2417	48.24	6902	7027	124.67
Power tiller	0		50	50	0.36	18	50	32	1.04	34	100	66

Source: Field Survey, 2007-08

Table 4.10 continued

Machinery	Sangrah				Shillai				Paonta				District			
	Number				Number				Number				Number			
	% users	E	R	G	% users	E	R	G	% users	E	R	G	% users	E	R	G
Maize sheller	12.12	223	300	77	10.59	189	300	111	40.55	650	700	50	16.93	1881	2600	719.5
Thresher	17.16	164	400	236	2.85	222	400	177.67	65.79	986	1200	214.17	47.78	2285	3700	1415.34
Iron plough	14.28	4783	5638	854.17	69.36	4350	6941	2590.67	59.84	15093	17063	1969.5	55.27	37131	49921	12789.3
Spray pump	28.47	4559	6000	1440.8	44.71	2127	7924	5797.58	49.64	3757	18525	14768	41.33	25426	52949	27523.1
Chaff cutter	0	369	1164	795.4	0.43	58	1112	1053.67	45.72	10118	20583	10465	16.88	17675	35381	17705.7
Power tiller	0	0	82	82	0	0	50	50	1.94	195	300	105	0.56	247	632	385

Source: Field Survey, 2007-08

Table 4.11 Existing Block Level Schemes for Agriculture Development

Block	No. of Schemes	Village covered	Population covered	Area covered	Beneficiary families (No)	Status	
						Complete (No)	Incomplete (No)
Water Harvesting							
Pachhad	2	3	66	11	16		2
Rajgarh	2	2	55	8	14		2
Nahan	2	4	90	10	24		2
Sangrah	2	3	75	12	18		2
Shillai	2	6	121	15	30		2
Paonta	2	2	49	9	12		2
Total	2	20	456	65	114		2
Soil/ Land Conservation							
Pachhad	1	36	145	670	158		1
Rajgarh	1	3	19	67	19		1
Nahan	1	45	236	1116	1000		1
Sangrah	1	20	35	210	112		1
Shillai	1	27	67	345	1690		1
Paonta	1	12	78	468	312		1
Total	1	143	580	2876	3291		1
Other Agricultural Schemes							
Pachhad	8	263	13000	2200	2600	1	7
Rajgarh	8	140	11000	2500	2200	1	7
Nahan	8	136	14000	3000	2800	1	7
Sangrah	8	121	20000	2500	4000	1	7
Shillai	8	190	17000	2200	3400	1	7
Paonta	8	454	17000	9000	3400	1	7
Total	8	1304	92000	21400	18400	1	7

Source: Field Survey, 2007-08

Table 4.12 Status of Completed Irrigation Schemes

Particulars	Pachhad	Rajgarh	Nahan	Sangrah	Shillai	Paonta	District
Lift irrigation							
Number	1	6	24	2	3	17	53
Amount spent (Rs. Lakh)	30	113	650	12	8	131	944
Villages covered	1	6	24	2	3	17	53
Beneficiaries (No.)	65	500	1725	20	150	2250	4710
Command area (ha)	50	318	1101	71	139	1834	3514
Actual irrigated area (ha)	50	246	941	53	139	1834	3263
Tube wells							
Number	0	0	3	0	0	15	18
Amount spent (Rs. Lakh)	0	0	75	0	0	177	252
Villages covered	0	0	3	0	0	15	18
Beneficiaries (No.)	0	0	235	0	0	750	985
Command area (ha)	0	0	181	0	0	682	863
Actual irrigated area (ha)	0	0	163	0	0	682	845
Kuhl							
Number	3	13	29	23	35	3	106
Amount spent (Rs. Lakh)	15	87	22	50	143	823	1140
Villages covered	7	13	29	23	35	65	172
Beneficiaries (No.)	400	373	1015	368	265	6250	8671
Command area (ha)	100	609	387	650	671	6270	8687
Actual irrigated area (ha)	90	550	349	349	671	5343	7351
Tank irrigation							
Number	456	0	0	0	40	0	496
Amount spent (Rs. Lakh)	160	0	0	0	25	0	185
Villages covered	100	0	0	0	10	0	110
Beneficiaries (No.)	972	0	0	0	40	0	1012
Command area (ha)	70	0	0	0	18	0	88
Actual irrigated area (ha)	100	0	0	0	20	0	120

Source: Field Survey, 2007-08

Table 4.13 Status of Functional Irrigation Schemes

Particulars	Pachhad	Rajgarh	Nahan	Sangrah	Shillai	Paonta	District
Lift irrigation							
Number	1	6	24	2	3	17	53
Amount spent (Rs. Lakh)	30	113	650	12	8	131	944
Villages covered	1	6	24	2	3	17	53
Beneficiaries (No.)	65	500	1725	20	150	2250	4710
Command area (ha)	50	318	1101	71	139	1834	3514
Actual irrigated area (ha)	50	246	941	53	139	1834	3263
Tube wells							
Number	0	0	3	0	0	13	16
Amount spent (Rs. Lakh)	0	0	75	0	0	154	229
Villages covered	0	0	3	0	0	13	16
Beneficiaries (No.)	0	0	235	0	0	650	885
Command area (ha)	0	0	181	0	0	592	773
Actual irrigated area (ha)	0	0	163	0	0	592	755
Kuhl							
Number	3	13	29	21	35	3	104
Amount spent (Rs. Lakh)	15	87	22	34	143	823	1123
Villages covered	7	13	29	21	35	65	170
Beneficiaries (No.)	400	373	1015	264	265	6250	8567
Command area (ha)	100	609	387	607	671	6270	8644
Actual irrigated area (ha)	90	550	349	349	671	5343	7351
Tank irrigation							
Number	456	0	0	0	30	0	486
Amount spent (Rs. Lakh)	160	0	0	0	20	0	180
Villages covered	100	0	0	0	6	0	106
Beneficiaries (No.)	972	0	0	0	30	0	1002
Command area (ha)	70	0	0	0	10	0	80
Actual irrigated area (ha)	100	0	0	0	12	0	112

Source: Field Survey, 2007-08

Table 4.14 Status of Non-Functional Irrigation Schemes

Particulars	Pachhad	Rajgarh	Nahan	Sangrah	Shillai	Paonta	District
Lift irrigation							
Number	0	0	0	0	0	0	0
Amount spent (Rs. Lakh)	0	0	0	0	0	0	0
Villages covered	0	0	0	0	0	0	0
Beneficiaries (No.)	0	0	0	0	0	0	0
Command area (ha)	0	0	0	0	0	0	0
Actual irrigated area (ha)	0	0	0	0	0	0	0
Tube well							
Number	0	0	0	0	0	2	2
Amount spent (Rs. Lakh)	0	0	0	0	0	23	23
Villages covered	0	0	0	0	0	2	2
Beneficiaries (No.)	0	0	0	0	0	100	100
Command area (ha)	0	0	0	0	0	90	90
Actual irrigated area (ha)	0	0	0	0	0	90	90
Kuhl							
Number	0	0	0	2	0	0	2
Amount spent (Rs. Lakh)	0	0	0	16.42	0	0	16.42
Villages covered	0	0	0	2	0	0	2
Beneficiaries (No.)	0	0	0	104	0	0	104
Command area (ha)	0	0	0	43	0	0	43
Actual irrigated area (ha)	0	0	0	0	0	0	0
Tank irrigation							
Number	0	0	0	0	10	0	10
Amount spent (Rs. Lakh)	0	0	0	0	5	0	5
Villages covered	0	0	0	0	4	0	4
Beneficiaries (No.)	0	0	0	0	10	0	10
Command area (ha)	0	0	0	0	8	0	8
Actual irrigated area (ha)	0	0	0	0	8	0	8

Source: Field Survey, 2007-08

Table 4.15 Irrigation Schemes: Funds for Repair and Maintenance

Schemes	Pachhad	Rajgarh	Nahan	Sangrah	Shillai	Paonta	District
Functional							
Lift irrigation							
Number	1	6	27	2	3	17	56
Annual maintenance	5	12	62	4	10	55	148
Replacement/overhauling in 10 yrs	90	120	945	40	25	393	1613
Tube well							
Number	0	0	3	0	0	13	16
Annual maintenance	0	0	15	0	0	70	85
Replacement/overhauling in 10 yrs	0	0	225	0	0	462	687
Kuhl							
Number	3	13	29	21	35	3	104
Annual maintenance	1	3	10	12	7	1	34
Replacement/overhauling in 10 yrs	44	262	131	101	429	2469	3436
Tank irrigation							
Number	456	0	0	0	30	0	486
Annual maintenance	0	0	0	0	20	0	20
Replacement/overhauling in 10 yrs	0	0	0	0	100	0	100
Total funds requirement							6123
Non-functional							
Lift irrigation							
Number	0	0	0	2	0	0	2
Annual maintenance	0	0	0	4	0	0	4
Replacement/overhauling in 10 yrs	0	0	0	0	0	0	0
Tube well							
Number	0	0	0	0	0	2	2
Annual maintenance	0	0	0	0	0	1	1
Replacement/overhauling in 10 yrs	0	0	0	0	0	25	25
Kuhl							
Number	0	0	0	0	0	0	0
Annual maintenance	0	0	0	0	0	0	0
Replacement/overhauling in 10 yrs	0	0	0	0	0	0	0
Tank irrigation							
Number	0	0	0	0	10	0	10
Annual maintenance	0	0	0	0	5	0	5
Replacement/overhauling in 10 yrs	0	0	0	0	5	0	5

Source: Field Survey, 2007-08

Table 4.16 Varietal and Technological Problems & Interventions for Cereals and Pulses (Per Cent of Panchayats)

Cereal	Problems	Pachhad	Rajgarh	Nahan	Sangrah	Shillai	Paonta	Interventions
Maize	Use of local variety	50	50	25	80	75	29	Development of new improved varieties and Timely availability of its seed
	Damage by wild animals (Monkeys and wild boars)	100	100	100	100	100	100	Tackling of monkey/wild animal menace
	Inadequate & Imbalanced use of fertilizer	100	100	75	100	100	57	Judicious use of fertilizer
	Diseases & Insect pest attack (ESR, leaf & sheath blight, stem borer, white grub, termites, cut worms, maize aphid)	100	100	100	100	100	100	Demonstration on effective plant protection technology
Paddy	Weeds(<i>Digitaria sanguinalis</i> , <i>Echinochloa colona</i> , <i>Ageratum conyzoides</i> , <i>Commelina benghalensis</i> , <i>Cyperus iria</i>)	100	100	100	100	100	100	Training and demonstration on weed control
	Lower productivity	75		50			29	High yielding & disease resistant variety
	Lack of assured irrigation	50		25			29	Creation of irrigation facility
	Insect- pest attack (brown spot, grain discolouration, false smut, stem borers, leaf folder, plant hoppers, nematodes)	100		100			100	Demonstration on effective plant protection technology
	Weeds (<i>Cyperus iria</i> , <i>Echinochloa crus-galli</i> , <i>Fimbristylis sp.</i> , <i>Eriocaulon sp.</i> , <i>Commelina forskalii</i>)	100		100			100	Training and demonstration on weed control

	Inadequate & Imbalanced use of fertilizer	75			50				29	Judicious use of fertiliser
Wheat	Rainfed areas	75	75	100	50	100	100	100	29	Drought resistant varieties and Harnessing of irrigation potential
	Old varieties	50	50	80	50	75			29	Improved seed
	Inadequate & Imbalanced use of fertilizer	100	100	100	75	100	100	100	57	Judicious use of fertiliser
	Diseases and pest problems (karnal bunt, rust, loose smut, termites, aphids, grass hoppers)	100	100	100	100	100	100	100	100	Demonstration on effective plant protection technology
	Weeds (<i>Anagallis arvensis</i> , <i>Stellaria media</i> , <i>Phalaris minor</i> , <i>Medicago denticulate</i> <i>Avena leudoviciana</i>)	100	100	100	100	100	100	100	100	Training and demonstration on weed control
Barley	Local varieties		100			100	100	100	100	High yielding variety
	Insect- pest attack (stem borers, leaf folder, plant hoppers, nematodes)		100			100	100	100	100	Demonstration on effective plant protection technology
	Inadequate & Imbalanced use of fertilizer		100			100	100	100	100	Judicious use of fertiliser
Pulses	Local varieties & Unavailability of quality seed	75	75	100	50	100	100	100	57	Improved and resistant variety and its assured availability
	Inadequate & Imbalanced use of fertilizer	100	100	100	100	100	100	100	100	
	Damage by insects and diseases (pod borers, hairy caterpillars, cut worms, blister beetle, bean bug, white grub, leaf spots)	100	100	100	100	100	100	100	100	Demonstration on effective plant protection technology

	Weeds (<i>Medicago denticulate</i> , <i>Chenopodium album</i> , <i>Sorghum halepense</i> <i>Anagallis arvensis</i> , <i>Fumaria parviflora</i>)	100	100	100	100	100	100	100	100	100	Training and demonstration on weed control
Oilseeds	Unavailability of quality seed and local varieties	60	60	40	80	75	29	Timely availability of Improved variety seed			
	Inadequate & Imbalanced use of fertilizer	100	100	80	100	100	57	Judicious use of fertiliser			
	Damage by insects and diseases (altermaria blight, white rust downy mildew, hairy catter piller, aphid complex, pod borer, cabbage catterpillar, painted bug	100	100	100	100	100	100	Demonstration on effective plant protection technology			
	Weeds (<i>Ranunculus arvensis</i> , <i>Phalaris minor</i> , <i>Polygogon monspensis</i> , <i>Melilotus lba</i> , <i>Anagallis arvensis</i> , <i>Digitaria sanguinalis</i> , <i>Dactyloctenium aegyptium</i> <i>Setaria glauca</i> , <i>Cyperus rotundus</i> , <i>Echinochloa colona</i> .)	100	100	100	100	100	100	Training and demonstration on weed control			

Source: Field Survey, 2007-08

Table 4.17 Varietal and Technological Problems and Interventions for Vegetables (Per Cent of Panchayats)

Vegetables	Problems	Pachhad	Rajgarh	Nahan	Sangrah	Shillai	Paonta	Interventions
Potato	Inadequate & Imbalanced use of fertilizer	50	50	50	40	50	50	Judicious use of fertiliser
	Disease and insects attack (late blight, bacterial blight, Tuber moth, white grubs, ut worm, wire worm)	100	100	100	100	100	100	Demonstration on effective plant protection technology
Peas	Inadequate & Imbalanced use of fertilizer	25	25	50	20	25	30	Judicious use of fertiliser
	Damage by diseases and insect pests (root rot/wilt complex, white rot, leaf minor, pod borer complex, blister beetle, bean bug, white grubs)	100	100		100	100	100	Demonstration on effective plant protection technology
	Partial use of recommended agro-techniques	50	50		40	50	50	Training and demonstration on full package of practices
Tomato	Lack of assured irrigation	50	50	25	40	75	40	Rain water harvesting
	Inadequate & Imbalanced use of fertilizer	25	25	50	20	50	50	Judicious use of fertiliser
	Poor quality inputs (seed and pesticides)	50	50	50	40	50	50	Easy availability of quality inputs
	Disease and insects attack (bacterial wilt, fruit rot, fruit borer, cut worm, hadda beetle, white fly)	100	100	100	100	100	100	Demonstration on effective plant protection technology
Cauliflower	Poor nursery raising					25	50	Demonstration on quality nursery raising techniques
	Poor quality manure					50		Use of well rotten FYM and vermicompost
	Inadequate & Imbalanced use of fertilizer					50		Judicious use of fertiliser

	Poor water management								25		Proper drainage of water
	Diseases & insect pest attack (caterpillar complex, aphid complex, cut worms, white grubs, black rot, stalk rot)								100		Demonstration on effective plant protection technology
Beans	Improper seed rate & spacing	50		50					50		Use of proper seed rate and spacing
	Poor quality manure	75		50					50		Use of well rotten FYM and vermicompost
	Inadequate & Imbalanced use of fertilizer	50		50					25		Judicious use of fertiliser
	Poor weed management	100		100					100		Demonstration on weed management
	Poor water management	50		50					50		Demonstration on water management
	Disease & insect pest attack	100		100					100		Demonstration on effective plant protection technology
Capsicum	Lack of assured irrigation	50		50					35	25	Creation of irrigation facilities
	Disease and insects attack (fruit borer, cut worm, hadda beetle, white fly)	100		100					100	100	Demonstration on effective plant protection technology
	Inadequate & Imbalanced use of fertilizer	50		50					50	50	Judicious use of fertiliser
	Poor weed management	100		100					100	100	Demonstration on weed management
Ginger	Infected seed	100		100			100	100	100	100	Supply of health seed
	Improper seed selection	70		75			50	40	75	60	Demonstration on seed selection
	Partial adoption of technologies	100		100			100	100	100	100	Demonstration on full package of practices

	Inadequate & Imbalanced use of fertilizer	100	100	100	100	100	100	100	Judicious use of fertiliser
	Diseases & insect pest attack (rhizome fly, white grubs, aphids)	100	100	100	100	100	100	100	Demonstration on effective plant protection technology
	Unavailability of improved Variety of seed	100	100	100	100	100	100	100	Development of new improved varieties
Garlic	Unscientific seed selection	75	75	50	40	75	50	50	Demonstration on seed selection
	Limited irrigation	50	50	50	60	70	35	35	Creation of irrigation facilities
	Inadequate & Imbalanced use of fertilizer	50	50	60	80	75	60	60	Judicious use of fertiliser
	Diseases & insect pest attack (rhizome fly, white grubs, aphids)	100	100	100	100	100	100	100	Demonstration on effective plant protection technology

Source: Field Survey, 2007-08

Chapter V

ALLIED AGRICULTURAL SECTORS

5.1 Horticulture

Sirmour district is known for its Rajgarh Peaches and Dhaulakuan Kinnows. Besides this, apple, mango, litchi and walnut are other important fruits being grown in this district. Strawberry is another crop in which this district has emerged as leader. The area under fruits and their production are increasing and various horticultural development projects launched from time to time in this district have proved to be beneficial to generate more farm income and employment from horticulture. Potential of horticulture has not been realised and there is lot of scope to increase acreage under various horticulture crops. The area under apples in Sirmour was 1,463 hectares producing 5,642 tonnes apples. Majority of the area and production was realised in Rajgarh and Shillai blocks. Through the implementation of agriculture plan under RKVY, nearly 2,500 ha additional area could be brought under apple plantation and the production at the existing productivity level may be around 14,645 tonnes. The information on existing schemes of horticulture for rural development is given in Table 5.1 However, the existing production and potential estimates for other fruit and temperate fruit are shown in Table 5.2

5.2 Animal Husbandry

Animal husbandry is most important component of farming systems in Sirmour. The information on existing schemes of livestock and fisheries for rural development is given in Table 5.3. The livestock wealth of Sirmour consists mainly of local and cross bred cattle, buffalo, sheep and goats numbering 1,15,113 (32.63%), 32,447 (9.20%), 48,672 (13.80%), 17,758 (5.03%) and 1,38,826 (39.35%) respectively (Table 5.4), which are reared for milk, wool, and meat purposes. Various schemes introduced for the improvement of livestock in the area have resulted in substantial improvement in the socio-economic status of the people. A total of 160 veterinary institutions are providing health care services to the people of the district. Each institute was serving 3,003 heads of animals.

5.3 Fisheries

Common carp, Rohu and Calta are important species of fish in this district. The status and potential of cultured fishery is presented in Table 5.5. Total ponds in this district are 134 and 105 households engaged in fisheries are producing about 68 quintal of fish.

5.4 Poultry

Poultry has not attained major importance in economy of Sirmour as it faces stiff competition with the poultries of neighbouring states. Very few households had reared poultry birds for their own consumption. Commercial poultry was not at all found in the area. The district has Govt. Central Poultry Farm situated at Nahan. This poultry farm was started to create awareness and interest among poultry breeders to rear improved varieties of poultry i.e. layers & broilers so as to raise the economic as well as nutritional status of farmers of the area. The farm has a rearing

capacity of 5,000 birds. HIM BROILER HATCHERY was started here in 1981 and the popularity of this farm increased considerably after starting the hatchery. Central Poultry Farm Nahan also has a poultry extension centre at Paonta Sahib.

5.5 Rabbitry

Rabbitry also did not find significant place in the economy of Sirmour although scope exists and there is need to make efforts for introducing this enterprises.

5.6 Sericulture

Climate in Paonta and Nahan block is quite favourable for sericulture and it is concentrated in Paonta Sahib. Presently, 676 farmers in 96 villages are engaged in cocoon production. Department of Industries provides mulberry plants to farmers and mulberry leaf is used as fodder for silk worms.

5.7 Mushroom

Though the area is suitable for growing mushrooms but due to lack of awareness and technical know-how, its potential has not been realised. Marketing of mushrooms is not a concern here as this district is close to many cities in neighbouring states. A large scale private concern, Himalayan International at Paonta Sahib is engaged in production, processing and export of processed mushroom products. Very few farmers have adopted this enterprise for generating income and employment.

5.8 Medicinal Plants

Cultivation of medicinal and aromatic plants on farmer's field was almost negligible. Some of the farmers had tried growing Safed Musali and Mentha plants but these endeavours were not very successful owing to the marketing constraints. Sirmour district is rich in medicinal and aromatic plants available in the natural conditions. The locals harvest these plants from the public forests and common land legally and also illegally. Among these plants the most common were *Kasturi Bhindi*, *Ghee Kwar*, *Shatavari*, *Brahmi*, *Safed Musali*, *Bharingraj*, *Kalihari*, *Mulahhthi*, *Pudina*, *Kaunch*, *Tulsi*, *Sarapgandha*, *Akarkara*, *Ashwagnadha* in Zone-I (Below 1200m) *Bach*, *Sahasrapal*, *Karu*, *Lanevder*, *Babuna*, *Rosmary*, *Thuth*, *Clary sage*, *Banafsha* in Zone II (1200-1800 m), and *Patish*, *Chora*, *Indian Belladonna*, *Haritpatri*, *Banhaldi*, *Bhutkesi*, *Chirayata*, *Muramansi*, *Khurasani-ajwain*, *Nihani*, *Mushkbala* and *Banfsha* in Zone III (1800-2800 m above mean sea level). The existence of medicinal plants under natural conditions/environment thus offers scope for their cultivation on commercial lines.

5.9 Beekeeping

Apis mellifera honeybees were reared by few households. Since the area is rich in flora (eucalyptus, toria, mustard, sal), there is lot of scope for spreading this enterprises. Some beekeeper migrate their bee colonies to neighbouring state of Haryana, when bee flora is not available locally and it yields them handsome income as honey yield increases substantially during migration.

5.10 Agricultural Marketing

Estimates of production and disposal of agricultural produce, fruits, vegetables, animal products and live animal stock are given in Tables 5.6 and 5.7. Among foodgrains, wheat, maize and paddy were the important items and among fruits, apple, peach, kinnow and strawberry were the most important commodity sold locally and outside the state. Among livestock products, milk and wool were common. Milk was sold within the villages while wool was sold to the Wool Federation as well as to the private traders.

5.11 Agricultural Infrastructure

5.11.1 Physical

As far as marketing infrastructure is concerned, there are several regulated market in the district. These are situated at Nahan, Dadahu, Paonta Sahib, Sataun, Bagthan, Sarahan, Rajgarh. The commercial produce of the area like potato, tomato, capsicum, frenchbean, pea, ginger, onion, garlic, peach, apple, etc., are brought to these markets. This district is having APMC and presently it is located at Paonta Sahib. The farmer groups at their own level have been marketing fruit and vegetables within and outside the state markets. The important existing and required marketing infrastructure and financial estimates for these are shown in Tables 5.8 and 5.9.

5.11.2 Institutions

The important institutions for carrying out agricultural development activities in the district include CSKHPKV, HAREC, Dhaulakuan carrying out research and extension activities in the field crops. Similarly, CSKHPKV, Krishi Vigyan Kenrda, Dhaulakuan and UHF, Horticulture Regional Research Station (RHRS) at Dhaulakuan cater to the needs of farming community in the areas of forestry and horticulture. The office of Dy. Director, Horticulture, Agriculture, Animal Husbandry, are extending all sorts of training and assistance to the farmers in various developmental activities. Beside, Department of fisheries, DRDA, Mid Himalayan Watershed Project etc are also existing and rendering various services to the farming fraternity. Both the Agricultural and Horticultural Universities and State Agricultural Management & Extension Training Institute (SAMETI), Mashobra provide multifarious trainings to the farmers. These institutions need to be strengthened to cover up the interior localities of this district.

5.11.3 Human Resource Development

Existing human resource development for agriculture is depicted in Table 5.10. The physical and financial estimates for human resource required for the development of agriculture, horticulture, animal husbandry and fishery are given in Table 5.11 and Table 5.12.

5.12 Rural Enterprises

As per Table 5.13 there were 49,354 unemployed persons registered in the employment exchanges in the district. The existing status of enterprises (agriculture and non agriculture based) is depicted through Table 5.14. Atta chakkis, oil expellers, vermi compost, mushroom

compost, rural handicraft, nursery raising of fruit plants,) were the important existing and potential rural enterprises for unemployed youth in Sirmour district (Table 5.15).

5.13 Agro-Processing

Among agro processing units, *atta chaki* and oilseeds processing units known as *kohlus* were important in the area. The number of *atta chakies* agro processing units is reducing due to less cultivation of cereals and commercialization of agriculture in favour of fruits and vegetables. The wheat flour is easily available in the area being supplied through PDS system. The existing number, requirement and gaps of agribusiness establishments are given Table 5.16.

5.14 Drudgery of Women

Women play equally important role in the economy of Sirmour. Majority of cultural farm operations in the fields and orchards are performed by women in addition to tending animals and other household chores. The extent of mechanisation is quite high in Paonta block that has reduced the drudgery of women in particular and farmers in general. However, traditional tools and techniques are being followed in hilly area of district (Table 5.17) and hence the drudgery is on the higher side.

5.15 Input Use and Gaps

Among inputs, fertilizers and chemicals were applied in apple orchards. The use of green fodder and dry fodder to the milch animals was common. The livestock in general was maintained on mix of stall feeding and grazing. In Paonta block some farmers were growing green fodder on their fields as well. Shrinking land holdings and mismanagement of pasture and common land is reflecting in form of fodder shortage. Farmers are force to buy wheat straw during winter months to meet the fodder demand of the livestock (Table 5.18). The concentrates were fed only to milch animals and application was also on the lower sides.

5.16 Yield Gap Analysis

The yield gaps in fruit crops and livestock products have been given in Tables 5.19 and 5.20. It can be seen from these tables that there was a huge gap between the actual and progressive farmers' yield of fruit and livestock in the area. The gap in the fruit yield was to the extent of 25% to 50 %.. The gap in milk yield was to the extent of 100%.

5.17 Reasons for Gap

The reasons for gaps in fruit crops were partial or non adoption of the package of practices suggested by the university and Horticulture Department. Improper plant to plant distance, lack of proper knowledge of pruning and cutting in time, damage by insects and disease and inadequate use of fertilizers are some of the factors responsible for the yield gaps. The difference in livestock product yields (milk) was due to non-availability of adequate fodder, low concentration of crossbred cows and lack of technical know-how.

5.18 Interventions for the District and Financial Estimates⁰

Development of new fruit varieties suitable for specific climatic conditions, recommended spacing in the orchards, supply of micro-nutrients, expansion of fruit plantation in potential area, timely supply of pesticides, demonstration on plant protection measures, fertilization and on training and pruning of fruit plants, adoption of improved package of practices through awareness camps, etc., are the required interventions for horticulture sector (Table 5.21).

The extent of animal diseases has been shown in Table 5.22. Preventive vaccination against Foot and Mouth Disease of livestock, de-worming, dusting and dipping against endoparasites and ectoparasites, livestock health awareness programme against tympany, pneumonia and repeat breeding, improvement in A. I services, mobile veterinary care services, regulation of feed supply, fodder production and grassland improvement through the introduction of suitable grasses and legumes, conservation of fodder to meet winter scarcity and provision of minerals on low cost to livestock rearers are the important intervention in livestock sector (Table 5.23). Regular supply of fish fingerlings, training to the fishermen, and supply of packages of fish farming, etc., are the major interventions for fishery (Table 5.24). The financial estimates for horticulture development, livestock improvement and fisheries have been shown in the district agriculture plan at a glance.

5.19 Research/Extension Gaps

As far as livestock sector is concerned, experimental farms under the supervision of scientists are being maintained at HAREC, Dhaulakuan. Gaps were examined on the basis of differences in outputs and were compared with the yield of progressive farmers of the area. The gaps between the average yields from the progressive farmers' yields can be reduced through the improvement of support lands (private grasslands) by applying different techniques to check the invasion of obnoxious shrubs and weeds and protection of forest grazing rights of shepherd community and imparting technical know-how about different processes of value-addition of the wild and cultivated apricot oil extraction.

5.20 Researchable Issues

Crop Production

- Characterization and classification of soils of different ecological zones of Sirmour district.
- Delineation of the Acid Soil Regions (ASR)
- Issues in solid waste management for organic farming in major cash crops of respective region
- Evaluation of resource conservation technologies (like conservation tillage, deficit water management, pressurized irrigation systems, nutrient-water interaction studies, recycling of waste organic residues etc.) for irrigated and rain fed areas
- Issues related to increasing water productivity of stored water through crop diversification and soil and water management practices
- Nutrient indexing and improvement of soil health

- Development of practices for organic farming under different cropping systems
- Development of resource conservation (soil and water) horticulture practices
- Protected cultivation technology and monitoring soil health in poly houses
- Demonstration of effective technologies for eradication of obnoxious weed from crop and non-crop lands.
- Identification of remunerative cropping sequences for various ecological and farming situations in Sirmour.
- Mechanisation of the farm practices for reduction of farmers' drudgery.
- Water harvesting and efficient use of stored water for meeting the critical water needs of the crops.
- Insect pest and nematode management under protected cultivation situations.
- Collection and utilization of local strains of entomopathogenic organisms for insect pest management under organic farming situations.
- Identification and utilization of native botanicals for eco-friendly pest management.
- Survey and surveillance for identification of new invasion of insect pests.
- Disease and pest management in honey bees; management of bee colonies for pollination in different crops for higher productivity; management practices for migratory beekeeping for better economic returns; quality analysis of honey from different sources for value addition.
- Identification and management of insect-pests of medicinal, aromatic and ornamental plants.
- Management of pomegranate fruit borer in wild and cultivated pomegranate crop
- Survey and surveillance of major diseases in important crops
- Identification of resistant sources and study of genetics of resistance in all crops
- Marker assisted selection of resistance genes using molecular markers and their use in gene pyramiding for resistance in commercial varieties
- Development of integrated disease management modules suitable for organic and protected agriculture conditions
- Development of IDM module important diseases of major crops
- Development of management strategies for mango malformation and diseases of ornamental crops like gladiolus, carnation, liliun, etc.
- Disease management in pomegranate
- Development of management strategies for disease problems in garlic, cabbage and colocasia

Animal Husbandry

- Documentation of the prevailing ethno-veterinary practices among livestock farmers of Sirmour district; for their scientific validation
- Development of a strategic dairy farming package for Sirmour livestock farmers in the face of 'LIVESTOCK REVOLUTION 2020'
- Constraints in way of adoption of dairy technology by livestock farmers,; perceptions of stake-holders i.e. livestock-keepers, veterinarians, paravets and development agencies/ NGOs
- Identification of the indigenous livestock health practices among livestock farmers in district Sirmour
- A gender analytic study of the contributions of male and female farmers of Sirmour district to animal husbandry operations
- Appropriateness of the recommended animal husbandry technologies for small scale production systems
- Identification of the critical technical gaps in attaining the profitability under hill cattle production system
- Cultivation and propagation of nutritious fodder grasses in wastelands in Sirmour district
- Development of an integrated livestock (cattle and poultry) production model (ILPM) for livestock
- A study of the training aspirations of women livestock farmers for profitable livestock / dairy farming

Horticulture

- Field testing of high yielding and better cultivars of peach and plum under mid hills, and of citrus, mango, amla and strawberry in lower areas
- Identification of niche area and remapping of different fruit growing belts
- Diversification of fruits and their varieties
- Development of efficient propagation techniques for walnut, pecanutt and persimmon
- Development of agro-techniques to combat the replant problem in stone fruits.
- Development of fruit based multi cropping system
- Development of modules for INM for different fruit crops
- Standardisation of agro-techniques to control regular bearing in olive
- Development of production module for organic fruit farming
- Development of irrigation and fertigation modules
- Delineation of areas/locations suitable for different flower crops

- Availability of authentic and quality germplasm/ planting material of various crops to the growers at affordable prices.
- Standardisation of location specific production technology for different flower crops.

Socio-economic Issues

- Analysing trends and patterns of demand, prices and markets of emerging crops and enterprises in the context of ongoing process of globalisation
- Understanding economic implications of climate change towards cropping systems, cropping patterns and livelihoods of the farmers
- Assessing impact of the ongoing process of commercialisation of agriculture on natural resource base (soil, water and environment) and its implications towards livelihoods of the farmers
- Studies on impact assessment and policy implications of various developmental programmes/schemes
- Study of the labour migration in Sirmour and suggest various measures to check this problem.
- Dynamics of the farming systems in Sirmour district and its impact on the socio-economic conditions of the farmers.

Table 5.1 Existing Block Level Schemes for Horticulture Development

Block	No. of Schemes	Village covered	Population covered	Area covered	Beneficiary families (No.)	Status	
						Complete (No.)	Incomplete (No.)
Horticulture							
Pachhad	2	132	2413	140	482.6	-	2
Rajgarh	2	70	2980	230	596.0	-	2
Nahan	2	68	980	60	196.0	-	2
Sangrah	2	60	2712	120	542.4	-	2
Shillai	2	90	1484	211	296.8	-	2
Paonta	2	224	1280	100	256.0	-	2
Total	2	644	11849	861	2369.8	-	2

Source: Field Survey, 2007-08

Table 5.2 Existing Status and Potential for Horticulture Development

(Area in Ha; Prod in Tonne)

Crop			Pachhad	Rajgarh	Nahan	Sangrah	Shillai	Paonta	District
Apple	E	Area		750		264	450		1463
		Production		3419		861	1362		5642
		Households		945		123	155		1223
	P	Area		1000		500	800		2300
		Production		5456		2163	3442		11061
		New Households		1260		233	276		1769
Stone fruits	E	Area	256	847	72	252	228	98	1753
		Production	543	2678	145	529	483	202	4580
		Households	72	468	24	86	29	36	715
	P	Area	500	1200	200	500	800	250	3450
		Production	1606	4992	640	1605	2570	802	12215
		New Households	141	663	67	171	102	92	1234
Citrus fruits	E	Area	36	30	50	20	24	112	272
		Production	84	83	151	56	65	354	792
		Households	81	112	86	72	65	463	879
	P	Area	70	60	100	50	120	250	650
		Production	226	197	430	191	443	1079	2565
		New Households	158	224	172	180	325	1033	2092
Mango	E	Area			196			252	448
		Production			745			932	1677
		Households			612			742	1354
	P	Area			350			500	850
		Production			1533			2285	3818
		New Households			1093			1472	2565
Strawberry	E	Area						135	135
		Production						972	972
		Households						675	675
	P	Area			100			250	350
		Production			710			2050	2760
		New Households			500			1250	1750

E = Existing P = Potential

Source: Field Survey, 2007-08

Table 5.3 Existing Block Level Schemes for Livestock and Fisheries Development

Block	No. of Schemes	Village covered	Population covered	Area covered	Beneficiary families (No)	Status	
						Complete (No)	Incomplete (No)
Fisheries							
Pachhad	1	6	65	0.5	13		1
Rajgarh	1	8	80	1.3	16		1
Nahan	1	9	90	3	18		1
Sangrah	1	1	5	0.01	1		1
Shillai	1	8	95	1.2	19		1
Paonta	1	12	190	7.5	38		1
Total	1	44	525	13.51	105		1
Livestock Improvement							
Pachhad	5	263			2800		5
Rajgarh	4	140			2400		5
Nahan	5	136			3200		5
Sangrah	4	121			4400		5
Shillai	4	190			3800		5
Paonta	5	454			3400		5
Total	5	1304	0		20000		5

Source: Field Survey, 2007-08

Table 5.4 Livestock Population (No.)

Livestock	Pachhad	Rajgarh	Nahan	Sangrah	Shillai	Paonta	Distt
Local	16105	15904	18248	23032	19978	21846	115113
Cross bred	6117	6188	5628	3504	1268	9742	32447
Buffalo	5863	4832	8173	3626	2706	23472	48672
Sheep	2378	2460	729	4928	5565	1698	17758
Goat	20025	12126	24272	35505	24570	22328	138826

Source: Field Survey, 2007-08

Table 5.5 Status and Potential for Cultured Fisheries

Particulars	Households (No.)	Fish prodn. (Qty.)	Ponds (No.)	Ponds Area (ha)	Fish Species					
					Common Carp	Rohu	Catla	Mrijal	Grass carp	Silver carp
Pachhad										
Existing	13	9	19	0.5	√	√	√	---	---	---
Potential	23	12	29	1.5	√	√	√	√	√	√
Gap	10	3	10	1	---	---	---	√	√	√
Rajgarh										
Existing	16	10	25	1.3	√	√	√	---	---	---
Potential	26	13	35	2.3	√	√	√	√	√	√
Gap	10	3	10	1	---	---	---	√	√	√
Nahan										
Existing	18	12	18	3	√	√	√	---	---	---
Potential	28	15	28	4	√	√	√	√	√	√
Gap	10	3	10	1	---	---	---	√	√	√
Sangrah										
Existing	1		1		√	√	√	---	---	---
Potential					√	√	√	√	√	√
Gap					---	---	---	√	√	√
Shillai										
Existing	19	12	22	1.2	√	√	√	---	---	---
Potential	29	15	32	2.2	√	√	√	√	√	√
Gap	10	3	10	1	---	---	---	√	√	√
Paonta										
Existing	38	25	49	7.5	√	√	√	---	---	---
Potential	48	28	59	8.5	√	√	√	√	√	√
Gap	10	3	10	1	---	---	---	√	√	√
District										
Existing	105	68	134	13.5	√	√	√	---	---	---
Potential	154	83	183	18.5	√	√	√	√	√	√
Gap	50	15	50	5	---	---	---	√	√	√

Source: Field Survey, 2007-08

Table continued

Constraints/Interventions	Pachhad	Rajgarh	Nahan	Sangrah	Shillai	Paonta	District
Quality/quantity of fingerlings	√	√	√	√	√	√	√
Quality and quantity of water supply	√	√	√	√	√	√	√
Training	√	√	√	√	√	√	√
Pond structure	√	√	√	√	√	√	√
Perishability	√	√	√	√	√	√	√
Remunerative price	√	√	√	√	√	√	√
Market	√	√	√	√	√	√	√

Source: Field Survey, 2007-08

Table 5.6 Production and Disposal of Agricultural Products (Tonnes)

Particulars	Pachhad	Rajgarh	Nahan	Sangrah	Shillai	Paonta	District
Cereals							
Total production (t)	5501	5980	47550	15227	5144	116401	195802
Consumption (t)	5501	5980	45527	15227	5144	110046	187424
Marketed surplus (t)	0	0	2023	0	0	6355	8378
Post harvest losses			85	0	0	289	374
Markets where sold							0
<i>Local</i>							0
<i>Distant within State</i>			1938			6066	8004
<i>Distant outside State</i>							0
Pulses							
Total production (t)	122	192	103	434	269	220	1339
Consumption (t)	122	192	103	434	269	220	1339
Marketed surplus (t)							0
Post harvest losses							0
Name of markets where sold							0
<i>Local</i>							0
<i>Distant within State</i>							0
<i>Distant outside State</i>							0
Oilseeds							
Total production (t)	31	28	35	79	5	199	376
Consumption (t)	31	28	35	79	5	199	376
Marketed surplus (t)							0
Post harvest losses							0
Name of markets where sold							0
<i>Local</i>							0
<i>Distant within State</i>							0
<i>Distant outside State</i>							0
Fruits							
Total production (t)	1675	8722	2309	2454	2822	3140	21123
Consumption (t)	1005	3140	1478	1693	1721	2167	11204
Marketed surplus (t)	670	5582	831	761	1101	973	9918
Post harvest losses	74	726	100	76	143	107	1225
Name of markets where sold							
<i>Local</i>	72	583	88	82	115	104	1043
<i>Distant within State</i>	286	2331	351	329	460	416	4173
<i>Distant outside State</i>	239	1943	293	274	383	347	3477
Vegetables							
Total production (t)	6627	20063	2332	9341	10132	3513	52008
Consumption (t)	756	169	184	95	105	81	1390
Marketed surplus (t)	5871	19894	2148	9246	10027	3432	50618
Post harvest losses	719	2365	234	1105	1247	401	6071
Name of markets where sold							
<i>Local</i>	618	2103	230	977	1054	364	5346
<i>Distant within State</i>	2473	8414	919	3908	4214	1455	21382
<i>Distant outside State</i>	2061	7012	766	3256	3512	1212	17819

Source: Field Survey, 2007-08

Table 5.7 Production and Disposal of Livestock Products and Livestock

Particulars	Pachhad	Rajgarh	Nahan	Sangrah	Shillai	Paonta	Distt
Milk (L/day)							
Total production	14445	13084	11416	8806	8326	18659	74736
Consumption	12569	10359	10419	8409	8047	14235	64038
Marketed surplus	1876	2725	997	397	279	4424	10698
Wool (Q/yr)							
Total production	15	34	18	38	23	36	164
Consumption	8	16	9	21	11	16	81
Marketed surplus	7	18	9	17	12	20	83
Poultry bird sold (No./yr)	24825	27425	70625	33620	29425	85363	271283
Sheep/ goat sold (No./yr)	2589	2647	3159	2870	2489	3984	17738

Source: Field Survey, 2007-08

Table 5.8 Marketing Infrastructure

Particulars		Pachhad	Rajgarh	Nahan	Sangrah	Shillai	Paonta	Distt
Agricultural produce collection Centers	E	3	3	2	2	1	1	12
	R	8	8	8	8	8	8	48
Market sub-yard & market information centre	E	1	2	2	1	0	3	7
	R	2	3	3	2	1	4	14
Cold Storage/ godown 50 MT capacity	E				0	0	0	0
	R		1	1			1	3
Milk processing infrastructure	E	1	1	2	1	1	0	6
	R				2	0	2	4
Co-operative marketing society	E	0	0	0	0	0	0	0
	R	1	1	1	1	1	1	6
Agri/Horti input supply centre including PACS	E	3	3	2	2	1	1	12
	R	8	8	8	8	8	8	48
Banking and insurance facility	E	11	11	24	16	5	26	92
	R	20	20	35	20	15	40	150

E= Existing R= Required

Source: Field Survey, 2007-08

Table 5.9 Financial Estimate for Marketing Infrastructure (Rs. Lakh)

Particulars	Pachhad		Rajgarh		Nahan		Sangrah		Shillai		Paonta		Distt	
	G	F	G	F	G	F	G	F	G	F	G	F	G	F
Agricultural produce collection centers	5	5	5	5	6	6	6	6	7	7	7	7	36	36
Market sub-yard and market information centre	1	3	1	3	1	3	1	3	1	3	1	3	6	18
Control Atmosphere Store (CAS)	1	50	-	-	1	50	-	-	-	-	1	50	3	150
Milk processing infrastructure	-	-	-	-	-	-	2	40	-	-	2	40	4	80
Co-operative marketing society	1	5	1	5	1	5	1	5	1	5	1	5	6	30
Agri/Horti input supply centre	5	10	5	10	6	12	6	12	7	14	7	14	36	72
Banking and insurance facility	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total	13	73	12	23	15	76	16	66	16	29	19	119	91	386

G= Gap F=Funds

Gap means difference between the existing and required number

Source: Field Survey, 2007-08

Table 5.10 Existing Human Resource for Agricultural Development (No.)

Particulars	Pachhad			Rajgarh			Nahan			Sangrah			Shillai			Paonta			Distt		
	S	P	R	S	P	R	S	P	R	S	P	R	S	P	R	S	P	R	S	P	R
SMS (Agri)	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	3	3	3	9	7	9
ADOs	2	2	3	6	1	6	6	2	4	3	4	8	2	8	27	6	8	27	6	31	
AEOs	10	3	10	13	3	13	11	9	1	9	12	2	12	20	3	20	75	15	75		
SMS (Horti)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	6	
HDOs	3	1	4	4	1	5	4	2	1	4	2	0	4	2	2	4	17	6	26		
HEOs	5	3	8	5	4	10	5	4	8	5	4	4	8	4	10	28	21	52			
SDSCO(Soil conservation)				1	1	1								1	1	1	2	2	2		
ADOs	1	1	1	0	0	0	2	2	1	0	1	1	0	1	1	1	6	4	6		
AEOs	2	0	2	2	1	2	2	4	1	4	2	1	2	4	1	2	16	4	14		
JE, DM, JDM							4	2	4					4	1	4	8	3	8		
Sr. Veterinary officers	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3	3	6		
Veterinary doctors	5	3	5	6	4	6	5	5	6	3	6	5	2	5	6	33	22	33			
Veterinary Pharmacist	22	20	26	22	19	26	32	30	36	28	27	32	29	28	32	40	165	154	192		
Extension Specialists for																					
Bee keeping			1			1			1		1				1		1	0	0	6	
Mushrooms			1			1			1		1				1		1	0	0	6	
Floriculture			1			1			1		1				1		1	0	0	6	
Sr. Fisheries officer							1	1	1							0	1	1	1		
Fisheries Sub-Inspector			1			1			1							1	0	0	6		
Fisheries Field Assistant			2			2			2							2	0	0	12		
Sericulture inspector			1			1			1							1	0	0	4		
Sericulture Assistant			1			1	1	1	3						3	3	5	4	10		
Protected cultivation			1			1			1							1	0	0	6		
Total	52	35	71	62	36	82	75	50	94	58	38	78	59	37	78	89	57	114	253	517	

Note: S – Sanctioned, P – Position, R – Required
Source: Field Survey, 2007-08

Table 5.11 Additional Requirement of Human Resource for Agricultural Development (No.)

Particulars	Pachhad	Rajgarh	Nahan	Sangrah	Shillai	Paonta	Distt
SMS (Agri)	0	1	0	0	1	0	2
ADOs	1	5	4	4	4	6	25
AEOs	7	10	8	8	10	17	60
SMS (Horti)	1	0	1	1	1	1	5
HDOs	3	4	3	3	4	2	20
HEOs	5	6	4	4	4	6	31
SDSCO(Soil conservation)	0	0	0	0	0	0	0
ADOs	0	0	1	1	1	0	2
AEOs	2	1	3	3	1	1	10
JE, DM, JDM	0	0	0	0	0	3	5
Sr. Veterinary officers	0	1	1	1	1	0	3
Veterinary doctors	2	2	3	3	3	1	11
Veterinary pharmacist	6	7	5	5	4	10	38
Extension specialist for:	0	0	0	0	0	0	0
Bee keeping	1	1	1	1	1	1	6
Mushrooms	1	1	1	1	1	1	6
Floriculture	1	1	1	1	1	1	6
Sr Fisheries officer	2	2	2	2	2	2	12
Fisheries Sub-Inspector	1	1	0	0	0	1	4
Fisheries Field Asistant	1	1	1	1	1	1	6
Sericulture inspector	1	1	0	0	0	1	4
Sericulture Assistant	1	1	0	0	0	2	6
Protected cultivation	1	1	1	1	1	1	6
Total	37	47	40	40	41	58	268

Source: Field Survey, 2007-08

Table 5.12 Financial Estimates for Required Human Resources (Lakh Rs.)

Particulars	Pachhad	Rajgarh	Nahan	Sangrah	Shillai	Paonta	Distt
SMS (Agri)	0	18	0	0	18	0	36
ADOs	15	75	60	60	60	90	375
AEOs	63	90	72	72	90	153	540
SMS (Horti)	18	0	18	18	18	18	90
HDOs	45	60	45	45	60	30	300
HEOs	45	54	36	36	36	54	279
SDSCO(Soil conservation)	0	0	0	0	0	0	0
ADOs	0	0	15	15	15	0	30
AEOs	18	9	27	27	9	9	90
JE, DM, JDM	0	0	0	0	0	36	60
Sr. Veterinary officers	0	27	27	27	27	0	81
Veterinary doctors	36	36	54	54	54	18	198
Veterinary pharmacist	43	50	36	36	29	72	274
Extension specialist for:	0	0	0	0	0	0	0
Bee keeping	18	18	18	18	18	18	108
Mushrooms	18	18	18	18	18	18	108
Floriculture	12	12	12	12	12	12	72
Sr Fisheries officer	24	24	24	24	24	24	144
Fisheries Sub-Inspector	6	6	0	0	0	6	24
Fisheries Field Assistant	4	4	4	4	4	4	25
Sericulture inspector	12	12	0	0	0	12	48
Sericulture Assistant	9	9	0	0	0	18	54
Protected cultivation	12	12	12	12	12	12	72
Sub Total	410	535	478	478	504	604	3108
Capacity building of extension personnel @ 3%	12	16	14	14	15	18	93
Total	422	551	492	492	519	622	3201

Source: Field Survey, 2007-08

Table 5.13 Unemployment Status (No.)

Particulars	2003	2004	2005	2006
Post Graduate	1364	1334	1639	1583
Graduate	4599	4100	4519	4679
Matric and above	29150	27194	28805	32026
Below matric	11737	11019	11816	10577
Illiterate	629	697	657	489
Distt	47479	44344	47436	49354

Source: Distt. Employment Officer, Nahan

Table 5.14 Status of Enterprises

Block	Existing			Potential			Assistance (Credit)
	No of units	Person employed	Investment (Rs lakh)	No of units	Employment	Investment (Rs Lakh)	
Atta chakki							
Pachhad	68	102	34	82	122	41	√
Rajgarh	95	143	48	114	171	57	√
Nahan	20	30	10	24	36	12	√
Sangrah	20	30	10	24	36	12	√
Shillai	102	153	51	122	184	61	√
Paonta	100	150	50	120	180	60	√
Total	405	608	203	486	729	243	√
Oil expeller							
Pachhad	5	10	5	6	12	6	√
Rajgarh	4	8	4	5	9	5	√
Nahan	8	16	8	9	18	9	√
Sangrah	8	16	8	9	18	9	√
Shillai	2	4	2	2	5	2	√
Paonta	12	24	12	14	28	14	√
Total	39	78	39	45	90	45	√
Bakery							
Pachhad	0	0	0	1	2	2	√
Rajgarh	0	0	0	1	2	2	√
Nahan	0	0	0	1	2	2	√
Sangrah	0	0	0	1	2	2	√
Shillai	2	4	1	0	0	0	√
Paonta	6	24	6	0	0	0	√
Total	8	28	7	4	8	8	√
Vermi-compost							
Pachhad	300	60	0.1	600	120	60	√
Rajgarh	300	60	0	600	120	60	√

Nahan	300	60	0	600	120	60	√
Sangrah	200	40	0.03	600	120	60	√
Shillai	200	40	0.03	600	120	60	√
Paonta	570	114	14.25	1000	200	100	√
Total	1870	374	14	4000	800	400	√
	Mushroom compost						
Pachhad	0	0	0	0	0	0	√
Rajgarh	0	0	0	0	0	0	√
Nahan	1	5	4	0	0	0	√
Sangrah	0	0	0	0	0	0	√
Shillai	0	0	0	0	0	0	√
Paonta	3	25	9	0	0	0	√
Total	4	30	13	0	0	0	√
	Rural craft						
Pachhad	1	1	4	5	20	4	√
Rajgarh	1	1	4	5	20	4	√
Nahan	1	1	4	5	20	4	√
Sangrah	2	2	8	5	20	4	√
Shillai	2	2	8	5	20	4	√
Paonta	2	2	8	5	20	4	√
Total	9	9	36	30	120	24	√
	Nursery raising						
Pachhad	17	17	0	20	20	0	√
Rajgarh	21	100	0	25	120	0	√
Nahan	1	4	0	1	5	0	√
Sangrah	0	0	0	0	0	0	√
Shillai	4	4	0	5	5	0	√
Paonta	34	150	15	41	180	18	√
Total	77	275	15	92	330	18	√
	Flower nursery						
Pachhad	5	5	0	6	6	0	√
Rajgarh	15	100	0	18	120	0	√
Nahan	1	5	1	1	6	1	√
Sangrah	0	0	0	0	0	0	√
Shillai	1	5	1	1	6	1	√
Paonta	2	5	1	2	6	1	√
Total	24	120	2	29	144	2	√
	Seed production						
Pachhad	0	0	0	0	0	0	√

Rajgarh	1	0	0	0	0	0	√
Nahan	1	3	2	1	4	3	√
Sangrah	0	0	0	0	0	0	√
Shillai	0	0	0	0	0	0	√
Paonta	3	50	35	6	120	60	√
Total	5	53	37	7	124	63	√
	Feed mill						
Pachhad	0	0	0	0	0	0	√
Rajgarh	0	0	0	0	0	0	√
Nahan	0	0	0	0	0	0	√
Sangrah	0	0	0	0	0	0	√
Shillai	0	0	0	0	0	0	√
Paonta	1	4	0	5	50	25	√
Total	1	4	0	5	50	25	√
	Fruit and vegetable processing						
Pachhad	0	0	0	0	0	0	√
Rajgarh	2	50	20	2	50	25	√
Nahan	0	0	0	0	0	0	√
Sangrah	0	0	0	0	0	0	√
Shillai	0	0	0	0	0	0	√
Paonta	4	60	40	6	100	70	√
Total	6	110	60	8	150	95	√
	Pickles/squashes						
Pachhad	0	0	0	0	0	0	√
Rajgarh	2	50	20	2	50	25	√
Nahan	0	0	0	0	0	0	√
Sangrah	0	0	0	0	0	0	√
Shillai	0	0	0	0	0	0	√
Paonta	2	50	20	3	100	50	√
Total	4	100	40	5	150	75	√
G Total		1842	503		2819	1061	

Source: Field Survey, 2007-08

Table 5.15 Potential Enterprises for Unemployed and Assistance Required

Sr. No.	Enterprise	Generation of mandays	Assistance required	Pachhad	Rajgarh	Nahan	Sangrah	Shillai	Paonta
1	Beekeeping (honeybees for honey & pollination)	365	1. Technology	√	√	√	√	√	√
			2. Credit	√	√	√	√	√	√
			3. Marketing	√	√	√	√	√	√
2	Establishment of fruit nursery	365	1. Technology	√	√	√	√	√	√
			2. Credit	√	√	√	√	√	√
			3. Marketing	√	√	√	√	√	√
3	Expertise in cutting, pruning, grafting and packaging and grading (Orchard management techniques)	180	1. Technology		√		√	√	
			2. Credit	√	√	√	√	√	√
4	Mushroom compost and mushroom growing	150	1. Technology	√	√	√	√	√	√
			2. Credit	√	√	√	√	√	√
			3. Marketing	√	√	√	√	√	√
5	Fruit and vegetable processing and canning	200	1. Technology	√	√	√	√	√	√
			2. Credit	√	√	√	√	√	√
			3. Marketing	√	√	√	√	√	√
6	Rural handicrafts	365	1. Technology	√	√	√	√	√	√
			2. Credit	√	√	√	√	√	√
			3. Marketing	√	√	√	√	√	√
7	Vermi-compost	365	1. Technology	√	√	√	√	√	√
			2. Credit	√	√	√	√	√	√
			3. Marketing	√	√	√	√	√	√
8	Seed production of cereals and pulses	365	1. Technology	√	√	√	√	√	√
			2. Credit	√	√	√	√	√	√
			3. Marketing	√	√	√	√	√	√
9	Dairy	365	1. Technology	√	√	√	√	√	√
			2. Credit	√	√	√	√	√	√
			3. Marketing	√	√	√	√	√	√

Source: Field Survey, 2007-08

Table 5.16 Agribusiness Establishments (No)

Block	Status	Agro sale centres	PACS	Rural handicraft		Cooperatives	
				Public	Private	Public	Private
Pachhad	E	3					
	R	8	20	5	5	20	20
	G	5	20	5	5	20	20
Rajgarh	E	3	17			17	
	R	8	20	5	5	20	20
	G	5	3	5	5	3	20
Nahan	E	2				1	
	R	8	20	5	5	20	20
	G	6	1	5	5	22	20
Sangrah	E	2					
	R	8	20			20	
	G	6	20	5	5	20	20
Shillai	E	1	1			2	
	R	8	20	5	5	20	20
	G	7	19	5	5	18	20
Paonta	E	1					
	R	8	20			20	
	G	7	20	5	5	20	20
District	E	12	18	0	0	20	0
	R	48	120	20	20	120	80
	G	36	83	30	30	103	120

E-Existing, R-Required, G-Gap

Source: Field Survey, 2007-08

Table 5.17 Drudgery of Women (Per Cent Response)

Block	Mode of operation	Pachhad	Rajgarh	Nahan	Sangrah	Shillai	Paonta
<i>Agricultural Operations</i>							
Clod breaking	Manually	100	100	52	33	82	32
	Power Iron	0	0	17	26	0	81
Paddy transplanting	Manually	100	100	30	100	100	74
	Transplanter	0	0	0	0	0	0
Manuring & fertilization	Manually	100	73	35	53	55	32
	Power Machinery	0	0	0	0	0	0
Intercultural operations	Manually	96	95	95	68	95	51
	Power Machinery	0	0	0	0	0	0
Threshing & winnowing	Manually	36	92	67	59	91	38
	Power Machinery	64	45	78	25	20	68
<i>Livestock rearing operations</i>							
Fodder resources	Cultivated	0	43	0	2	0	49
	Ghasni	90	78	62	85	75	33
	Both	10	0	100	2	0	20
Fodder cutting	Traditional tools	78	62	86	98	97	22
	Improved Tools	22	19	25	12	18	63
Fodder transportation	On Head/Backload	100	58	70	98	95	84
	Tractor-Trolley	0	0	0	0	0	5
Fodder chaffing	Chaff Cutter	5	2	25	1	0	69
	Without Chaffcutter	95	20	31	18	24	27
Feeding System	Inside Manger	14	47	36	30	34	62
	On floor	86	51	64	56	98	38
Feeding practices	Stall feeding	36	57	41	36	24	49
	Grazing	38	43	58	48	46	15
	Both	26	11	100	60	72	38
Animal waste disposal	Bio-gas plant	0	0	0	2	0	0
	Head/Back-load to field	51	94	24	24	92	47
	FYM	49	100	74	88	4	82
Cleaning of animals & sheds	Manually	100	100	100	100	100	100
	Water Pressure Jet	0	0	0	0	0	0
Milking operation	Hand milking	100	100	100	100	100	100
	Machine Milking	0	0	0	0	0	0
Selling of milk	Within Village	30	57	24	32	17	36
	Distant Market	10	12	13	2	9	6
Churning of milk	Manually	27	10	69	79	11	54
	Using Machine	73	90	5	65	58	47
Animal Shed	Kachha	76	97	75	72	91	61
	Pucca	24	3	25	28	9	39
Animal Shed Floor	Kachha	72	89	82	88	90	66
	Pucca	28	11	18	12	10	34

Source: Field Survey, 2007-08

Table 5.18 Livestock Feeding Practices (kg/animal/day)

Type of animal	Feeding Practices	Pachhad	Rajgarh	Nahan	Sangrah	Shillai	Paonta	District
Crossbred cows	Green Fodder	8.06	9.36	10.3	9.53	11.02	14.05	10.39
	Dry Fodder	4.48	5.61	7.54	6.72	5.7	8.48	6.42
	Concentrate	1.87	1.44	1.04	1.96	0.86	1.44	1.44
Local cow	Green Fodder	2.92	5.4	9.88	2.76	5.97	6.68	5.60
	Dry Fodder	1.75	1.02	1.02	3.88	1.16	3.63	2.08
	Concentrate	0.79	0.69	1.15	0.58	0.63	1.27	0.85
Buffaloes	Green Fodder	8.03	10.37	9.12	8.31	8.55	13.95	9.72
	Dry Fodder	5	6.81	6.2	7.14	5.95	4.45	5.93
	Concentrate	2.09	0.98	1.88	1.93	1.54	1.64	1.68

Source: Field Survey, 2007-08

Table 5.19 Yield Gaps in Fruit Crops (q/ha)

Particulars	Pachhad	Rajgarh	Nahan	Sangrah	Shillai	Paonta	District
	A	A	A	A	A	A	A
Apple		4.56		3.26	3.03		3.86
Stone fruits	2.12	3.16	2.02	2.10	2.12	2.06	2.61
Citrus fruits	2.32	2.76	3.02	2.81	2.69	3.16	2.91
Mango			3.80			3.70	3.74
Strawberry						7.20	7.20
	P	P	P	P	P	P	P
Apple		5.46		4.33	4.30		4.74
Stone fruits	3.21	4.16	3.20	3.21	3.21	3.21	3.40
Citrus fruits	3.23	3.28	4.30	3.81	3.69	4.32	3.03
Mango			4.38			4.57	4.49
Strawberry			7.10			8.20	7.83
	G	G	G	G	G	G	G
Apple		0.90		1.07	1.27		0.89
Stone fruits	1.09	1.00	1.18	1.11	1.09	1.15	0.79
Citrus fruits	0.91	0.52	1.28	1.00	1.00	1.16	0.12
Mango			0.58			0.87	0.75
Strawberry						1.00	0.63

A= Actual, P= Progressive farmers' yield and G= Gap

Source: Field Survey, 2007-08

Table 5.20 Livestock Production Estimates (Units/animal/day)

Type of animal	Pachhad			Rajgarh			Nahan			Sangrah			Shillai			Paonta			District		
	A	P	G	A	P	G	A	P	G	A	P	G	A	P	G	A	P	G	A	P	G
Crossbred cows (l/day)	3.89	8	4.11	4.59	8	3.41	4.76	10	5.24	4.45	8	3.55	2.47	8	5.53	5.32	10	4.68	4.24	8.66	4.42
Local cow (l/day)	1.67	3	1.33	1.97	3	1.03	1.6	4	2.4	1.22	3	1.78	0.95	3	2.05	1.55	4	2.45	1.49	3.33	1.84
Buffaloes (l/day)	2.73	6	3.27	1.19	6	4.81	4.88	8	3.12	2.98	6	3.02	2.57	6	3.43	4.27	8	3.73	3.10	6.66	3.56
Goats (l/day)	1.22	2	0.78	0	2	2	0	2	2	0	2	2	0	2	2	0.02	2	1.98	0.20	2	1.79
Sheep wool (kg/year)	1.08	2	0.92	0	2	2		2	2	1.14	2	0.86	0.27	2	1.73	0	2	2	0.41	2	1.58
Poultry (yield, eggs/year/bird)	100	120	20		120	120	0	120	120	0	120	120		120	120		120	120	17	120	103
Broilers (yield, meat/bird)		0	0		0	0		0	0		0	0		0	0		0	0	0	0	0

Note: A – Actual yield, P – Potential yield, G – G

Source: Field Survey, 2007-08

Table 5.21 Varietal and Technological Problems and Interventions for Fruit Crops (Per Cent of Panchayats)

Crop	Problems	Pachhad	Rajgarh	Nahan	Sangrah	Shillai	Paonta	Interventions
Apple	Improper management of orchard		25		20	25		Adoption of full package of practices
	Lack of pollinizers & pollinators		25		20	25		Suitable mix of pollinizers in orchard
	Hailing		50		20	50		Adoption of anti-hailing techniques
Citrus	Inadequate & Imbalanced use of fertilizer		100		100	100		Judicious use of fertilizer
	Diseases & insect pest attack		100		100	100		Demonstration on effective plant protection technology
	Nutritional disorders	50	50	75	40	50	57	Judicious use of fertilizer
	Infestation of insect-pest & diseases	100	100	100	100	100	100	Demonstration on effective plant protection technology
	Improper management of orchard	50	75	50	40	75	71	Adoption of full package of practices
Mango	Improper management of orchard			50			57	Adoption of full package of practices
	Inadequate & Imbalanced use of fertilizer			100			100	Judicious use of fertilizer
	Mango malformation			100			100	Demonstration on control of mango malformation
	Alternate bearing			100			100	Adoption of improved varieties
	Infestation of insect-pest & diseases			100			100	Demonstration on effective plant protection technology
Stone fruits	Frost damage			100			100	Demonstration on preventing frost damage
	Improper management of orchard	25	25	25	40	25	29	Adoption of full package of practices
	Inadequate & Imbalanced use of fertilizer	100	100	100	100	100	100	Judicious use of fertilizer
	Attack of insect-pest & diseases	100	100	100	100	100	100	Demonstration on

Table 5.22 Incidence of Livestock Diseases (Per Cent)

Type of animal/Disease	Pacchad		Rajgarh		Nahan		Sangrah		Shillai		Paonta	
	I	M	I	M	I	M	I	M	I	M	I	M
Cattle and Buffaloes												
a. FMD	10	0	0	0	2	0	20	0	60	2	0	0
b. Hemorrhagic Septicaemia	5	4	0	0	5	0	4	3	40	4	80	4
c. Tympany	1	0	4	0	4	0	62	4	15	0	5	0
d. Pneumonia	3	0	0	2	0	0	8	1	10	0	5	0
e. Diarrhoea/Dysentery	2	0	0	0	10	0	70	7	15	0	20	2
f. Calf scour	10	3	0	0	5	0	2	2	20	0	30	12
g. Endoparasites	40	0	80	0	8	0	85	0	90	0	80	0
h. Ectoparasites	50	0	80	0	70	0	85	0	95	0	80	0
i. Repeat Breeding	25	0	0	0	0	0	60	0	80	0	25	0
j. other	0	0	0	0	0	0	0	0	0	0	0	0
Sheep & Goats												
a. PPR/CCPP	20	12	0	0	0	5	2	1	65	20	25	10
b. Mange	20	0	0	0	0	0	70	7	0	0	10	0
c. Lice and ticks	50	0	52	0	0	0	75	5	80	0	40	0
d. Endoparasites	60	0	17	0	0	0	0	0	90	0	60	0
e. Diarrhoea/Dysentery	5	0	0	0	0	10	30	4	25	5	10	0
f. other	0	0	0	0	0	0	0	0	0	0	0	0
Poultry												
a. Coccidiosis	20	0	0	0	5	0	0	0	0	0	0	0
b. Ranikhet disease	10	0	0	0	0	0	0	0	0	0	10	0
c. Fowlpox	0	10	0	0	0	0	0	0	0	0	0	0
d. Merek's disease	0	0	0	0	0	0	0	0	0	0	0	0
e. other	0	0	0	0	0	0	0	0	0	0	0	0
Equine												
a. Respiratory distress	0	0	0	0	0	0	4	0	30	5	0	0
b. Colic	0	0	6	0	0	0	10	4	15	0	0	0
c. Internal parasites	0	0	0	0	0	0	60	12	65	0	0	0
d. Glanders	0	0	0	0	2	2	0	0	0	0	0	0
e. other	0	0	0	0	0	0	0	0	0	0	0	0

I= Infected M= Mortality

Source: Field Survey, 2007-08

Table 5.23 Intervention for Livestock Diseases and Feed and Fodder Development

Disease/Animal	Intervention	Pacchad	Rajgarh	Nahan	Sangrah	Shillai	Paonta
Cattle							
Foot and Mouth Disease	Preventive vaccination	√	√	√	√	√	√
Endoparasites	Preventive deworming	√	√	√	√	√	√
Ectoparasites	Preventive dusting and dipping	√	√	√	√	√	√
Tympany and Pneumonia	Livestock health awareness programme	√	√	√	√	√	√
Repeat breeding	Livestock health awareness programme	√	√	√	√	√	√
Sheep & goats							
PPR/CCPP	Preventive vaccination	√	√	√	√	√	√
Mange	Preventive dusting and dipping	√	√	√	√	√	√
Lice and ticks	Preventive dusting and dipping	√	√	√	√	√	√
Endoparasites	Deworming	√	√	√	√	√	√
Diarrhoea/Dysentery	Livestock health awareness programme	√	√	√	√	√	√
Equine							
Colic	Livestock health awareness programme	√	√	√	√	√	√
Internal parasites	Deworming	√	√	√	√	√	√
Livestock reproductive Efficiency	Improvement in A. I services	√	√	√	√	√	√
	Livestock health awareness programme	√	√	√	√	√	√
	Mobile veterinary care services	√	√	√	√	√	√
	Improving economic condition of stakeholders to adopt animal health services	√	√	√	√	√	√
Feed and fodder management	Regulation of feed supply	√	√	√	√	√	√
	Fodder production and grassland improvement	√	√	√	√	√	√
	Introduction of suitable grasses and	√	√	√	√	√	√

	legumes in the pastures						
	Conservation of fodder to meet winter scarcity	√	√	√	√	√	√
	Providing minerals on low cost	√	√	√	√	√	√

Source: Field Survey, 2007-08

Table 5.24 Problems / Interventions for Cultured Fisheries

Constraint	Pachhad	Rajgarh	Nahan	Sangrah	Shillai	Paonta	District
Quality/quantity of fingerlings	√	√	√	√	√	√	√
Quality and quantity of water supply	√	√	√	√	√	√	√
Training	√	√	√	√	√	√	√
Technical know how	---	---	---	---	---	---	---
Pond structure	√	√	√	√	√	√	√
Perishability	√	√	√	√	√	√	√
Remunerative price	√	√	√	√	√	√	√
Market	√	√	√	√	√	√	√

Source: Field Survey, 2007-08

Chapter VI

DISTRICT PLAN

The district has been discussed in detail in terms of climatic parameters, location, population, literacy, soils and water resources, infrastructural facilities, analysis of strengths, weaknesses, opportunities and threats (SWOT) and existing status of agricultural and allied sectors like crop production, horticulture, animal husbandry, fisheries, and sericulture. Valuable insights have been thrown about the existing status in terms of yield gaps and constraints and interventions to realise the potential of agricultural development in the district. Likewise, the physical targets in critical areas like potential for irrigation development, water harvesting and requirement for infrastructural facilities like rural roads and rural markets to accelerate rate of growth in agriculture and allied sectors have been earmarked to be accomplished in the next five years. The present chapter gives financial estimates of the plan along with sectoral and yearly allocations, new schemes/works that are proposed in the plan, projected growth rates of production of foodgrain, vegetables, fruit and milk, projected input requirement, growth drivers and vision for the next plan.

6.1 Plan Estimates

The details about the total plan outlay and its sectoral allocation and yearly distribution are given in Table 6.1. The total plan outlay is 503.35 crores out of which around 7.5 per cent is earmarked for crop sector to reduce the yield gaps by undertaking measures like promotion of high yielding variety seeds, improvement of soil health, protection of crops against biotic and abiotic stresses, promoting water use efficiency, and so on. The need based infrastructure development i.e. irrigation and improvement in its delivery has been allocated Rs 158.81 crore. Lack of water has emerged as the biggest constraint in realisation of the potential of the agriculture sector in the ongoing process of agricultural transformation towards high value cash crops. The development of irrigation potential is expected to give a big boost to the overall development of agricultural sector including livestock and horticulture. Share of natural resource conservation and management was Rs 169.96 crore. Around 16.5 per cent of the plan outlay is earmarked for the development of livestock sector while horticulture sector accounts for nearly 1.74 per cent. It needs to be mentioned here that a huge amount of investment is also being made in the horticultural sector under National Horticulture Technology Mission. Over the five-year period, the plan outlay has been allocated in the proportion of 15 per cent for the first year of the plan, 20 per cent for the next three years and the remaining 25 per cent is proposed for the fifth year of the plan.

6.2 New/Innovative Schemes

Given the resource potential in the district, emerging demand, markets and available technologies, a number of new schemes including schemes for irrigation and water harvesting schemes have been identified to be included in the district agricultural plan. The details of these schemes in terms of villages covered, beneficiary families, potential area along with required funds are provided in Table 6.2 and Table 6.3. The proposed schemes include watershed

harvesting, soil/land conservation, protected cultivation, organic farming, agro-tourism, horticultural schemes, sericulture, fisheries, livestock improvement, rural roads and bridges and rural markets.

6.3 Prioritisation of Different Schemes

While carrying out field survey, the progressive farmers and other stakeholders were asked about prioritisation of the implementation of different schemes//works proposed in the plan in different sectors, namely, agriculture, horticulture and animal husbandry. These priorities are given in Table 6.4. The table shows that in case of agriculture, the provision of irrigation through flow irrigation & rain water harvesting has been given the highest priority followed by improved agricultural inputs & technologies, soil & water conservation, control of monkey & wild animal menace, organic agriculture and agro tourism. Insofar as horticulture is concerned, the provision of protected cultivation infrastructure has been assigned the top most priority followed by the provision of improved inputs & technologies, control of monkey and wild animal menace, diversification, processing and storage and mushroom cultivation. In livestock sector vaccination & medication facilities, solution for repeat breeding, grassland improvement, easy availability of technical know how & inputs were required on priority.

6.4 Projected Outcomes, Growth Rates and Input Requirement

The implementation of the proposed plan is expected to accelerate the pace of agricultural development in the district. Assuming the assured irrigation facilities are provided by harnessing the irrigation potential and harvesting rainwater, the foodgrains production is expected to grow at a rate of 6.83 per cent per annum (Table 6.6). Likewise, the augmentation of land and water resources shall have significant impact on enhancing productivity of these scarce resources. The detailed outcomes are listed below.

- Irrigation potential shall be created which will provide irrigation to an area of 10,427 hectares (Table 6.5).
- Available water potential shall be exploited and thereby 10,427 hectares of land (5,177 ha through irrigation sources and 5,250 ha through water harvesting) shall be brought under protective and assured irrigation (Table 6.5).
- With the implementation of plan 54.33 per cent of the arable land will have assured irrigation facilities compared to existing 28.59 per cent (Table 6.5).
- Land amounting to 22,921 hectares infested with soil erosion, stream bank erosion, etc shall be treated by adopting soil conservation measures (Table 6.5).
- Support land (permanent pasture & grazing lands) of 54,305 hectares shall be treated against invasive weeds and shrubs. This shall improve the fodder production to the approximate level of 5,431 metric tonnes (Table 6.5).
- Foodgrain production shall increase from 1,09,513 metric tonnes to 1,46,895 metric tonnes after the implementation of the plan recording a growth rate of 6.83 per cent per annum in scenario I (Table 6.6). Even in scenario II when 20 per cent of irrigated land is shifted to vegetable production, the growth rate in foodgrains production shall be very high at 6.33 per cent per annum

- Production of vegetables would increase from 1, 11, 169 metric tonnes to 1, 29, 793 metric tonnes in scenario I registering a growth rate of 3.35 per cent per annum when the proportion of area under these crops remains same. The production would increase to 1, 71, 693 metric tonnes recording a growth rate of 10.89 per cent per annum in scenario II when 20 per cent of the irrigated area is brought under these crops (Table 6.6). This will generate a marketable surplus of 1, 54, 523 metric tonnes which in monetary terms amounts to Rs 139.07 crores. This will create huge employment opportunities through backward and forward linkages.
- Yields of different crops of average farmers and those of progressive farmers and the current area under different crops have been used to calculate the projected production. The expected growth rates over the existing production would be remarkable ranging from as high as 28.89 per cent in case of rajmash followed by paddy (16.54 per cent per annum) and barley (16.27 per cent). The growth in case of cereals crops is projected at 10.17 per cent for maize and 12.45 per cent for wheat (Table 6.7).
- Based on yields of progressive farmers, the production of different fruit crops is expected to register high growth rates. For example, the production of important fruit crops like apple, stone fruit, citrus, mango and strawberry is expected to increase at a rate of 9.6 per cent, 20.8 per cent, 28.0 per cent, 16.0 per cent and 184.0 per cent per annum, respectively (Table 6.8).
- The milk production is expected to increase about fifty five per cent. The milk from crossbred cows, local cows and buffalo is expected to increase at a rate of 24.64 per cent, 20.81 per cent and 22.98 per cent, respectively (Table 6.9). Wool production is expected to increase by 28.11 per cent per annum.
- Agriculture, horticulture and animal husbandry sectors are projected to grow at annual rate of 11.30 per cent, 6.08 per cent and 23.26 per cent, respectively (Table 6.10). The overall growth rate of agriculture excluding fishery is projected at 10.82 per cent per annum. The fish production is projected to grow at 4.41 per cent per annum.
- Supply of the fertilizers should increase in juxtaposition to increase in its demand. The demand of different types of fertilisers like CAN, UREA, 12:32:16, SSP and MOP is projected to increase to 36, 4058, 2029, 20 and 520 metric tonnes, respectively by the year 2012-13 under scenario I (Table 6.11). Under scenario II, the demand for these fertilisers is projected to increase at 46, 4891, 2432, 25 and 597 metric tonnes, respectively. And in scenario III it is projected to increase to 59, 5874, 2905, 32 and 683 metric tonnes, respectively.

6.5 Growth Drivers

Suitable agro-climatic conditions to grow high value cash crops (fruit, vegetables, spices and condiments), burgeoning demand for these crops coupled with huge market in the neighbouring states are the most important growth drivers of the crop sector particularly the cultivation of high value cash crops. Likewise, emerging local demand for dairy products, especially milk, in the district because of lot of industrial projects work, is an important potential growth driver of animal husbandry sector. The availability of basic infrastructural facilities like assured irrigation, rural roads, the Control Atmosphere Storage (CAS), extension facilities, etc.; are the important

growth drivers for different sectors. The continuous R&D efforts for generating new agricultural technologies to increase yield levels, eradicate weeds to improve the productivity of support and pasture lands and reduction in the cost of cultivation are urgently required for harnessing the potential of the district.

6.6 Vision of Next Plan

This plan shall accelerate the ongoing process of crop diversification. This shall make the district a leader in production of off-season vegetable, spices and condiments and quality fruit. The harnessing of irrigation potential both through irrigation schemes like flow irrigation and harvesting of rain water through watershed development shall go a long way in reducing risk and stabilising the production of different crops. Likewise, improving rural connectivity and proving marketing infrastructure shall further accelerate the process of crop diversification towards fruits and vegetable. As mentioned above, the district has a potential to switch over to organic cultivation of different crops, in particular apple, spices and medicinal and aromatic plants/herbs, which can be sold at a premium price both in the domestic and world markets. As a result of all this these efforts, there will be a significant increase in the incomes and employment of the farmers. This whole process is expected to give rise to a number of rural non-farm activities encouraging the process of transfer of workers from agriculture to non-agricultural sector.

The climate change may invite the introduction of new crops and threaten the economic viability and ecological sustainability of existing crops. Many more new challenges are expected to emerge like the emergence of new diseases and insects and pests. Certain valuable flora and fauna may disappear. There might be shortage of water due to less snowfall on hills and its early melting. Besides climate changes, several second generation problems may also emerge like newer and more efficient technologies which may endanger the economic viability of the existing crops and cropping systems. All these emerging challenges call for concerted efforts to understand full implications of such changes and devise effective strategies to cope up with such impending challenges.

Table 6.1 Sectoral Outlays and Yearly Allocation (Lakh Rs.)

Sr. No.	Schemes	Total Plan Outlay	Yearly Allocation				
			I	II	III	IV	V
I	Interventions to Improve and Enhance Sustainability of Crop Production System	3772	565.8	754.4	754.4	754.4	943
1	Improvement of productivity of cereals, pulses, oilseeds, vegetables and spices crops through promotion of HYV seeds including hybrids	250	37.5	50	50	50	62.5
2	Improvement of soil health through vermin-composting, bio-fertilizers, micro nutrients, soil testing etc.	260	39	52	52	52	65
3	Protection of crops against biotic stresses (diseases, pests, weeds) and abiotic stresses (hailstorms, drought, flash floods, etc) and other risk factors	150	22.5	30	30	30	37.5

4	Water use efficiency through micro irrigation	1000	150	200	200	200	250
	(i) Sprinkler	900	135	180	180	180	225
	(ii) Drip	100	15	20	20	20	25
5	Agricultural mechanization through popularization of improved tools and hill specific machinery like power tillers, tractors, crop planters/ harvesters, sprayers, clod breakers and gender friendly post harvesting equipments to remove women drudgery	220	33	44	44	44	55
6	Protected (poly house) cultivation to minimize risk factors and enhance quality and productivity	1792	268.8	358.4	358.4	358.4	448
7	Strengthening and improvement of quality control infrastructure (seed, pesticides and fertilizer testing laboratories)	20	3	4	4	4	5
8	Strengthening of seed production farms and promotion of infrastructure to improve seed production and replacement	80	12	16	16	16	20
II	Need Based Infrastructure Development	15881	2382.15	3176.2	3176.2	3176.2	3970.25
1	Irrigation	7318	1097.7	1463.6	1463.6	1463.6	1829.5
2	Improvement of on-farm water delivery and efficiency of existing irrigation systems	6163	924.45	1232.6	1232.6	1232.6	1540.75
3	Rural markets	100	15	20	20	20	25
4	Rural roads for connectivity	2300	345	460	460	460	575
III	Natural Resource Conservation and Management	16969	2545.35	3393.8	3393.8	3393.8	4242.25
1.	Soil conservation of arable and non-arable land through engineering measures	1500	225	300	300	300	375
2.	Water harvesting check dams, ponds, tanks, etc	13125	1968.75	2625	2625	2625	3281.25
3.	Land improvement	2344	351.6	468.8	468.8	468.8	586
IV	Niche Based Enterprises for Rural Entrepreneurs	605	90.75	121	121	121	151.25
	(i) Organic farming	280	42	56	56	56	70
	(ii) Sericulture	100	15	20	20	20	25
	(iii) Agro-tourism	225	33.75	45	45	45	56.25
V	Fruit Production	875	131.25	175	175	175	218.75
VI	Livestock, Poultry & Fisheries	8322	1248.3	1664.4	1664.4	1664.4	2080.5
1	Livestock improvement	8262	1239.3	1652.4	1652.4	1652.4	2065.5
2	Fisheries	60	9	12	12	12	15
VII	Human Resources	3201	480.15	640.2	640.2	640.2	800.25
1	Additional man power requirement	3108	466.2	621.6	621.6	621.6	777
2	Capacity building of extension personnel	93	13.95	18.6	18.6	18.6	23.25
VIII	Research & Extension	710	106.5	142	142	142	177.5
IX	All Sectors & Schemes	50335	7550.25	10067	10067	10067	12583.75

Table 6.2 New Schemes for Agriculture and Rural Development

Block	No. of Schemes	Village (No)	Beneficiary families (No)	Potential area (ha)	Funds required (Lakh Rs)
Water harvesting scheme (polylined tanks & WHS)					
Pachhad	2	263	3200	120	720
Rajgarh	2	140	1700	60	360
Nahan	2	136	1650	60	360
Sangrah	2	121	1450	60	360
Shillai	2	190	2300	90	540
Paonta	2	454	5500	60	360
Total	2	1304	15648	450	2700
Soil/land conservation schemes					
Pachhad	1	40	1319	500	250
Rajgarh	1	40	1882	500	250
Nahan	1	40	2581	500	250
Sangrah	1	50	3877	500	250
Shillai	1	50	2459	500	250
Paonta	1	50	3071	500	250
Total	1	270	15189	3000	1500
Horticultural schemes					
Pachhad	4	80	1600	250	125
Rajgarh	4	100	2000	375	188
Nahan	4	80	1600	250	125
Sangrah	4	80	1600	250	125
Shillai	4	100	2000	375	188
Paonta	4	80	1600	250	125
Total	4	520	10400	1750	875
Sericultural schemes					
Pachhad	1	15	50	2	10
Rajgarh	1	15	50	2	10
Nahan	1	32	100	4	30
Sangrah					
Shillai					
Paonta	1	128	1000	20	50
Total	1	190	1200	28	100
Fisheries (pond constructions)					
Pachhad	1	5	10	1	10
Rajgarh	1	5	10	1	10
Nahan	1	5	10	1	10

Sangrah	1	5	10	1	10
Shillai	1	5	10	1	10
Paonta	1	5	10	1	10
Total	1	30	60	6	60
Livestock improvement schemes					
Pachhad	4	263	200		600
Rajgarh	4	140	150		550
Nahan	4	136	200		700
Sangrah	4	121	300		800
Shillai	4	190	250		550
Paonta	4	454	250		1000
Total	4	1304	1350		4200
Other agril schemes					
Pachhad	5	263	3200	526	63
Rajgarh	5	140	1680	280	34
Nahan	5	136	1630	272	33
Sangrah	5	121	1450	242	29
Shillai	5	190	2280	380	46
Paonta	5	454	5450	908	109
Total	5	1304	15690	2608	313
Rural roads (Kms)					
Pachhad	1	10	500		300
Rajgarh	1	10	500		300
Nahan	1	5	250		350
Sangrah	1	10	500		400
Shillai	1	10	500		500
Paonta	1	5	250		450
Total	1	50	2500		2300
Bridges					
Pachhad					
Rajgarh	1	5	50		200
Nahan	1	5	50		200
Sangrah					
Shillai					
Paonta	2	10	100		400
Total	4				800
Rural markets					
Pachhad					
Rajgarh					

Nahan					
Sangrah	1	120	270	550	50
Shillai	1	190	220	450	50
Paonta					
Total	2	310	490	1000	100
Protected cultivation					
Pachhad	1	30	300	30	384
Rajgarh	1	15	150	15	192
Nahan	1	15	150	15	192
Sangrah	1	15	150	15	192
Shillai	1	20	200	20	256
Paonta	1	45	450	45	576
Total	1	140	1400	140	1792
Organic farming					
Pachhad	1	30	450	300	60
Rajgarh	1	15	225	150	30
Nahan	1	15	225	150	30
Sangrah	1	15	225	150	30
Shillai	1	20	300	200	40
Paonta	1	45	675	450	90
Total	1	140	2100	1400	280
Agro-tourism					
Pachhad	1	5	25		38
Rajgarh	1	5	25		38
Nahan	1	5	25		38
Sangrah	1	5	25		38
Shillai	1	5	25		38
Paonta	1	5	25		38
Total	1	30	150		225

Source: Field Survey, 2007-08

Table 6.3 Potential/New Irrigation Schemes

Particulars	Pachhad	Rajgarh	Nahan	Sangrah	Shillai	Paonta	District
Lift irrigation							
Number	0	9	2	0	10	11	32
Amount required	0	800	55	0	1144	1514	3513
Villages to be covered	0	22	2	0	10	11	45
Beneficiaries(No.)	0	4400	135	0	750	1575	6860
Command area(ha)	0	67	52	0	647	1067	1833
Tube wells							0
Number	0	0	1	0	0	15	16
Amount required	0	0	35	0	0	620	655
Villages to be covered	0	0	1	0	0	15	16
Beneficiaries(No.)	0	0	70	0	0	625	695
Command area(ha)	0	0	30	0	0	450	480
Kuhl							0
Number	18	8	7	8	12	9	62
Amount required	346	290	280	300	396	692	2304
Villages to be covered	18	9	7	8	12	9	63
Beneficiaries(No.)	750	700	500	550	750	875	4125
Command area(ha)	400	370	300	350	540	654	2614
Tank irrigation							
Number	100	100	50	100	100	50	500
Amount required	200	200	100	200	200	100	1000
Villages to be covered	100	100	50	100	100	50	500
Beneficiaries(No.)	1000	1000	500	1000	1000	500	5000
Command area(ha)	50	50	25	50	50	25	250

Table 6.4 Prioritizations of Schemes/Works (Ranks)

Sector	Scheme	Pachhad	Rajgarh	Nahan	Sangrah	Shillai	Paonta	District
		Rank						
Agriculture	Irrigation through FIS & rain water harvesting	1	1	1	1	1	1	1
	Improved agri inputs & technologies	2	2	3	2	2	3	2
	Soil & water conservation	3	3	2	3	3	2	3
	Monkey & wild animal menace control	4	4	4	4	4	4	4
	Organic agriculture	5	5	6	5	5	6	5
	Agro tourism	6	6	5	6	6	5	6
Horticulture	Protected cultivation	1	1	1	1	1	1	1
	Improved horti inputs & technologies	2	2	2	2	2	2	2
	Monkey and wild animal menace control	3	3	3	3	3	3	3
	Divesification	5	5	4	5	6	4	4
	Processing and storage	6	6	5	4	5	5	5
	Mushroom cultivation	4	4	6	6	4	6	6
Animal Husbandry	Vaccination & medication facilities	1	1	1	1	1	1	1
	Solution for repeat breeding	2	2	2	2	2	2	2
	Grassland improvement	3	3	3	3	3	3	3
	Easy availability of technical know how & inputs	4	4	4	4	4	4	4

Table 6.5 Augmentation of Land and Water Resources: Physical Targets (Ha)

Blocks	Cultivated land	Potential cultivable land	Productive support land	Potential support land	Existing irrigated area	Potential irrigated land	Irrigation potential through water harvesting
Pachhad	4788	6128	3570	5354	240	450	900
Rajgarh	5041	4445	3274	4912	796	487	1200
Nahan	6018	2531	4232	6348	1453	407	1500
Sangrah	5540	4375	5746	8619	402	400	800
Shilai	4519	1529	3343	5014	830	1237	600
Paonta	14597	3913	1557	2336	7859	2196	250
District	40503	22921	21722	32583	11580	5177	5250

Table 6.6 Projected Output of Foodgrain and Vegetables

Crops	Existing			Potential Production (MT)		Growth (% p. a.)	
	Area (ha)	Production (MT)	Yield (q/ha)	Scenario I	Scenario II	Scenario I	Scenario II
Maize	22860	46865	20.50	60248	59940	5.71	5.58
Paddy	5435	7776	14.31	12004	11953	10.88	10.74
Wheat	26036	48422	18.60	64751	64434	6.74	6.61
Barley	2505	3908	15.60	4596	4570	3.52	3.39
Pulses	3579	2509	7.01	2950	2934	3.52	3.39
Foodgrains	60595	109513	17.91	146895	144183	6.83	6.33
Vegetables	6353	111169	175.00	129793	171693	3.35	10.89

Note: i. Scenario I output growth with increased irrigated area and crop improvement programmes

ii. Scenario II output growth with diversion of 20 % irrigated area to vegetable crops

Table 6.7 Projected Output and Growth in the Production of Different Crops

Cereal	Current Production (mt)	Projected Production (mt)	Growth rate (% p.a.)
Maize	87050.34	131319.53	10.17
Paddy	5068.96	9260.60	16.54
Wheat	72462.84	117574.51	12.45
Barley	1317.84	2390.20	16.27
Mash	857.15	1117.55	6.08
Rajmash	46.80	114.40	28.89
Toria	364.76	489.11	6.82
Sarson	322.3	509.82	11.64
Potato	11129.64	17354.50	11.19
Peas	3039.96	4764.76	11.35
Tomato	35560.98	46892.43	6.37
Cauliflower	143.98	177.10	4.60
Beans	1532.42	2159.68	8.19
Capsicum	1234.20	1694.00	7.45
Ginger	17336.00	28888.08	13.33
Garlic	10088.64	15960.12	11.64
Onion	2990.46	3693.75	4.70
Sugarcane	18235.00	27702.50	10.38

Table 6.8 Projected Output Growth in Fruit Crops Production

Particulars	Existing			Potential			Growth rate in production (% p.a.)
	Area (ha)	Prod (mt)	Yield (q/ha)	Area (ha)	Prod (mt)	Yield (q/ha)	
Apple	1463	5642	38.6	2300	11061	48.1	9.6
Stone fruits	1753	4580	26.1	3450	12215	35.4	20.8
Citrus fruits	272	792	29.1	650	2565	39.5	28.0
Mango	448	1677	37.4	850	3818	44.9	16.0
Strawberry	135	972	72.0	350	2760	78.9	184.0

Table 6.9 Projected Output Growth in Livestock Products and Live Animals for Sale

Particulars	Existing			Potential (MT)			Growth rate in production (% p.a.)
	No	Prod (MT)	Milk	No.	Prod (MT)	Milk	
			Yield (l/day)			Yield (l/day)	
Local	115113	171.9	1.49	115113	383.7	3.33	24.64
Cross bred	32447	137.8	4.25	32447	281.2	8.67	20.81
Buffalo	48672	151	3.1	48672	324.5	6.67	22.98
Wool/Sheep	17758	7.4	0.42	17758	17.8	2	28.11
Sheep/Goat for meat	138826			166591			4.00

Table 6.10 Projected Value Output and Growth of Agriculture and Allied Sectors

Cereal	Current value productivity (Rs. lakh)	Projected value productivity (Rs. lakh)	Growth rate (% p. a.)
Agriculture	22811.45	35697.29	11.30
Horticulture	2516.97	3282.21	6.08
Livestock	73.55	159.09	23.26
Fisheries	3.40	4.15	4.41
Overall without fisheries	25401.96	39138.60	10.82

Table 6.11 Fertiliser Actual Supply and Projections for 2012-13 (Tonnes)

Year	CAN	UREA	12:32:16	SSP	MOP
2003-04	308	2235	830	93	13
2004-05	272	1866	860	23	9
2005-06	52	2455	977	12	5
2006-07	22	2430	976	16	11
2007-08	12	2922	1217	27	42
Growth rate (% p. a)	-19.24	6.15	9.35	-14.19	44.62
Projection for 2012-13	36	4058	2029	20	520
Projection making allowance for crop diversification @ 2 %	46	4891	2432	25	597
Projection making allowance for irrigation@ 2 % over diversification	59	5874	2905	32	683

Source: (i) Data on Supply, Himfed Nahan and IFFCO, Paonta Sahib

(ii) Projections by the consultant following methodology adopted by Fertilizer association of India, New Delhi

APPENDIX TABLES

Appendix 1 Block-wise Demographic and Institutional Features (No.)

Sr No	Particulars	Pachhad	Rajgarh	Nahan	Sangrah	Shillai	Paonta	District
1.	Gram panchayats	30	30	34	41	29	64	228
2.	Villages	263	140	136	121	190	454	1304
3.	Households	8674	6587	8775	9382	9343	27884	70645
	Total population							
4.	Male	23842	21296	32331	31201	27984	79002	215656
	Female	22178	20384	29030	29957	24560	69158	195267
	Schedule caste	18164	18706	19012	24832	15049	30917	126680
	Schedule tribe	32	41	4746	3	0	972	5794
	Rural	46020	41680	61361	61158	52544	148160	410923
	Urban	0	0	10615	0	0	0	10615
	Sex ratio	930	957	898	960	877	875	916
5.	Literacy rate							
	Male	79	36	86	61	95	75	72
	Female	88	28	70	44	85	60	63
6	Households economic status							
	Antodaya households	430	1152	1539	0	793	3442	7356
	BPL households	6469	1740	2323	1381	538	5794	18245
	APL1 households	1275	3695	0	0	3993	19719	28682
	APL2 households	1656	0	2207	0	793	0	4656
7.	Village amenities							
	Connected with pucca roads	75	65	71	22	15	75	323
	Connected with kuchha roads	45	40	32	61	37	60	275
	Connected with no roads	142	35	37	57	88	5	364
	Drinking water supply	262	140	140	140	140	140	962
	Villages electrified	262	140	140	140	140	140	962
	Post office	20	21	20	39	20	41	161
	Fair price shops							
	<i>Co-op depots</i>	30	49	30	2	10	55	176
	<i>Private dealers</i>	12	17	0	0	17	0	46
8.	Educational and health institutions							
	Primary schools	135	108	127	180	171	253	974
	Middle schools	28	23	32	36	29	49	197
	High schools	19	15	36	23	14	23	130
	Technical institutions							
	<i>Polytech/Engg</i>	0	0	1	0	1	0	2
	<i>ITI</i>	1	2	1	4	0	10	18
	<i>Nurshing TI</i>	0	0	1	0	0	0	1
	<i>College of Education</i>	0	1	1	0	0	1	3

	PHC	5	4	5	10	2	0	26
	Dispensaries	5	0	1	0	0	0	6
	Sub-health centres	22	13	28	27	14	0	104
	Community HCs	1	1	0	1	0	0	3
	Hospitals	0	1	2	0	1	1	5
	Medl college cum hospitals	0	0	0	0	0	0	0
	Veterinary hospitals	4	4	4	5	5	5	27
	Veterinary dispenserries	12	16	23	26	26	22	125
	Gosadan	0	0	1	0	0	2	3
	Other health institutions	0	0	0	0	0	1	1
	Anganwaries/balwaries	154	187	233	209	214	252	1249
9.	Village/community organizations							
	Mahila mandals	30	30	34	41	29	64	228
	Self help groups	148	133	404	95	126	80	986
	Youth clubs	1	114	150	0	25	0	290
	NGOs	3	5	35	2	3	26	74
	Farmers co-operatives	0	17	22	0	2	0	41
10	Banking institutions							
	Commercial banks	9	7	15	12	5	24	72
	RRBs	0	4	1	0	0	0	5
	Central co-operative banks	2	0	5	4	0	0	11
	Co-operative credit societies	30	3	1	0	1	0	35

Source: Field Survey, 2007-08

Appendix 2 Distribution of Workers and Categories of Farmers (No.)

Particulars	Pachhad	Rajgarh	Nahan	Sangrah	Shillai	Paonta	District
Workers							
Cultivators	25216	21165	22274	33298	21618	38027	161598
Agri. labour	348	847	901	543	172	2956	5767
H.hold/industry workers	168	152	678	257	289	1051	2595
Others	3749	3711	15959	3217	2171	27105	55912
Total							
Main workers	23496	18227	28538	27334	20719	57599	175913
Marginal workers	5985	7648	11274	9981	3531	11540	49959

Source: District Statistical Officer, Nahan

Appendix 3 Farm Gate Prices of Different Crops

Crop	Unit price (Rs/MT)
1. Maize	6500
2. Paddy	9000
3. Wheat	8500
4. Barley	10000
5. Mash	3500
6. Rajmash	4000
7. Toria	3000
8. Sarson	3000
9. Potato	5000
10. Peas	10000
11. Tomato	6000
12. Cauliflower	5000
13. Beans	8000
14. Capsicum	10000
15. Ginger	22000
16. Garlic	30000
17. Onion	4000
18. Sugarcane	800
19. Apple	20000
20. Citrus	20000
21. Mango	15000
22. Stone fruits	15000
23. Strawberry	30000
24. Milk	15000
25. Wool	60000
26. Fisheries	50000

Source: Field Survey, 2007-08

