Department of Agriculture
Himachal Pradesh

DISTRICT AGRICULTURE PLAN

SOLAN, 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 Solan was prepared by Dr. R. K. Sharma, Dr. H. R. Sharma and Dr. S. K. Chauhan. 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

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**	**2530**	**379.5**	**506**	**506**	**506**	**632.5**
1	Improvement of productivity of cereals, pulses, oilseeds, vegetable and spice 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.	150	22.5	30	30	30	37.5
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	900	135	180	180	180	225
	(i) Sprinkler	700	105	140	140	140	175
	(ii) Drip	200	30	40	40	40	50
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	45	6.75	9	9	9	11.25
6	Protected (poly house) cultivation to minimize risk factors and enhance quality and productivity	960	144	192	192	192	240
7	Strengthening and improvement of quality control infrastructure (seed, pesticides and fertilizer testing laboratories)	45	6.75	9	9	9	11.25
8	Strengthening of seed production farms and promotion of infrastructure to improve seed production and replacement	30	4.5	6	6	6	7.5
II	**Need Based Infrastructure Development**	**447**	**67.05**	**89.4**	**89.4**	**89.4**	**111.75**
1	Improvement of on-farm water delivery and efficiency of existing irrigation systems	327	49.05	65.4	65.4	65.4	81.75
2	Rural markets	120	18	24	24	24	30
III	**Natural Resource Conservation and Management**	**9645**	**1446.75**	**1929**	**1929**	**1929**	**2411.25**
1.	Soil conservation of arable and non-arable land through engineering measures	330	49.5	66	66	66	82.5
2.	Water harvesting check dams, ponds, tanks, etc	9315	1397.25	1863	1863	1863	2328.75
IV	**Niche Based Enterprises for Rural Entrepreneurs**	**130**	**19.5**	**26**	**26**	**26**	**32.5**

	(i) Organic farming	130	19.5	26	26	26	32.5
V	**Fruit Production**	**1061**	**159.15**	**212.2**	**212.2**	**212.2**	**265.25**
VI	**Livestock, Poultry & Fisheries**	**1050**	**157.5**	**210**	**210**	**210**	**262.5**
1	Livestock improvement	890	133.5	178	178	178	222.5
2	Fisheries	160	24	32	32	32	40
VII	**Human Resources**	**983**	**147.45**	**196.6**	**196.6**	**196.6**	**245.75**
1	Additional man power requirement	954	143.1	190.8	190.8	190.8	238.5
2	Capacity building of extension personnel	29	4.35	5.8	5.8	5.8	7.25
VIII	**Research & Extension**	**388**	**58.2**	**77.6**	**77.6**	**77.6**	**97**
IX	**All Sectors & Schemes**	**16234**	**2435.1**	**3246.8**	**3246.8**	**3246.8**	**4058.5**

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

Comprehensive District Agriculture Plan: Sectoral Outlays and Yearly Allocations (Rs. 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**	**2530**	**379.5**	**506**	**506**	**506**	**632.5**
1	Improvement of productivity of cereals, pulses, oilseeds, vegetable and spice 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.	150	22.5	30	30	30	37.5
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	900	135	180	180	180	225
	(i) Sprinkler	700	105	140	140	140	175
	(ii) Drip	200	30	40	40	40	50
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	45	6.75	9	9	9	11.25
6	Protected (poly house) cultivation to minimize risk factors and enhance quality and productivity	960	144	192	192	192	240
7	Strengthening and improvement of quality control infrastructure (seed, pesticides and fertilizer testing laboratories)	45	6.75	9	9	9	11.25
8	Strengthening of seed production farms and promotion of infrastructure to improve seed production and replacement	30	4.5	6	6	6	7.5
II	**Need Based Infrastructure Development**	**1901**	**285.15**	**380.2**	**380.2**	**380.2**	**475.25**
1	Irrigation	614	92.1	122.8	122.8	122.8	153.5
2	Improvement of on-farm water delivery and efficiency of existing irrigation systems	327	49.05	65.4	65.4	65.4	81.75
3	Rural markets	240	36	48	48	48	60
4	Rural roads for connectivity	720	108	144	144	144	180
III	**Natural Resource Conservation and Management**	**18960**	**2844**	**3792**	**3792**	**3792**	**4740**
1.	Soil conservation of arable and non-arable land through engineering measures	330	49.5	66	66	66	82.5
2.	Water harvesting check dams, ponds, tanks, etc	18630	2794.5	3726	3726	3726	4657.5

IV	**Niche Based Enterprises for Rural Entrepreneurs**	**130**	**19.5**	**26**	**26**	**26**	**32.5**
	(i) Organic farming	130	19.5	26	26	26	32.5
V	**Fruit Production**	**1061**	**159.15**	**212.2**	**212.2**	**212.2**	**265.25**
VI	**Livestock, Poultry & Fisheries**	**1050**	**157.5**	**210**	**210**	**210**	**262.5**
1	Livestock improvement	890	133.5	178	178	178	222.5
2	Fisheries	160	24	32	32	32	40
VII	**Human Resources**	**983**	**147.45**	**196.6**	**196.6**	**196.6**	**245.75**
1	Additional man power requirement	954	143.1	190.8	190.8	190.8	238.5
2	Capacity building of extension personnel	29	4.35	5.8	5.8	5.8	7.25
VIII	**Research & Extension**	**388**	**58.2**	**77.6**	**77.6**	**77.6**	**97**
IX	**All Sectors & Schemes**	**27003**	**4050.45**	**5400.6**	**5400.6**	**5400.6**	**6750.75**

PROPOSED INTERVENTIONS AND EXPECTED OUTCOMES

I. Projected Output Growth of Agriculture in District Solan

Crops	Existing			Potential Production (MT)		Growth (% p. a)	
	Area (Ha)	Production (MT)	Yield (Q/ha)	Scenario I	Scenario II	Scenario I	Scenario II
Maize	21,775	38,392	17.63	46,629	45,935	4.29	3.93
Paddy	4,719	10,351	21.93	16,758	16,571	12.38	12.02
Wheat	23,894	45,945	19.23	60,619	59,789	6.39	6.03
Barley	1,573	1,799	11.44	2,084	2,051	3.16	2.80
Pulses	2,789	959	3.44	1,111	1,094	3.16	2.80
Foodgrains	54,750	9,7467	17.80	1,28,097	1,26,334	6.29	5.92
Vegetables	6982	1,66,172	238.00	2,06,816	3,60,713	4.89	23.41

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

II. Projected Output Growth in Fruit Production (MT)

Particulars	Actual production	Potential production	Growth rate (% p.a.)
Apple	27	51	7.41
Other temperate fruit	3,870	5,946	4.47
Dry fruit	126	236.25	7.29
Citrus fruit	587	835	3.52
Other subtropical fruit	874	1410	12.27

Note: For computation of growth rates, 12 years period was taken for harnessing the potential production

III. Projected Output Growth in Milk Production (L/animal/year)

Livestock	Actual production	Potential production	Growth rate (% p.a.)
Crossbred cow	2211.90	3650.00	13.00
Local cow	1018.35	1825.00	15.84
Buffalo	1861.50	2920.00	11.37
Goat	518.30	730.00	8.17

IV Projected Output and Growth in the Production of Different Crops

Crop	Current production (Quintals)	Projected production (Quintals)	Growth rate (% p.a.)
Maize	429507	703866	12.78
Paddy	38087	75720	19.76
Wheat	242627	422940	14.86
Barley	17348	22598	6.05
Mash	2205	3020	7.40
Kulthi	606	920	10.36
Sesame	1623	1905	3.47
Sarson	6972	9296	6.67
Linseed	2507	3064	4.44
Potato	29930	43050	8.77
Peas	84771	114894	7.11
Tomato	919250	1345200	9.27
Cabbage	8929	13724	10.74
Cauliflower	23928	29929	5.02
Beans	29177	34388	3.57
Capsicum	54174	99552	16.75
Bhindi	14596	17898	4.53
Brinjals	10200	12960	5.41
Curcubits	10371	14742	8.43
Onion	5825	7141	4.52
Spinach	5661	7650	7.03
Radish	9805	12062	4.61
Ginger	56516	71640	5.35
Garlic	11314	13833	4.45

Interventions

- To ensure 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
- Promotion of integrated nutrient management through vermi-composting, popularization of bio-fertilizers and other ameliorants in addition to judicious and balanced nutrients to crops
- Promotion of micro-irrigation for efficient management and delivery of required quantities of water as per crop needs
- Promotion of mechanization conducive to hill farming and equipments & implements to reduce labour and to provide relief to the women folk
- Strengthening and improvement 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

- Construction of adequate number of CAS (Controlled Atmosphere Storage) at critical points
- The installation of anti-hail guns at critical points

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

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

Block	Cultivated land	Potential Cultivable land	Productive support land	Potential support land	Existing irrigated area	Potential irrigated land	Irrigation potential through water harvesting
Solan	3,366	2,989	10,000	1,639	321	90	800
Kandaghat	2,844	1,547	13,000	899	652	107	700
Kunihar	8,518	2,134	11,410	7,605	1,552	70	1,600
Nalagarh	18,017	8,747	4,000	12,093	3,527	95	3,500
Dharampur	5,521	2,879	10,000	4,680	102	43	800
District	38,266	18,296	48,410	26,916	6,154	405	7,400

VI. Projected Fertilisers Demand by 2012-13 (MT)

Fertilisers	Scenario-I	Scenario-II	Scenario-III
UREA	6323.54	6641.28	7315.07
IFFCO	2247.80	2358.84	2594.07
15:15:15	1761.27	1815.02	1926.45
MOP	41.98	44.01	48.30

Note: (i) Scenario-I projects demand on the basis of growth rate of demand for different fertilisers during the last five years.

(ii) 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.

(iii) 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.

VII Projected Value of Output and Growth of Agriculture and Allied Sectors (Rs. Lakhs)

Sectors	Current value of output	Projected value of output	Growth rate (% per annum)
Agriculture	16497.11	25196.50	10.55
Horticulture	1209.22	2383.69	19.43
Livestock	24514.16	35180.75	8.70
Overall	42220.49	62760.94	9.73

Interventions

- *In situ* soil and water conservation by employing different measures
- Improvement of support lands (private grasslands) by employing different measures for the control of invasive shrubs, weeds, etc.
- Use of water potential to provide assured irrigation to rainfed areas
- Water harvesting to create water potential for irrigation and to augment ground water

VIII Potential Enterprises for Gainful Employment

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

IX Human Resource Requirement (No.)

Block	Crop Production	Horticulture	Animal Husbandry	Others	Total
Solan	5	4	9	3	21
Kandaghat	5	1	4	2	12
Kunihar	5	1	6	2	14
Nalagarh	5	3	10	4	22
Dharampur	5	1	5	1	12
District	25	10	34	12	81

Intervention

- Need based training to the extension personnel within and outside the country
- Exposure to places of success stories where exemplary success has been achieved in the improvement of farming systems

X Some Quantitative Outcomes

- Foodgrain production shall increase from 97,467 metric tonnes to 1, 28,097 metric tonnes after the implementation of the plan recording a growth rate of 6.29 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 5.92 per cent per annum
- Production of vegetables would increase from 1, 66,172 metric tonnes to 2, 06,816 metric tonnes in scenario I registering a growth rate of 4.89 per cent per annum when the proportion of area under these crops remains same and to 3, 60,713 metric tonnes recording a growth rate of 23.41 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 3, 24, 641 metric tonnes which in monetary terms amounts to Rs. 324.64 crores. In addition, it will generate huge employment opportunities through backward and forward linkages.
- The apple production is expected to grow at a rate of 7.41 per cent per annum, other temperate fruit by 4.47 per cent per annum and dry fruit at a rate of 7.29 per cent per annum.
- The milk production is expected to increase by 13.00 per cent, 11.37 per cent and 8.17 per cent for crossbred cow, buffalo and goat, respectively.
- The production of different crops is projected to grow at different rates which varied from 3.47 per cent in case of sesame to as high as 19.76 per cent per annum in case of paddy.
- Irrigation potential shall be created which will provide irrigation to an area of 7,805 hectares.
- Available water potential shall be exploited and thereby 7,805 hectares of land shall be brought under protective and assured irrigation.
- With the implementation of plan, 20.40 per cent of the arable land will have assured irrigation facilities compared to existing 16.08 per cent.
- A huge chunk of land amounting to 1,14,780 hectares prone to soil erosion, stream bank erosion, etc shall be treated by adopting soil conservation measures.
- Support land (private grasslands) of 75,326 hectares shall be treated against invasive weeds and shrubs. This shall improve the fodder production to the approximate level of 7,532.60 metric tonnes.
- The demand for UREA, MOP, IFFCO and 15:15:15 is projected to increase to 6323.54 41.98, 2247.80 and 1761.27 metric tonnes, respectively in scenario I, 6641.28, 44.01, 2358.84 and 1815.02 metric tonnes respectively in scenario II and 7315.07, 48.30, 2594.07 and 1926.45 metric tonnes respectively in scenario III.
- With the effective implementation of plan, agriculture sector as whole is expected to grow at a rate of 9.73 per cent per annum as against the targeted 4 per cent. Different allied sectors, namely, agriculture, horticulture and livestock are projected to grow at 10.55 per cent, 19.43 per cent and 8.70 per cent per annum, respectively.

XI Researchable Issues

- 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 rainfed areas
- Issues related to increasing water productivity of stored water through crop diversification and soil and water management practice
- Formulation of bio-intensive IPM strategies for the management of *Helicoverpa armigera* (tomato and gram), white grubs (potato, maize, peas, ginger, cabbage etc), diamondback moth and cabbage caterpillar (cole crops), shoot and fruit borer (brinjal and okra), leaf miner and pod borer (peas), plant parasitic nematodes (cereals and vegetables)
- Insect pest and nematode management under protected cultivation situations
- Management of insecticide resistance in field populations of *Helicoverpa armigera, Spodoptera litura, Plutella xylostella, Leucinodes orbonalis, Trialeurodes vaporariorum*
- 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
- 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
- Standardization of agro-technology for organic vegetable production
- Development/refinement of production technology in ginger

- 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 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
- Survey and surveillance of major diseases of important crops
- Pathogenic and genetic diversity in pathogens associated with major crop like Bacterial wilt of solanaceous vegetables
- Identification of resistant sources and study of genetics of resistance
- 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 like important seed and soil borne diseases (pea root rot and wilt complex, bacterial wilt, bean mosaic, urd bean leaf crinkle, bacterial blight, potato viruses etc.)
- Development of IDM module like important diseases of major crops
- Characterization and classification of soils
- Development of improved commercially profitable dairy husbandry practices / technology
- Identification of the critical technical gaps in attaining the profitability under cattle production system
- Development of nutritious fodder grasses
- Development of an integrated livestock and poultry production model (ILPM)
- 'Monkey menace': socio-biological causes, economic implication and remedial strategy to tackle it
- The stray cattle menace: A technical study in to its genesis and for its sustainable remedy
- Development of suitable horticultural varieties keeping in view the climatic changes in the region
- To work out the nutritional requirements of the plants
- To standardize the intercultural operations in the fruit crops
- To introduce new breeds in fisheries which give higher yields

- Formulation of bio-intensive IPM strategies for the management of fruit flies (cucurbits and tomatoes)
- Replacement of old cultivars of plum, peaches, apricot with new improved varieties with a view to overcome mono-varietal situation, on-farm testing of persimmon and pomegranate varieties with better yield and quality for fruit crop diversification
- Development of efficient propagation techniques for walnut, pecan nut and persimmon
- Development of modules for INM for different fruit crops
- Standardization of agro-techniques to control irregular bearing in olive
- Research on organic farming in horticultural crops
- Identification of areas/ locations suitable for different flower crops
- Maintaining authentic and quality germplasm/ planting material of various flower crops to the growers at the affordable prices
- Development of flower varieties/ production technology, standardization of planting time & nutrients, integrated nutrient and pest management, irrigation management and flower regulation as per market demand
- Studies on post harvest management and maintaining the cool chain
- Nutrient indexing and improvement of soil health
- Irrigation water requirement & scheduling under conventional and high tech systems
- Development of resource conservation horticultural practices
- Development of technology for Integrated Nutrient Management (INM) in fruit and vegetables
- Protected cultivation technology and monitoring of soil health in poly houses
- Management of green peach aphid in capsicum under protected cultivation
- Generation of data base of pollinator diversity in different horticultural crops
- Safe waiting periods of pesticides on horticultural crops
- Disease management in pomegranate, stone fruit and ornamental plant crops like gladiolus, carnation, chrysanthemum, etc.
- Development of strategies for bean rust, bacterial spot of bell pepper and cucumber downy mildew
- Constraint identification in different horticultural crops
- Analyzing trends and patterns of demand, prices and markets of emerging crops and enterprises in the context of ongoing process of globalization
- Understanding economic implications of climate change towards cropping systems, cropping patterns and livelihoods of the farmers

- Assessing impact of the ongoing process of commercialization 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

XII 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 big boost to the ongoing process of crop diversification towards high value cash crop agriculture including off-season vegetable crops 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 of preparing an integrated plan considering available resources and encompassing all sectoral activities and schemes being carried out by the government or non-government organizations 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 decentralized 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 decentralized 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 have to proceed 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 of 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, to 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 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. 1,500 crores has been approved for 2007-08. The financial assistance provided to the state governments from this centrally sponsored scheme is subject to fulfillment 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 mechanizations, 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, the H P State Department of Agriculture entrusted the task of preparing these plans to the 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 utilization, farming systems, cropping pattern, horticulture, inputs use, farm machinery, yield and input gaps, issues in livestock management, fisheries, women drudgery, livelihoods of local population, different ongoing irrigation and watershed programmes/schemes, potential for new schemes, post harvest operations, market infrastructure, and so on at the village/panchayat 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 as follows.

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 inquiry, 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[1], 2000. The present section 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 to be 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. Wherever 10 per cent of 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 to be taken. Following this methodology, the number of panchayats selected in district Solan was 23, the detail of which is 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/ Tehsil level. Second, those on which data were to be collected at the panchayat level. Accordingly, two questionnaires were developed which were discussed with different stakeholders and officials of line departments before finalizing. 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 Sample Panchayats

Sr. No.	Block	Total Panchayats (No.)	Selected Panchayats (No. and name)
1	Kandaghat	24	4 (Sirinagar, Jhajha, Chhausa, Basha)
2	Kunihar	45	5 (Maan, Bakhalog, Daseram, Kunihar, Chakkar)
3	Dharampur	38	4 (Kotbeja, Madhala, Anjimatla, Chammo)
4	Nalagarh	69	6 (Behari, Matoli, Kishan Pura, Khera, Majhauli, Panjehra)
5	Solan	35	4 (Salogra, Nauni, Barog, Anhech)
	District	211	23

1.2.3 Analytical Tools

The data were analyzed 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 prioritized 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 it.

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 Introduction

Solan as an independent district came into existence on 1st September, 1972 consequent upon reorganization of the districts in Himachal Pradesh. It is said that the name Solan is associated with the local deity SHOOLINI. Solan is considered as gateway to Himachal Pradesh. The district was carved out from the Solan and Arki tehsils of the Mahasu district and Tehsil Kandaghat and Nalagarh of the Shimla district.

2.1.2 History

The district in its present form comprises of the erstwhile princely states of Bhagal, Bhagat, Kunihar, Kuthar, Mangal, Beja, Mahlog, Nalagarh and parts of Keonthal and Kothi and hilly areas of composite Punjab State which were merged in Himachal Pradesh on the 1st November, 1966 on the reorganization of composite Punjab on the linguistic basis. Most of these princely states as per history were subjected to the onslaught of Gorkha invasion from the year 1803 to 1805. It was in the year 1815 that after the Gorkhas lost to the Britishers, these states were freed and restored to the respective rulers. Most of the states were small in area and population and were under the control of the superintendent of Shimla Hill States before independence. Himachal Pradesh appeared on the administrative map of the country on 15th April, 1948 and the states of Bhagat, Baghal, Kunihar, Kuthar, Mangal, Beja, Keonthal and Koti formed a part of the then Mahasu district. Nalagarh state which was merged after independence in Patiala and East Punjab State Union later on formed a part of Punjab, when the reorganization of the states took place in 1956 and remained a tehsil of Ambala district. Kandaghat and Shimla tehsils of Shimla district like other hilly areas of Kullu, Lahul and Spiti and Kangra districts became part of Himachal Pradesh on 1st September, 1972 and Solan district sprang up on the administrative map of the state.

2.1.3 Location

Solan district of the state falls in Zone I and Zone II, which include low and mid hill regions. The district is situated between $76^0$42' to $77^0$20' East Longitude and $30^0$30' to $30^0$15' North latitude. The district comprises of five development blocks viz, Nalagarh, Dharampur, Solan, Kandaghat and Kunihar. The elevation of the district ranges from 300 to 3,000 meters above mean sea level. The district has some parts of very low altitude and others of high altitude. The terrain is mostly mountainous except valleys of Saproon in Solan Tehsil, Doon in Nalagarh Tehsil and Kunihar in Arki Tehsil. The mountains of lower elevation are found in Western and Southern part of district comprising of Nalagarh and Arki Tehsil while higher ranges start from central regions and extend upto north Eastern corner of the district comprising of Solan, Kasauli, Kandaghat and parts of Arki Tehsil. Mangal and Berral panchayats of Arki tehsil are situated on very high mountain ranges and difficult terrain.

2.1.4 Boundaries

The district is bounded by Shimla district in the north and by Ropar district of Punjab and Ambala district of Harayana in the South, by Sirmour district in the East and by Bilaspur district in the West. Mandi district touches the boundary of Solan district in north-East. The shape of the district is rectangular with slight bulge on the northern side intruding towards Mandi district. The mountain ranges lie in the outer Himalayas and are a part of Shivalik ranges. This district is covered by catchment areas of four important rivers, namely, Satluj, Ashwani, Giri and Ghagher. Ashwani and Giri are the main tributaries of Yamuna and those of Satluj River are Kyar-ka-nala, Gambhar and Dabur Khud. Kuthar Nadi is the main tributary of Ghagher. Sirsa is the main stream in Nalagarh sub-division.

2.2 Physiographic Features

2.2.1 Area

The total geographical area of the district is 1,936 sq. km. (1,80,547 hectares) which constitutes 3.49 per cent of the total area of the state and ranks 9th amongst the districts. The net area sown in the district is 39,997 ha out of which 28,866 ha is sown more than once. Total cropped area, including fodder crops, is 68,864 ha. Net irrigated area is 9,509 ha, which is 23.77% of the total net area sown of the district.

2.2.2 Seasons and Climate

The climate of district Solan is sub-tropical to sub-temperate. The temperature ranges from 0^{o} C in winters to 40^{o} C in summers. The fine climate of this place round the year makes it an ideal destination for all seasons. The climate of all the blocks varies differently. Most of area of Nalagarh, Kunihar and Dharmpur blocks have sub-tropical climate. The climate of Solan and Kandaghat blocks is sub-temperate and sub-humid. The climatic conditions of the district suit for the cultivation of stone fruits (mid hill zone), sub-tropical fruits (foot hill zone) and off season vegetables like; tomato, capsicum, ginger, French bean, cabbage, cauliflower, peas, etc.

2.2.3 Rainfall and Snowfall

The district receives an average annual rainfall of 1420.40 mm, mostly during monsoon. Snowfall is not a regular feature and is received in some parts of the district during December-January.

2.2.4 Soils

As the district has hilly to plain areas, the soils are mostly neutral to slightly acidic and the soil texture varies from sandy loam to clay loam. The soil depth is generally shallow except areas having vegetation coverage. Generally the soils show AC profiles in which process of illuviation has given rise to the development of cambia or argellic horizon. The organic matter is medium to high. Available phosphorus is low to medium and potassium is generally in medium category. According to soil taxonomy, the soils classify as hapludolls, hapludalfs and udorthents.

2.2.5 Forests

The area of forests in the district was 19.6 '000' ha during 1982-83 which marginally increased to 20.3 '000' ha during 2004-05, which is 10.64 per cent of the total geographical area of the district (1,80,547 ha). Pine and oak forests are prominent in the district.

2.2.6 Fisheries

Fisheries have a scope in the district particularly in Nalagarh block. At present, the area under fisheries is around 40 ha and about 150 persons are involved in this sector. Both reverine and culture fishing is prevalent in the area. The reverine area is around 135 km in the main stream and the breeds of the fishes usually found are Gid and Mahasheer. The total number of days for fish catching is 250. From the ponds point of view, there are about 150 ponds. Composite culture is adopted. The main breeds found in the ponds are katla, Rohu, Mrigal, Silver carp and Grass carp. The annual catch per ha is between 1,000 and 3,500 under normal circumstances. The natural feed can sustain 1 fish per cubic meter but in some of the ponds, the intensity is higher. But due to lack of knowledge farmers do not provide adequate feed and thus catch is lower, otherwise, it can go upto 5,000 catches per year. There are many natural ponds which can be renovated for the development of fisheries. It has been observed that small ponds are not successful because of shortage of water. The other factors responsible for the low functioning of small ponds may be higher sand contents in the soils; non-availability of the infrastructure, etc. In case of reverine fishing, the major constraints may be listed as reduced water because of higher number of lift irrigation, dams, disturbance in stream, reduction in water discharge and increase in pollution.

2.3 Demographic Features

2.3.1 Distribution of Population

The total population of Solan district was 3,03,280 in 1981 which increased by 26.04 per cent in 1991 and 30.94 per cent in 2001 over 1991 (Table 2.1). The rural population was 89.24 per cent in 1981which decreased to 81.78 per cent in 2001. It is important to see that sex ratio decreased significantly over time.

Table 2.2 summarizes the tehsil wise information. The results show that the highest population was in Nalagarh tehsil followed by Solan and Arki. The male population was higher than female population in all the blocks and the district except in case of Arki. The highest male population was in Kasauli (55.48%). The urban population was nil in Ramsheher (Sub Tehsil), Krishnagarh (Sub tehsil) and Kandaghat. The highest urban population was found in Solan Tehsil. The percentage of urban population to total population was also found to be highest in Solan Tehsil.

Table 2.1 Decadal Variation of Population in Solan District

Year	Persons	Rural	Urban	Decadal variation	Variation (%)	Sex ratio (F/1000M)
1981	303280	270657	32623	-	-	929
1991	382268	334989	47279	14656	31.00	909
2001	5,00,557	4,09,362	91,195	43,916	48.16	852

Note: SC=9.73%; ST=71.83% and total number of households= 20781during 2001
Source: Census Report 2001

Table 2.2 Tehsil Wise and Sex Wise Population in District Solan, 2001

Tehsil	Total			Rural			Urban		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Arki	83,230	41,509	41,721	80,353	39,981	40,372	2,877	1,528	1,349
Ramshahar (S. T.)	29,718	14,901	14,817	29,718	14,901	14,817	-	-	-
Nalagarh	1,55,619	88,832	66,787	1,23,575	66,829	56,746	32,044	22,003	10,041
Kasauli	71,225	39,519	31,706	57,626	31,447	26,179	13,599	8,072	5,527
Krishnagarh (S.T.)	25,836	13,073	12,763	25,836	13,073	12,763	-	-	-
Kandaghat	35,136	18,085	17,051	35,136	18,085	17,051	-	-	-
Solan	99,793	54,372	45,421	57,118	29,834	27,284	42,675	24,528	18,137
District	5,00,557	2,70,291	2,30,266	4,09,362	2,14,150	1,95,212	91,195	56,141	35.054

Source: Census Report 2001

Table 2.3 Block Wise Detail of BPL Families

Block	Total families	BPL families	% of BPL families	SC/ST families among BPL families
Dharampur	12386	3120	25.19	2026
Kandaghat	6295	2414	38.25	1391
Nalagarh	25005	6707	26.82	2769
Kunihar	11661	3515	30.14	1575
Solan	10071	2178	21.63	1564
District	65418	17934	27.41	9325

Source: Potential Linked Credit Plan (2007-08) Solan, NABARD, HP Regional Office Shimla.

2.3.2 BPL Families

The Table 2.3 shows that the total families in district Solan were 65418 out of 27.41 per cent were BPL families. Kandaghat block had maximum percentage of BPL (38.25%) families followed by Kunihar block. It is clear from the table that number of SC/ST families among the BPL families was higher in Nalagarh block which was 30 per cent of total BPL families (9325 families) of the district followed by Dharampur block.

2.3.3 Area and Population

Table 2.4 explains the area and population of Solan district. It can be seen from the table that the area of Solan was 3.48 per cent to the total area of HP (55,673 sq. km) whereas population was 8.23 per cent. The population density was more than double in the district as compared to the state as a whole. The highest number of villages was found in Nalagarh block (619) followed by Dharampur (555) and Kunihar (477). The population also varied in a similar pattern (Table 2.5).

Table 2.4 Area, Population and Density of Solan District

Particular	Area (Km^2)	Population (No.)			Density (Km^2)
		Total	Rural	Urban	
Solan	1,936	5,00,557	4,09,362	91,195	259
H.P.	55,673	60,77,900	54,82,319	5,95,581	109

Source: Statistical Abstract of District Solan

Table 2.5 Block Wise Population and Villages of Solan District (2001)

Block	Population (No.)	Villages (No.)
Dharampur	82,549	555
Kandaghat	35,903	262
Nalagarh	1,53,293	619
Kunihar	80,353	477
Solan	57,264	475

Source: Statistical Abstract of District Solan

2.3.4 Sex Ratio

The sex ratio decreased significantly in all the tehsils/ sub tehsils of the district (Table 2.6). The highest fall was observed in case of Nalagarh and the minimum in Ramshahar. In the state also, the sex ratio decreased significantly.

Table 2.6 Sex Ratio of Population in District Solan

District/ tehsil/ sub-tehsil	Sex ratio (Female/ 1000 male)	
	1991	2001
Arki	1,086	1,005
Ramshahar (S. T.)	1,013	994
Nalagarh	818	752
Kasauli	827	802
Krishnagarh(S.T.)	999	976
Kandaghat	969	943
Solan	873	835
District	909	852
H.P.	976	968

Source: Census Report, 2001.

2.3.5 Literacy

The literacy rate increased substantially from 41.07 per cent in 1981 to 63.30 per cent in 1991 and to 76.60 per cent in 2001 (Table 2.7). The increase was more spectacular among females which increased from 28.90 per cent to 66.90 per cent during the respective period. The block wise literacy (Table 3.8) shows that it was highest in Dharampur block (70.75 per cent) followed by Solan (70.03 per cent). The lowest was found in Kunihar (56.64 per cent). As expected, the female literacy was much lower than male literacy in all the blocks.

Table 2.7 Literacy Rate in Solan (1981-2001)

Year	Literacy %		
	Persons	Male	Female
1981	41.07	52.37	28.90
1991	63.30	74.67	50.69
2001	76.60	84.8	66.90

Source: Statistical Outlines of HP

Table 2.8 Block Wise Literacy Rate of District Solan-2001 (Per Cent)

Block	Male	Female	Total
Dharampur	39.86	30.89	70.75
Kandaghat	36.54	29.21	65.75
Nalagarh	39.95	27.50	67.45
Kunihar	34.98	21.66	56.64
Solan	40.12	29.91	70.03

Source: Statistical Abstract of District Solan

Table 2.9 Distribution of Population into Workers and Non-Workers in Solan District (2001)

Particular	Total		Male		Female	
	Number	Per cent	Number	Per cent	Number	Per cent
Total population	5,00,557	100.00	2,70,291	100.00	2,30,266	100.00
Main workers	1,72,274	34.42	1,37,209	50.76	35,065	15.23
Marginal workers	9,1,171	18.21	28,068	10.38	63,103	27.40
Non-Workers	2,37,112	47.37	1,05,014	38.86	1,32,098	57.37

Source: Statistical Outline of Himachal Pradesh

2.3.6 Distribution of Workers

Table 2.9 shows that 34.42 per cent of total population was main workers, 18.21 per cent marginal workers and 47.37 per cent non-workers. Out of this, 57.37 per cent of females were defined as non-workers and only 15.23 per cent of female population was under the category of main workers.

2.3.7 Distribution of Total Workers by Work Category

The results show that out of 2,63,445 total workers, 56.91 per cent were agricultural workers (Table 2.10). The proportion of cultivators was 54.53 per cent and the agricultural labour was only 2.39 per cent. The other workers were 41.84 per cent of the total population. Nearly 23 per cent of workers are engaged in non-agricultural activities and the district ranks second in this regard (Table 2.11).

Table 2.10 Distribution of Total Workers by Work Category in Solan (2001)

Sr. No.	Particular	Number	Per cent of total
I	Total workers	2,63,445	100.00
II	Agricultural workers	1,49,939	56.91
	a) Cultivators	1,43,630	54.53
	b) Agricultural labourers	6,309	2.39
III	Household industry workers	3,291	1.25
IV	Other workers	1,10,215	41.84

Source: Statistical Outline of Himachal Pradesh

Table 2.11 Ranking of Districts by Percentage of Workers Engaged in Non- Agricultural Activities: 2001

Rank	District	Percentage of workers engaged in non-agricultural activities
1	Lahaul Spiti	28.78
2	Solan	22.63
3	Kinnaur	18.85
4	Shimla	16.81
5	Una	16.74
6	Kangra	16.01
7	Bilaspur	14.44
8	Hamirpur	14.18
9	Chamba	13.12
10	Mandi	17.07
11	Sirmour	12.73
12	Kullu	12.11

Source: Census of India 2001, Series 3, Himachal Pradesh

2.4 Agricultural Status

2.4.1 Changes in Land Holdings

Table 2.12 presents the per cent change in the number and area of land holdings in Solan district from 1980-81 to 1995-96. The table shows that the total number of holdings increased over the years from 39,442 in 1980 to 49,584 in 1995 which is mainly due to sub-division and fragmentation of medium and large holdings.

Table 2.12 Pattern of Changes in Land Holdings in Solan District, 1980-81 to 1995-96 (Per Cent)

Particular	Census Year	Marginal (<1 Ha)		Small (1-2 Ha)		Medium (2-4 Ha)		Large (>4 Ha)		Total	
		Holding	Area	Holding	Area	Holding	Area	Holding	Area	Holding	Area
Solan	1980-81	36.20	7.90	23.76	15.01	23.90	28.87	16.14	48.22	39442	91071
	1985-86	40.55	10.77	24.99	18.53	21.76	29.77	12.70	40.93	45091	91587
	1990-91	41.67	10.36	25.09	18.66	20.13	30.53	13.11	40.45	46936	91297
	1995-96	40.09	10.92	28.83	19.28	20.46	31.13	10.62	38.67	49584	91580
	2000-01	43.74	12.57	26.52	21.48	20.11	30.87	9.54	35.09	50576	90148
H. P.	1980-81	55.30	14.92	22.03	20.43	15.16	27.08	7.51	37.57	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	67.29	25.72	19.06	24.99	9.83	24.86	3.81	24.42	913914	978754

Note: Percentages have been worked out on the basis of total number and area (hectares) in each district shown in last column of the table
Source: Agricultural Census Reports, Directorate of Land Records, Shimla.

In case of the area of holdings, similar trend was observed over the years except in case of medium holdings where the area increased from 28.87 per cent in 1980 to 31.13 per cent during 1995. Almost similar pattern was observed for the state as a whole. The average size of holdings was higher (1.85 ha) in district Solan as compared to the state as a whole (1.13 ha). In overall situation (Table 2.13), a decrease in the average size of holdings was observed from 2.31 ha during 1980 to 1.85 ha in 1995. During 1995, the average size of holding was 0.50 ha for marginal farmers, 1.23 ha for small, 2.81 ha for medium and 6.73 ha for large farmers. Similar trend was observed for HP as a whole except in case of large farmers where a sharp decrease in the size of holdings was observed from 7.31 ha in 1990 to 4.54 ha in 1995.

Table 2.13 Changes in Average Size of Holdings in Solan District, 1980-81 to 1995-96

Particular	Year	Marginal (<1 Ha)	Small (1-2 Ha)	Medium (2-4 Ha)	Large (>4 Ha)	Overall (Ha)
Solan	1980-81	0.50	1.46	2.79	6.90	2.31
	1985-86	0.54	1.51	2.78	6.54	2.03
	1990-91	0.48	1.45	2.95	6.00	1.95
	1995-96	0.50	1.23	2.81	6.73	1.85
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	4.54	1.13

Note: Medium includes semi-medium holdings also
Source: Agricultural Census Reports, Directorate of Land Records, Shimla.

2.4.2 Land Use Pattern

Table 2.14 presents the land utilization pattern of district Solan. The table reveals that the land utilization pattern remained almost similar over the years except in case of current fallow and other fallow lands. The current fallow lands decreased over the years from 2.43 per cent in 1990 to 2.21 per cent in 2004-05 whereas the other fallow lands increased from 0.36 per cent in 1990 to 0.55 per cent in 2004-05. The net area sown marginally decreased from 22.61 per cent in 1990 to 21.78 per cent during the same period.

Table 2.14 Changes in the Land Utilization Pattern in District Solan (Per Cent)

Particular	Year	Forest land	Barren land	Non-agri. uses	Culturable waste	Pasture	Misc trees/ groves	Current fallow	Other fallow	Net sown area
Solan	1990-91	11.10	5.65	5.83	6.69	44.63	0.70	2.43	0.36	22.61
	1995-96	11.11	6.07	6.05	7.19	42.42	1.52	3.01	0.51	22.11
	2000-01	11.21	8.43	5.35	6.61	42.95	0.45	0.66	2.78	21.56
	2004-05	11.22	7.63	5.80	7.90	42.56	0.33	2.21	0.55	21.78
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	24.23	14.78	10.08	2.80	33.02	1.51	1.33	0.31	11.94

Source: Statistical Outlines of Himachal Pradesh

The net area sown in the district was very high as compared to the state. Although it decreased in the district as well as in the state but the decrease in the state was spectacular as compared to the district. The barren land also increased by more than 2 per cent over the years mainly due to unavailability of labour resulting from non-farm employment in the region.

2.4.3 Cropping Pattern

The total cropped area in the district decreased over the years from 70 '000'ha in 1990-91 to 65 '000'ha in 2005-06 due to rapid industrialization and more non-farm opportunities.

Table 2.15 Changes in Cropping Pattern in Solan District (Per Cent)

Particular	Year	Maize	Rice	Wheat	Barley	Pulses	Food-grains	Cropped area ('000' ha)
Solan	1990-91	39.80	5.21	34.92	2.82	6.57	90.26	70.02
	1995-96	38.37	5.77	40.45	2.99	6.51	88.56	65.03
	2000-01	38.34	5.28	36.48	2.46	5.06	87.92	63.70
	2005-06	33.50	7.26	36.76	2.42	4.29	84.23	65.00
HP	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	3.80	87.43	949.89
	2000-01	31.46	8.65	38.27	2.71	3.28	85.98	947.54
	2005-06	30.97	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.
Source: Statistical Outlines of Himachal Pradesh

Marginal changes in the cropping pattern were observed in the district (Table 2.15). Majority (84.23 per cent) of the cropped area was under foodgrains during 2005-06. In food crops, nearly 39 per cent of the area was under maize crop followed by wheat (35 per cent) whereas in the state, the reverse trend was observed. Rice which is an important food crop occupied only 5 per cent of the area which was attributed to less irrigation facilities and rain fed agriculture but it increased to 7.26 per cent in 2005-06. Most of the irrigated area was put under vegetable crops. In pulses, nearly 2 per cent decrease in area was observed over the years.

2.4.4 Crop Yields

The yields of major foodgrain crops have been presented in Table 2.16. It is clear from the table that the yield of food grain crops decreased over the years both at the district as well as state level but it was higher in the district (15.39 q/ha) as compared to the state (13.53 q/ha). In case of different crops, no specific trend in the yield was observed. The yield of maize which was very high (nearly 23 q/ha) in the 1990s, decreased to 16.72 q/ha. This may be because of animal menace as well as the diversion of area to vegetable crops even under rainfed conditions. In case of wheat, yield decreased from 19 q/ha in 1990-91 to 15.78 q/ha in 2005-06. The yield of wheat was found to be quite low during 2005-06 as compared to normal yields which may be because of abnormal year. The sowing was delayed and thus the yields were adversely affected. The yield of rice was 18 q/ha.

Table 2.16 Changes in Yields of Major Food Grain Crops in Himachal Pradesh, 1990-91 to 2005-06 (Q/ha)

Particular	Year	Maize	Rice	Wheat	Barley	Pulses	Food grains
Solan	1990-91	22.50	13.06	19.10	14.65	0.87	18.61
	1995-96	21.20	14.82	7.43	12.69	3.60	14.24
	2000-01	20.32	22.34	7.99	4.58	4.03	12.09
	2005-06	16.72	17.55	15.78	6.00	3.44	15.39
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	13.53

Source: Statistical Outlines of Himachal Pradesh

2.4.5 Cropping Intensity

The cropping intensity of different blocks has been presented in Table 2.17. It is clear from the table that the overall cropping intensity of Solan district was 165 per cent. The highest cropping intensity was in Kunihar block (178 per cent) followed by Nalagarh block. In other blocks, it was quite low which can be increased by growing more vegetables as the climate of the region is more suitable for vegetable cultivation.

Table 2.17 Block Wise Area and Cropping Intensity in Solan District, 2004-05

Block	Total cropped area (ha)	Net sown area (ha)	Cropping intensity (%)
Kandaghat	3779	2829	134
Kunihar	15208	8534	178
Dharampur	8773	5822	151
Nalagarh	31407	17963	175
Solan	5817	4222	138
District	64984	39370	165

Source: Statistical Outline of Himachal Pradesh

Table 2.18 Relative Share of Fruit Production in Solan, 2006-2007

Fruit	Solan		HP	
	Area (ha)	Production (mt)	Area (ha)	Production (mt)
Apple	112 (1.77)	53 (0.94)	86,202 (46.12)	2,68,402 (72.72)
Other temperate fruit	2,945 (46.44)	3,215 (56.81)	25,223 (13.50)	35,612 (9.65)
Subtropical fruit	2,145 (33.83)	1,667 (29.46)	43,976 (23.53)	49,507 (13.41)
Nuts & dry fruit	316 (4.98)	116 (2.05)	11,100 (5.93)	2,912 (0.79)
Citrus fruit	823 (12.98)	608 (10.74)	20,402 (10.92)	12,670 (3.43)
Total	6,341	5,659	1,86,903	3,69,103

Note: Figures in the parentheses are percentages to the total.
Source: Statistical Outline of Himachal Pradesh

2.4.6 Fruit Production

Stone fruit and subtropical fruit were mainly grown in the district. The total area under different fruit was 6,341 ha, which is nearly 3.39 per cent of the state area under fruit (Table 2.18). The production is 5,659 mt which is only 1.53 per cent of the total production in the state. The area under temperate fruit was 48 per cent to total fruit area in the district. This was followed by subtropical fruit. The contribution of other fruits was found to be almost negligible.

2.4.7 Vegetable Production

The total area under vegetables in Solan district was found to be 6,983 ha. The area was 14 per cent of the total area in Himachal Pradesh whereas the production was 7.06 per cent. The area under tomato (54.43 per cent) was the highest in the district followed by pea (16.36 per cent). In production, the contribution of tomato and pea was 75.68 per cent and 6.89 per cent, respectively (Table 2.19). In HP, the contribution of tomato to total area under vegetables, was 18.47 whereas for pea it was 32.79 per cent. The respective percentages for production were 32.39 and 19.04.

All other vegetables accounted for below 2 per cent in area except beans (2.99 per cent) and capsicum and chillies (4.71 per cent) in the district.

Table 2.19 Relative Share of Vegetable Production in Solan, 2005-2006

Crop	Solan		HP	
	Area (ha)	Production (mt)	Area (ha)	Production (mt)
Pea	1,142 (16.36)	11,420 (6.89)	16,348 (32.79)	1,77,036 (19.04)
Tomato	3,800 (54.43)	1,25,400 (75.55)	9,211 (18.48)	3,01,183 (32.39)
Beans	442 (6.33)	4,950 (2.98)	2,674 (5.36)	27,973 (3.01)
Onion	37 (0.53)	740 (0.44)	1,454 (2.92)	21,834 (2.35)
Garlic	91 (1.30)	1638 (0.90)	2,281 (4.57)	27,788 (3.00)
Cabbage	71 (1.02)	1,775 (1.07)	3,677 (7.37)	1,15,920 (12.46)
Cauliflower	106 (1.52)	1,908 (1.15)	2,263 (4.54)	53,103 (5.71)
Radish/ turnip/ carrot	93 (1.33)	1,860 (1.12)	1,571 (3.15)	32,675 (3.51)
Bhindi	124 (1.78)	1,488 (0.90)	1,728 (3.47)	19,659 (2.11)
Cucurbits	110 (1.57)	1,100 (0.66)	2,082 (4.18)	43,845 (4.71)
Capsicum & chillies	601 (8.61)	7,813 (4.71)	2,081 (4.17)	30,876 (3.32)
Brinjal	94 (1.35)	1,128 (0.68)	772 (1.55)	14,267 (1.53)
Other vegetables	270 (3.87)	4,743 (2.86)	3,716 (7.45)	63,817 (6.86)
Total	6,982	1,65,963	49,858	9,29,976

Note: Figures in the parentheses are percentages to the total.
Source: Annual Season and Crop Reports

2.4.8 Irrigation Status

The irrigated area to net area sown in the district decreased from 28.90 per cent in 1995-96 to 24.30 per cent in 2002-03 (Table 2.20). It can be further seen from the table that the irrigation facilities remained constant over time for maize whereas for paddy, it increased by about 4.5 percentage points and for wheat the increase was about 10 percentage points. On the other hand, for the state as a whole there was marginal increase in the irrigated area. For maize, paddy and wheat, there was about 3 percentage point increase in the state.

Table 2.20 Irrigated Area under Major Crops in Solan District (Per Cent)

Particular	Triennium	Maize	Paddy	Wheat	% Irrigated area to net sown area
Solan	1990-91	12.49	79.23	26.46	-
	1995-96	12.94	81.11	32.14	28.90
	2000-01	15.09	80.91	31.16	24.43
	2002-03	12.55	83.92	35.85	24.30
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: Annual Season and Crop Reports

2.4.9 Area under HYVs

During 1999-2000, the area under HYVs for maize, paddy and wheat was 77.50 per cent, 80.64 per cent and 100.00 per cent, respectively. These figures were much higher than the respective figures for the state (Table 2.21).

Table 2.21 Area under High Yielding Varieties of Major Crops in Solan District of Himachal Pradesh (Per Cent)

Particular	Year	Maize	Paddy	Wheat
Solan	1980-81	20.91	NA	34.67
	1999-2000	77.50	80.64	100
H P	1980-81	14.83	NA	33.85
	1999-2000	61.63	41.61	61.05

Note: NA = Area not available for 1980-81
Source: Annual Season and Crop Reports

Table 2.22 Fertilizer Consumption in Solan District of Himachal Pradesh

Particular	Year	NPK (mt)			NPK (kg/ha)		
		Kharif	Rabi	Total	Kharif	Rabi	Overall
Solan	1980-81	684	392	1,076	17.69	11.81	14.97
	1991-92	1,635	1,302	2,937	44.94	40.08	42.65
	1998-99	1,713	1,321	3,034	48.44	43.59	46.20
	2005-06	2,108	1,583	3,691	59.44	60.36	59.84
H. P.	1980-81	8,155	5,795	13,950	15.93	13.33	14.74
	1991-92	15,599	15,006	30,605	29.12	34.36	31.47
	1998-99	15,318	19,534	34,852	28.88	42.85	35.33
	2005-06	19,197	28,776	47,973	37.28	66.69	50.78

Source: Statistical Outlines of Himachal Pradesh

2.4.10 Fertilizer Consumption

The total fertilizer consumption in the district was 3,691 mt which was 7.69 per cent of the total consumption of the state. The percentage consumption to total fertilizer consumption during kharif was about double than rabi consumption (Table 2.22). It can be further seen from the table that, during kharif, per hectare consumption was higher in the district as compared to the state whereas during rabi it was lower for all the periods under study except during 1991-92. The overall consumption was also found to be higher in the district.

2.4.11 Livestock and Poultry Production

The livestock population shows that there was 3,24,926 livestock during 1992 which decreased to 3,19,881 during 2003 in the district, that is, a decrease of 1.55 per cent (Table 2.23). In the state, the decrease was found to be 1.39 per cent. In the district, there was increase in the population of cattle and buffalo but a sharp decrease was observed in case of sheep and goat. Poultry increased from 46,167 to 79,819 over a period of a decade in the district.

Table 2.23 Changes in Livestock Population Over Census Years in Solan District (No.)

Particular	Solan		H. P.	
	1992	2003	1992	2003
Cattle	1,43,491	1,54,570	21,65,034	21,96,538
Buffalo	74,349	90,787	7,03,549	77,3,229
Sheep	19,713	4,313	10,78,940	9,06,027
Goat	82,542	67,488	11,18,094	11,15,587
Total livestock	3,24,926	3,19,881	51,16,933	50,46,044
Poultry	46,167	79,819	7,22,742	76,4136

Source: Livestock Census 1992 & 2003

Table 2.24 Tehsil Wise Livestock Population in Solan District (No.)

Tehsil	Cattle crossbred		Cattle indigenous		Buffalo	
	Male	Female	Male	Female	Male	Female
Arki	2,525	11,169	15,424	15,902	667	9,228
Kandaghat	1,530	4,773	7,512	8,303	284	3,613
Kasauli	1,205	4,136	4,841	5,190	384	6,590
Krishnagarh(S.T.)	1,170	2,032	4,380	4,830	345	3,828
Nalagarh	2,250	3,579	8,546	4,202	2,569	48,232
Ramshahar(S. T.)	613	1,521	7,038	3,800	726	8,793
Solan	1,813	8,802	8,745	8,739	300	5,228
Solan district	11,106	36,012	56,486	50,966	5,275	85,512

Table 2.24 contd.

Tehsil	Sheep		Goat	Other	Poultry
	Crossbred	Indigenous			
Arki	399	1,223	9,722	604	2,965
Kandaghat	99	807	1,989	405	204
Kasauli	302	180	5,710	472	1,416
Krishnagarh(S.T.)	243	165	9,654	212	1,012
Nalagarh	38	23	20,575	307	69,370
Ramshahar(S. T.)	114	13	13,280	243	631
Solan	126	581	6,558	480	4,221
Solan district	1,321	2,992	67,488	2,723	79,819

Source: Livestock Census, 2003

Tehsil wise distribution of livestock population during 2003 shows that indigenous cows (both male and female), were higher in all the tehsils of the district (Table 2.24). For district as a whole, the indigenous female cattle were 41.16 per cent higher than cross bred cattle. The table further shows that female cross bred were significantly higher in all the tehsils as compared to males whereas the indigenous male cattle were higher except in Kandaghat. The female buffalo population was much higher than male population in all the tehsils of the district. As far as sheep and goat is concerned, the population of goat was higher than sheep. The goat population was higher in Nalagarh Tehsil followed by Ramshahar. The sheep population was found to be highest in Arki. Nalagarh Tehsil also topped in poultry accounting for 87 per cent of the total poultry in the district.

The cow milk contributed 49.65 per cent to the total milk production in the district as against 58.18 per cent for the state (Table 2.25). In case of buffalo, the contribution was higher in the district (48.64 per cent) compared to state (38.56 per cent). Since goat and sheep are not important ventures in the state, the wool production was quite low. For meat production the contribution of goat was found to be significant. The average milk yield per day was found to be highest for cross bred cow followed by buffalo and local cow (Table 2.26).

Table 2.25 Livestock Production in Solan District (2006-07)

Particular	Solan	Himachal Pradesh
Milk production ('000' tonnes)		
Cow	42.10	505.59
Buffalo	41.25	335.06
Goat	1.45	28.36
Total	84.80	869.01
Wool (mt)	11.32	1,605.33
Meat (mt)		
Sheep	40.66	966.77
Goat	84.10	2,015.04
Pig	9.97	128.78
Total	134.73	3,110.59
Eggs (lakh)	108.60	771.98

Source: Statistical Outline of Himachal Pradesh

Table 2.26 Contribution in Milk Production and Average Productivity of Milch Animals in Solan District of Himachal Pradesh, 2006-07

Particular	Contribution to milk production in the state (%)	Average Yield (litre/animal/day)		
		Crossbred	Buffalo	Local cow
Solan	9.76	2.36	1.74	1.04
HP	100.00	2.17	1.88	1.08

Source: Statistical Outline of Himachal Pradesh

2.5 General Infrastructure

The block wise general infrastructure of Solan district is presented in Table 2.27. The number of panchayats is 211 out of which 69 were in Nalagarh making it the biggest block in the district followed by Kunihar block. There are 295 fair price shops in the district. The total number of health centre was 304 out of which 225 were allopathic. There exist 148 veterinary hospitals to look after animal health in the district.

Table 2.27 General Infrastructure in Different Blocks of Solan District (No.)

Block	Panchayat	Fair price shops	Health centre		Veterinary hospitals	Post offices	Banks
			Allopathic	Ayurvedic			
Kandaghat	24	28	28	10	19	23	12
Kunihar	45	53	45	15	36	36	16
Dharampur	36	88	49	12	30	33	24
Nalagarh	69	76	77	29	39	49	30
Solan	35	50	26	13	19	24	34
District	211	295	225	79	148	180	116

Table 2.27 contd.

Block	Small scale industries		Large/ medium scale industries		Educational institutions		
	Existing	Pipe line	Existing	Pipe line	Primary schools	Middle schools	Sen. sec. schools
Kandaghat	123	-	-	-	91	24	15
Kunihar	136	-	1	-	155	46	31
Dharampur	136	9	6	3	147	31	25
Nalagarh	202	176	22	49	228	55	35
Solan	200	54	10	4	99	16	22
District	797	239	39	56	757	173	128

Source: Potential Linked Credit Plan (2007-08), Solan, NABARD, HP Regional Office, Shimla.

The district also has 180 post offices and 116 banks. The number of banks was highest in Solan block followed by Nalagarh. The number of banks was minimum in Kandaghat block which needs due consideration. There exist 797 small scale industries and 39 large scale industries in the district out of which more than 50 per cent are in Nalagarh and Solan block. Good education facilities are also available in the district. The district has 757 primary schools, 173 middle schools and 128 senior secondary schools.

Table 2.28 Infrastructural Indicators of District Solan

Parameter	Solan	HP
Electricity		
Percentage of villages electrified	100	99.41
Transportation		
Road density per 1000 sq. km	1146.18	466.44
Number of transport vehicles per 1000 sq. km	18825	5173
Irrigation		
% of net irrigated area to net cropped area	24.79	20.50
% area irrigated through groundwater	28.35	12.58
% area irrigated through surface water	71.65	87.42
Number of tube wells per 100 ha of cropped area	3.17	0.85
Communication		
Number of telephone lines per 100 population	10.61	8.51
Population served per post office	2720.41	2186.30
Average area served per post office	10.52	20.02
Education		
Number of schools (primary & middle) per lakh population	225	237
Number of secondary and sr. secondary schools per lakh population	23.17	28.23
Number of degree and professional colleges per lakh population	0.80	0.90
Teacher – pupil ratio		
Up to class V	22	21
Class V – VIII	18	19
Health		
Birth rate	18.50	20.50
Death rate	4.50	5.70
Sub centres/ primary health centres/ community health centres per lakh population	35.90	38.60
Sub centres per lakh population	30	31
Primary health centres per lakh population	5.40	6.60
Community health centres per lakh population	0.50	1
Number of dispensaries and hospitals per lakh population	1.60	1
Number of hospitals per lakh population	0.80	0.70
Number of dispensaries per lakh population	0.80	0.70
No. of beds in hospitals per lakh population	155	132.30
Doctors per lakh population	19.40	20.40
Water supply		
% of villages having drinking water supply	100	100
Agriculture markets		
Number of regulated markets per 100 sq. km	0.57	0.07
Number of agriculture markets	11	38
Poverty		
% of rural people below poverty line	27.44	27.62

Source: Potential Linked Credit Plan (2007-08), Solan, NABARD, HP Regional Office, Shimla.

The major infrastructural indicators include irrigation, power, transport, communication, education, health etc. Table 2.28 revealed that the district is fully electrified and well connected by roads and communication facilities. The percentage of net irrigated area to net cropped area was 24.79 per cent which was higher than the net irrigated area of the state. There were 225 primary and middle schools, 23.17 secondary and sr. secondary schools and 0.80 degree and professional colleges per lakh of population which was marginally less than the state average. Teacher pupil ratio was almost similar as that of the state. Nearly 36 sub centres/ primary health centres/ community health centres are there for every 1 lakh population. The birth rate was 18.50 and death rate was 4.50 per thousand persons. All the villages of the state had good drinking water facilities in the district. The number of regulated markets per 100 sq. km was 0.57 which was very high as compared to the state (0.07).There were 11 agricultural markets which came to 29 per cent of the total agricultural markets (38) of the state. The number of rural people below poverty line was 27.44 per cent.

2.6 Sum Up

To sum up, Solan district of the state has total geographic area of around 1936 sq. km. and constitutes 3.49 per cent of the total area of the State. The District comprises of five development blocks viz, Nalagarh, Dharampur, Solan, Kandaghat and Kunihar. The net area sown in the district is 39,997 ha out of which 28,866 ha is sown more than once. Total cropped area, including fodder crops, is 68,864 ha. About 23.77% of the total net area sown of the district is irrigated. The total population of the district is 5,00,557 out of which nearly 82% lives in rural area. The sex ratio of the district is 852. The total villages in the district are 9325. The literacy rate of the district is 76.6%. The female literacy was much lower than male literacy in all the blocks. Out of 2,63,445 total workers, 56.91 per cent are agricultural workers. The proportion of cultivators is 54.53 per cent and the agricultural labour is only 2.39 per cent. The other workers are 41.84 per cent. About 84.23 per cent of the cropped area is under food grains. In food crops, nearly 39 per cent of the area was under maize crop, 35% under wheat and 7.26% under rice. The yield per ha of maize, paddy and wheat is 16.7q, 17.6q and 15.8q, respectively. Most of the irrigated area is under vegetable crops. Among vegetables, tomato is the most important vegetable crop with 54 per cent of total area under vegetables followed by pea (16 per cent). The total area under different stone and subtropical fruits is 6,341 ha with a production of 5,659 mt. The total fertilizer consumption in the district is 3,691 mt which was 7.69 per cent of the total consumption of the state. The NPK consumption in the district is 60 kg per ha. The total livestock population of the district is 5,046 thousand. The cow milk contributes 49.65 per cent to the total milk production in the district which was 84.8 thousand tonnes. The district has good educational and infrastructural facilities. The villages are fully electrified and well connected with the roads and other communicational facilities.

CHAPTER III

SWOT ANALYSIS OF THE DISTRICT

3.1 SWOT Analysis for Improving Agricultural and Allied Sectors

The district comprises of five blocks. These vary significantly among themselves as well as within themselves. There are four agro-ecological situations (AES) which are as follows.

1. Low hills and valley areas: (AES I). The altitude ranges between 350-650 m amsl with hot humid climate. The cropping system includes agricultural crops (cereals, oilseeds and pulses), fruit crops (mango, guava, citrus, papaya, etc.) and animal husbandry as an important component.
2. Low mid hills: (AES II) It ranges between 651-900 m amsl, with warm climate. The cropping system comprises of agricultural crops such as vegetable crops, stone fruit, subtropical fruit and animal husbandry.
3. High mid hills: (AES III) Altitude between 901-1800 m amsl, with moderate climate. The farming/ cropping system consists of vegetable crops, cereal crops, stone fruit, floriculture and animal husbandry.
4. High hills: (AES IV) It comprises of an area more than 1800 m altitude. The situation is blessed with cool climate. The cropping system includes vegetable crops, agricultural crops, stone fruit, floriculture and animal husbandry.

In Solan block, all the four AES exists whereas in Nalagarh only low hills and valley areas (AES I) exists. Dharampur consists of AES I and AES II, Kandaghat and Kunihar AES II and AES III. The strength, weaknesses, opportunities and threats are thus different for each AES.

3.1.1 Strengths

General

- Cereals being replaced by high yielding cash crops
- Mechanical farming possible
- Sustainability of cross bred cows

AES I

- Moderate connectivity and input supply
- Scope for increasing irrigation facilities
- Land is almost flat with gentle slope
- Soils are sandy loam, shallow and light textured and are quite productive
- Good road network/ good transportation facilities
- Easy access to technology generation and dissemination centre
- Climatic conditions are suitable for sub tropical fruit and rearing milch animals like buffalo and cows with good market facilities

- Developing industrial area
- Nearer to market like Chandigarh

AES II

- Soil light textured and quite fertile
- Sloping lands having good drainage
- Suitable for cereals, vegetables, spices, floriculture and sub tropical fruit
- Moderate connectivity and input supply system
- Suitable for flower cultivation

AES III

- Soil texture loam to clay loam and fertile
- Scope for off season vegetables and vegetable seed production
- Suitable climate for stone and sub tropical fruit
- Scope for milch cattle rearing

AES IV

- Pollution free, congenial climate for raising off-season vegetables, temperate and seed production of temperate vegetable crops
- Suitable for quality stone fruits, floriculture and tradition mountain crops like millets
- Rich in biodiversity and ecotourism

3.1.2 Weaknesses

General

- Insufficient extension facilities
- Area specific package of practices not available
- Small and fragmented land holdings
- Non-availability of improved varieties of crops
- Lack of regulated market within the district
- Lack of storage facilities
- Lack of awareness about soil health, fertilizer use, integrated pest management and high female drudgery
- Market intelligence
- Non-availability of fodder

AES I

- Depleting water table

- Improper land use
- Unorganized farming community
- Shortage of feed and fodder

AES II

- Shortage of irrigation water during peak summer season
- Unorganized farming community
- Distant markets
- Improper feeding
- Poor management of milch animals
- Low profitability in agriculture

AES III

- Improper land use
- Undulating topography
- Distant markets
- Spread of obnoxious weeds
- Rainfed farming
- Shortage of fodder
- Unorganized farming community

AES IV

- Undulating topography
- Poor water management
- Poor extension work and input supply system
- Predominant local breeds of animals
- Poor road connectivity and marketing facilities
- Spread of obnoxious weeds
- Lack of fodder

3.1.3 Opportunities

General

- Started cultivation of medicinal and aromatic plants (MAPs) and vegetables
- Cultivation of vegetables under polyhouse
- Development of watershed
- Cultivation of forage grasses/ trees for regular supply of fodder

- Fisheries and poultry have a scope
- Small unit for vegetable and fruit processing
- Development of crop/ vegetable varieties

AES I

- Scope for farm mechanization
- Growing field crops
- Seed production of cereals
- Rain water harvesting
- Rearing milch animals
- Raising subtropical fruit
- Pisciculture

AES II

- Scope for diversification and intensification
- Rearing milch animals
- Potential for raising sub tropical fruit
- Flower cultivation

AES III

- Scope for off season vegetable cultivation
- Diversification and intensification
- Rearing of milch animals, goat and sheep
- Potential for stone fruit cultivation

AES IV

- Terrace/ contour farming
- Scope for diversification and organic farming
- Ecotourism and scenic beauty

3.1.4 Threats

General

- Animal menace particularly monkey menace and stray cattle
- Existing sources of water drying up
- Urbanization (increasing drinking water demand thus vegetable and floriculture will suffer, depletion of forests)
- No perennial source of water

- Shifting of cultivated land to non-agricultural uses
- Pollution due to industrialization
- Slope is being disturbed causing major threat to water table affecting cultivation of commercial crops like vegetables and floriculture
- Diseases/ insect pest/ weeds
- Manifestation of obnoxious weeds

AES I

- High degree of soil erosion
- Lowering water table
- Declining productivity
- Migration of human resources from rural to urban areas
- Air and water pollution
- Occurrence of frost and other natural calamities

AES II

- Genetic erosion of traditional germplasm
- Rural youth are opting for avenues other than agriculture

AES III

- Unplanned diversification resulting into poor response
- Genetic erosion of traditional germplasm
- Migration of human resources
- Natural calamities
- Low profitability from agricultural sector

AES IV

- Soil erosion and degradation of natural resources
- Pollution by tourism
- Distant marketing
- Genetic erosion of local germplasm
- Decline in milch animal rearing
- Decline in raising horticultural crops due to low profitability

3.2 Issues Emerging Out of SWOT Analysis

Agriculture

- Non-availability of HYVs

- Low irrigation facilities
- Spurious and inadequate fertilizers/ plant protection measures
- Lack of awareness regarding fertilizer use leading to low adoption
- Animal menace
- Small and fragmented holdings
- Urbanization causing pollution and water scarcity
- Traditional tools, need for farm mechanization
- High female drudgery
- Decreasing use of FYM
- High infestation of weeds

Livestock

- Low success of AI
- Scarcity of fodder
- Imbalanced feeding
- Increasing stray/ Non-milking animal
- Lack of awareness about minerals/ concentrates use

Fisheries

- Uneconomic small ponds
- Lack of marketing/ cooling vans
- Lack of knowledge about feeding
- Drying up of ponds due to lift irrigation on the upper part of the stream
- Costly fish equipments

Horticulture

- Old plantation
- Non-availability of new varieties
- Non-availability of irrigation at critical time
- Lack of awareness about plant protection measures

3.3 Sectoral Growth Drivers

- **Production of HYVs**: The analysis has shown that there is need for improvement in crop varieties. For this, there is need to strengthen the agriculture and horticulture universities of the state with respect to manpower as well as funds for research and development.

- **Development of marketing**: To receive the remunerative prices marketing of the produce is an essential aspect. For this, there is need to develop storage, roads, bridges, transport and refrigerated vehicles.
- **Crop diversification**: There is lot of scope to diversify the traditional cereal based cropping system to vegetable based cropping system. There is need to provide irrigation, awareness/ training, marketing, adequate input supply.
- **Animal husbandry sector**: To develop the animal husbandry sector, there is need to provide adequate fodder. For this, the cultivation of fodder grasses/ trees is important. The milk centres can be formed for collection and sale of milk. This is expected to reduce the female drudgery also.
- **Farm mechanization**: Most of the work is done by females manually except wheat threshing. There is need to provide modern equipments/ machinery. The SAU should be adequately funded to develop such equipments and state agriculture department needs to be involved in its distribution and popularization.

CHAPTER IV

DEVELOPMENT OF AGRICULURE SECTOR

4.1 Land Use Pattern and Soil Health

Total geographical area of the district was 1,80,930 ha. Nalagarh was the largest block and Kandaghat was the smallest one (Table 4.1). The cultivated area was 16%, 13.7%, 21.6%, 25.5% and 19% for Solan, Kandaghat, Kunihar, Nalagarh and Dharampur block, respectively. The per cent land put to non-agricultural uses was quite high in Solan block. In absolute terms, the degraded land was highest in Nalagarh block. Current fallow was comparatively low in all the blocks.

Soils are vital natural resources on whose proper use depends 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 State is suffering from one or other soil degradation problem. The major degradation problems were 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 state. 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 state and develop these as models, which will act as wheels of agro-technology transfer for the development of the adjoining areas. An effort has been made to compile the soil survey information available from different sources for its best use for the preparation of district wise State Agriculture Development Plans. Solan district is dominated with brown hill soils in gently sloping lands of Lesser Himalayas. Generally, the soils show ABC profiles in which process of illuviation has given rise to the development of cambic or argillic horizons. The soils are slightly acidic to neutral in reaction and sandy loam to clay loam in texture. Taxonomically, soils belong to Hapludolls, Hapludalfs and Udorthents. Rock outcrops on steep to very steep slopes are common.

The soils of side slopes of Lesser Himalayas are shallow to deep, well to excessively drained, sandy, loamy-skeletal, coarse loamy to fine loamy and non-calcareous to calcareous. They are slightly acidic to neutral on high reaches and neutral to slightly alkaline on lower hills. The soils are classified as Udorthents, Eutrochrepts and Hapludolls. The soils of district Solan are medium in nitrogen and low to medium in available phosphorus and potassium. As vegetable farming is being practised since long, the deficiencies of Zn, B and even Mo are being observed. The soils are prone to water erosion. The soils are having medium to high organic carbon status.

4.1.1 Problems and Interventions for Land Development

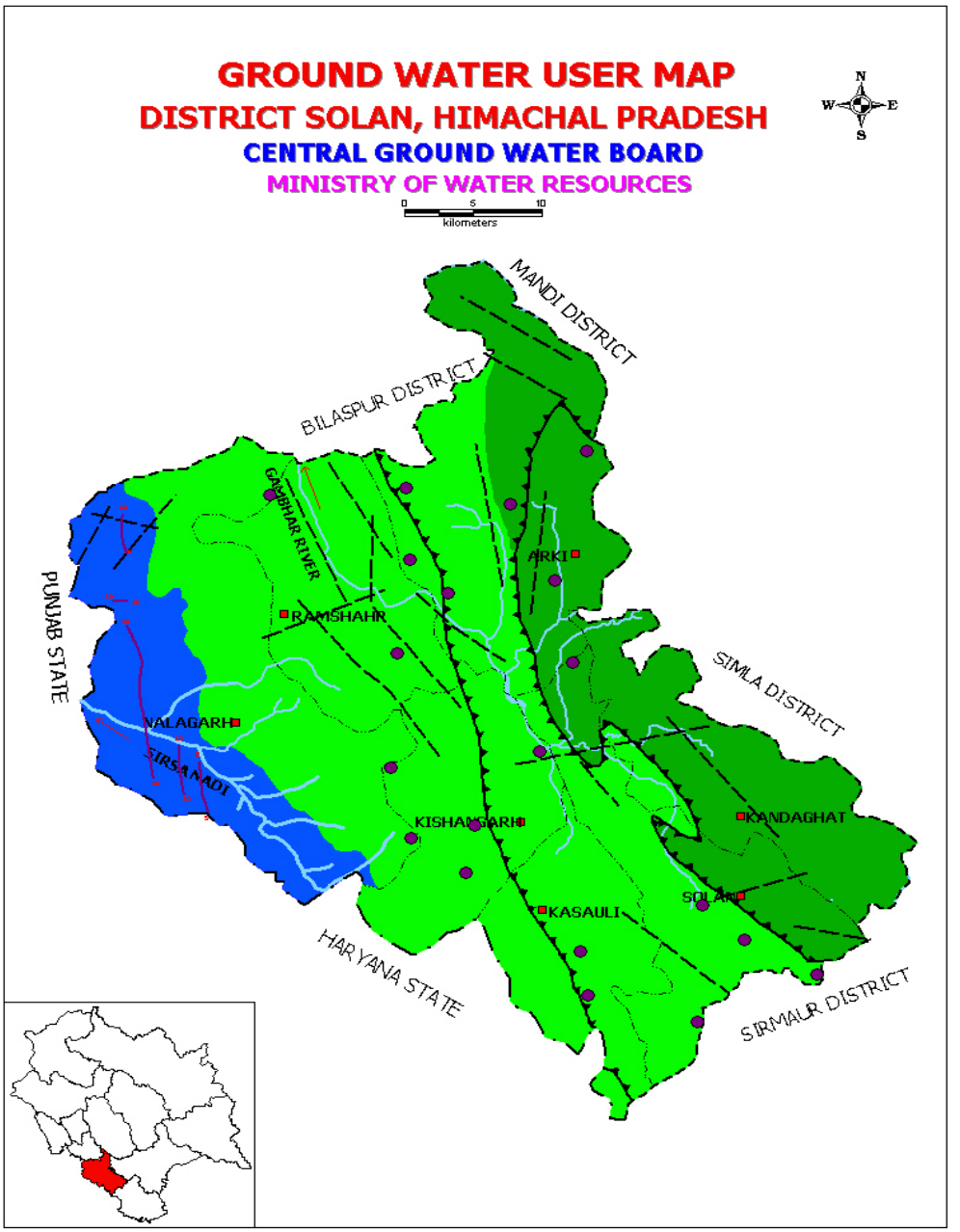
Sloping land was one of the biggest problems in the district. For this, the interventions suggested were land levelling, cultivation of fruit plants in these slopes, contour method of cultivation etc. Weed infestation, animal menace were other problems (Table 4.2). The suggested interventions were reduction in fallow land for weeds and Go-sadan for animals and catch/ castration of monkeys. These were the common problems and interventions required for all the blocks.

4.1.2 Improvement Needed to Increase the Land Productivity

To increase the land productivity, suggestions have been given in Table 4.3. Land levelling, contour bunding, fencing etc. were some of the major problems which needed intervention of the state government. In addition to this, check dam might also help through better irrigation particularly at the critical stage.

4.2 Water Resources and Management

Geologically, the area is underlain by formations ranging in age from Quaternary to Pre-Cambrain. Phyllite, slate, quartzite, limestone, schist, dolomites, granite and gneisses constitute the older (hard rocks) formations. The valley fills deposits in the district which represent the Quaternary deposits and are restricted in the western part of Bagheri – Kherachak – Baddi area. Major part of the area is covered by Shiwaliks & Tertiary group of rocks. The district can be divided into porous and fissured formations. Ground water occurs under water table to semi-confined condition in porous formations with depth to water level varies from near ground level to more than 30 m bgl mainly in valley fill/ alluvial areas. In fissured formations, springs are the major source of water supply. Springs located along major thrust/ faults (structurally weak planes) are high yielding.



Map 4.1 Ground Water User, Map District Solan, Himachal Pradesh

Ground Water User Map

Legend

District Solan

	Wells feasible	Rigs suitable	Depth of Well (m)	Discharge (lpm)	Suitable artificial Recharge structures
Soft rock aquifers	Tube well Dug well	Percussion & Percussion cum Rotary Manual	100-120 10-20	1200-2500 300-500	Check dam, Check dam cum ground water dam, Recharge shaft
Hard rock aquifers	Tube well Dug well Spring development	DTH with Odex Manual	100-150 10-20	1000-2000 300-500 30-2000	
Thrust			Fault/Lineament		
5 Water level contour (m bgl) (Pre monsoon decadal mean, 1993-2002) Major drainage Spring			Tehsil boundary District boundary State boundary		

Large number of hand pumps have been constructed by the state government for developing ground water in the district for domestic water supply. For ground water regime monitoring, CGWB has established 12 NHS in the district where ground water levels are monitored four times and ground water quality is monitored once in pre-monsoon period.

Central Ground Water Board has so far drilled 15 exploratory wells in the district, ranging in depth from 65 to 300 m bgl. The discharge in the wells constructed ranges from 2 to 30 lps for drawdown between 2 to 24 m. The transmissivity value ranges from 11 to 1480 m^2/ day. The ground water quality in the district is generally good with EC less than 1,000 µS/ cm.

The ground water resources are estimated for the 230 sq. km valley area (Nalagarh valley) for the year 2004. The net annual ground water availability is 6,936.12 ha m against 718.30 ha m existing gross groundwater draft for irrigation. The stage of ground water development is 14.77 % and falls under “SAFE” category.

Heavy ground water development in irrigation sector and recently setup industrial areas in Solan district (Baddi/ Barotiwala) are likely to cause ground water depletion as well as pollution problem and thus there is need to adopt rainwater harvesting for augmenting ground water resources.

Roof top rain water harvesting structures and construction of check dam/ subsurface dam, recharge well/ shafts can be adopted as a measures for harvesting/ augmenting ground water resources in the district.

Status of irrigation schemes is presented in respective tables. The water resources have mainly been divided into four viz, lift irrigation, tube well, kuhl and tank irrigation. These have been examined in terms of completed, functional, non-functional and ongoing. The irrigated area under irrigated schemes was about 2,668 ha, out of which Nalagarh block had the highest share. The number of villages covered and the beneficiaries were also the highest in this block. Tube well had little scope in the area. Kuhl were other major source of irrigation. In case of functional schemes, kuhl was the most important source. The actual irrigated area was about 1,000 ha. Lift irrigation was another major source of irrigation. The non-functional schemes were very few. But by making those functional about, 300 ha of land can be put under irrigation. There were few sites where different schemes of irrigation needed repair and maintenance. There was sufficient scope for increasing the area under irrigation which will help in increasing the land/ crop productivity in the blocks/ district. The potential area indicated that about 269 ha of land could be put under lift irrigation out of which 90 ha was in Kandaghat and 55 ha in Solan block. With the help of kuhl, 82 ha could be brought under irrigation.

4.3 Cropping Systems and Cropping Pattern

The district had maize-wheat; maize-barley and vegetable based cropping system under un-irrigated conditions (Table 4.4). These systems were almost common in all the blocks. In some of the blocks, paddy-wheat was also followed. Under irrigated conditions, in almost all the blocks vegetable based system was the most common. However, paddy-wheat, maize-wheat was also followed. Cereal crops occupied the major importance in the cropping pattern of the district as well as the blocks (Table 4.5). Within cereals, maize was the important crop in kharif in all the blocks while paddy was also found to be important in Nalagarh and Kunihar blocks. Wheat in rabi season was the major cereal grown in the district. Barley was another rabi crop but was confined to three blocks. Among pulses, mash and kulthi were the important crops. Mustard, the major oilseed grown in four blocks, occupied 1,328 ha of land in the overall district level. Solan district as a whole was known for vegetable production particularly off-season vegetables. There were specific niches where these off-season vegetables could be grown. The major vegetables grown in the area were peas, tomato, cabbage, cauliflower, french bean, capsicum, lady finger and brinjal. Although in some blocks cucurbits were also grown. Radish was another vegetable in three out of five blocks of the district.

4.4 Input Use and Gaps

It has been observed that among cereal crops, the use of seed was higher than the recommended one except in case of Kandaghat where it was marginally below the recommended one (Table 4.6). In case of pulses and oilseeds also, the seed rate was found to be higher. Among vegetable crops, the seed rate for peas was higher in Solan block while in other blocks, it was found to be

below the recommended one. In case of tomato, where the seed rate was in gm, the gap was estimated to be very less. The use was higher in Solan, Kunihar and Nalagarh blocks. In other blocks, it was less. The seed rate was found to be higher in all the blocks for cauliflower whereas in beans reverse trend was found. In other vegetables like capsicum, lady finger and brinjal, the used seed rate was less than the recommended one. In case of ginger, no specific trend was followed in different blocks.

4.5 Yield Gap Analysis

Table 4.7 gives the yield gap.

Cereals

The yield gap has been estimated for different crops. The gaps were calculated by subtracting the average/ actual yield per hectare of the farmer and the yield of the progressive farmer. On an average the yield gap for maize has been estimated to be 10.67q/ha. It was 14.91, 12.79, 4.03 q/ha for paddy, wheat and barley. The highest gap was found in Kunihar block for maize, whereas in case of wheat, it was in Nalagarh block.

Pulses and Oilseeds

Pulses included mash and kulthi. The yield gap was very less in both the crops mainly because these crops are generally grown as mixed crop and that, too, under unirrigated conditions. For the district as a whole, the gap for mash was estimated to be 1.35 q while in case of kulthi, it was 1.36 per ha. Linseed, mustard and sesame were the oilseeds grown in Nalagarh block of the district. The gap was found to be quite low. Similarly, in Dharampur block also, the gap for mustard and linseed was found to be around 1 q/ha.

Vegetables

The yield gap in case of potato was estimated to be about 64 q/ha. In tomato, the highest gap (193.05q) was found in Solan block whereas the minimum was in case of Nalagarh (50q/ha). For the district as a whole, the average yield for cabbage was 122.31q whereas the progressive farmer was getting a yield level of 188 q/ha. In this crop also, the maximum difference between progressive farmer yield and average yield was estimated to be in Solan block. In cauliflower the maximum average yield was estimated in Kunihar block followed by Solan block. For the district, the gap between average yield and progressive farmers yield was estimated to be 34.70 q/ha. Capsicum was another important vegetable crop of the district. The actual yield was found to be highest in Kunihar block. The gap was nearly 62 q/ha. The gap was found to be minimum in Dharmpur. The average yield of lady finger for the district was estimated to be 92.97 q/ha as against 114 q/ha of the progressive farmer. The highest yield was found in Kunihar whereas the largest gap was found in Nalagarh block. In brinjal, the average yield was estimated to be higher than 216 q/ha the blocks. In Solan block, it was more than 250 q/ha. In rest of the vegetables, which were grown in some of the blocks, the yield gap was not very high.

Spices

Ginger was grown in all the blocks. The yield gap was about 38q. The average yield was found to be highest in Kandaghat and Kunihar blocks. In case of garlic, the average yield was found to be highest in Kndaghat block. In case of garlic the average yield at the district level was found to be 130.04. The gap was estimated to be 29 q/ha.

4.6 Reasons for Gap

The reasons for gap were enquired into and the results obtained are summarised in the respective table.

Cereals

Better management by the progressive farmers was mentioned as the major reason in maize. Monkey menace was yet another important aspect. The progressive farmers engaged labour for keeping monkeys away whereas average farmer was unable to spend that much of amount. Lack of irrigation at critical time, general rainfed maize cultivation along with low use of FYM and fertilizer were also some of the important reasons for gap. In general, these were all common in all the blocks. Some of the progressive farmers had access to HYVs of paddy with knowledge about fertilizer use. They had better irrigation facilities also. All these factors led to high yield on these farms. The wheat cultivation was generally dependent upon rain. Thus, the progressive farmers, with better management, kept themselves ready for timely sowing. Thus, they received higher yields. Monkey menace, low fertilizer use due to poor purchasing capacity were some of other important reasons for gap in yield. No new variety of barley had been introduced since long which could come up to the expectations of farmers. Further, because of low capital base, the management on the average farm was also poor. Fertilizers were also not added. On the other side, progressive farmers did take care of these things and obtained higher productivity.

Pulses and Oilseeds

Lack of awareness, low fertilizer use and lack of variety were found to be the main reasons for yield gap in pulses in the district. The cultivation of local varieties and lack of awareness/ better management on the part of progressive farmers were some of the important reasons of yield gap in oilseeds.

Vegetables

In all the vegetables, it was observed that better management in terms of diseases and insect/ pest control along with balanced fertilizer use were important reasons for yield gap. The use of hybrid varieties by the progressive farmers also added to higher yields on the farms of progressive farmers. Adequate irrigation particularly at the critical stage had also significant effect on the vegetable production. The progressive farmers had assured irrigation and thus higher yields as compared to average yield of the general farmers. In some of the vegetables, the progressive farmers were also using higher doses of fertilizers. These reasons were found common in all the blocks of the district wherever these vegetable crops were grown.

Spices

In case of ginger and garlic, lack of awareness and better management were some of the important reasons for yield gap.

Floriculture

The major reason for receiving low income in floriculture was the marketing. For this improved packaging system and cool chain were the major requirements. The progressive farmers got it through their contact and thus received higher returns than the average farmers. The situation remained the same in all the blocks of the district.

Manures and Fertilizers

There was high degree of correlation between irrigation and fertilizer use. The average farmers had low irrigation facilities and thus the use of fertilizer was also less. The low purchasing power was another important reason for lower use of manures and fertilizers in the district as a whole and also in different blocks of the district also.

Vermi-Compost

Non-availability and lack of awareness about the importance of vermi-compost were the major reasons for low use of vermi-compost. In addition to this, in adequate training in its use had also led to lower use of this important input at the level of average farmer.

Pesticides/ Insecticides/ Other Chemicals

Lack of purchasing power along with lack of knowledge about their use at the average farmer level were important reasons for low use. Both these reasons were common in all the blocks of the district.

4.7 Farm Mechanization

The use of thresher was quite high in the district (Table 4.8). Almost the entire wheat threshing was done through thresher. The number of threshers was highest in Nalagarh followed by Solan and Kunihar. Most of the farmers were using iron plough rather than wooden plough. The number of iron ploughs was maximum in Kunihar block followed by Nalagarh and Solan. Farmers were mainly using hand sprayers because of vegetable cultivation except in Kunihar where the use was very low. For fodder, chaff cutters were used by most of the farmers whereas the use of power tillers was nil in all the blocks. Most of the farmers were using metal store bins for storage of foodgrains.

4.8 Ongoing Schemes for Agriculture Development

The various schemes for agricultural and rural development were on water harvesting, soil/ land conservation, horticulture, fisheries, livestock, etc. There were 8 schemes on water harvesting covering 70 villages in all the four blocks of the district except Dharampur (Table 4.9). Out of these, 75% of the schemes were completed. There were 33 other agricultural schemes covering 2,290 villages. The additional fund required for ongoing other agricultural schemes was Rs 1,505 Lakh.

4.9 Interventions and Financial Estimates for District

- To ensure 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
- Promotion of integrated nutrient management through vermi-composting, popularization of bio-fertilisers and other ameliorants in addition to judicious and balanced nutrients to crops.

- Promotion of micro-irrigation for efficient management and delivery of required quantities of water as per crop needs.
- Promotion of mechanization conducive to hill farming and equipments & implements to reduce labour and to provide relief to the women folk.
- Strengthening and improvement 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
- Construction of adequate number of CAS (Controlled Atmosphere Storage) at critical points
- The installation of anti-hail guns at critical points

4.9.1 Varietal and Technological Problems of Cereal, Pulse and Oilseed Crops

These problems have been studied for cereals, pulses and oilseeds crops independently and presented in Table 4.13.

Cereals

In maize, tall varieties, broadcasting method of sowing and maize stem borer were the major problems which were almost common in all the blocks of the district. Unbalanced use of fertilizers was other important problem in case of Solan and Nalagarh blocks. This might be because it was not known in other blocks. In case of paddy, water scarcity, weed problem were said to be the major problems. In addition to this, unbalanced use of fertilizers was also an important problem. This might be because of lack of knowledge about use and/or might be because of non-availability of fertilizers. Diseases were the major problems in wheat particularly the loose smut, although it could be controlled by seed treatment. Lack of knowledge about fertilizer use and weed infestation were other technological/ varietal problems in the district. Lack of irrigation at the critical time was important problem in all the blocks which hinders the method of sowing, time of sowing and adoption of new varieties. Barley was treated as a marginal crop and weeds in this crop were found to be important problem in all the blocks where it was grown. The low and unbalanced use of fertilizers also led to low productivity of this cereal crop.

Pulses and Oilseeds

In case of pulses, wilting was the major problem besides low and unbalanced use of fertilizers. Pulses were generally grown as a mixed crop and wherever these were taken up as a solo crop, fertilizers were rarely applied. This was good also in terms if fertilizers and chemicals were completely banned and these could be grown as organic pulses. The farmers could earn high income because of the organic cultivation. As in case of other crops, cultivation of local varieties, weeds, low and unbalanced fertilizer use were found to be the major problems in oilseeds.

4.9.2 Technological Interventions of Cereal, Pulse and Oilseed Crops

Table 4.14 depicts technological interventions of cereals, pulses and oilseed crops.

Cereals

The most important intervention for maize in all the blocks was high yielding and disease resistant varieties. Although the hybrid seeds were coming up very fast through private agencies but their quality and reliability were uncertain. The farmers were interested to have those varieties which were distributed through department of agriculture after thorough certification from agricultural university. Another important intervention was provision of plant protection material. Many times, farmers received spurious material which led to crop failure. Farmers were also interested in having demonstration plots for HYVs, fertilizer use as well as plant protection measures. In areas where farmers were comparatively educated, the need for small processing unit was also voiced so that they did not have any marketing problem. In case of paddy, the new and HYVs were the major interventions required. Demonstration plots, plant protection measures, awareness about adequate and balanced use of fertilizers were also other interventions required by the farmers. The availability of HYVs, awareness about use of inputs, availability of plant protection measures, demonstrations etc. were some of the important interventions required in the district for wheat. For barley, better quality of seed and demonstration of technology were the interventions required for this crop. This is a marginal crop thus other important interventions like use of balanced fertilizers, awareness about diseases, insect/ pests, etc. were not given.

Pulses and Oilseeds

High yielding varieties and demonstrations of technology in all the blocks were considered to be important for increasing the pulse production. For oilseeds also, the availability of HYVs, demonstration, were given as the major interventions required.

4.9.3 Varietal and Technological Problems of Vegetable and Spice Crops

Varietal and technological problems of vegetables and spice crops are given in Table 4.15.

Vegetables

Availability of fertilizers, diseases, irrigation and frost injury were the major problems of potato in Kunihar block of the district. Tomato was being grown in all the blocks of the district. Bacterial wilt was the major technological problem which caused heavy losses to the farmers. Irrigation and awareness about diseases/ insect/ pest control were other problems. Stem rotting, whitefly and black rot were the main diseases which caused severe losses to the farmers. Knowledge about fertilizers and their use, diseases like powdery mildew and wilting were the major problems in pea. In cabbage/ cauliflower diseases were the major problem. The non-availability of fertilizers particularly CAN was another problem. Farmers generally used this fertilizer because of its being comparatively cheap. These problems were common to all the blocks of the district. In capsicum, bacterial wilt was also given the major problem for the district as a whole as well as for all the blocks.

Spices

Garlic on commercial scale was grown in Kunihar block where diseases and low germination were given as the major problems which hindered the productivity of crop. Four out of five

blocks grew ginger. The ginger rot and incidence of other diseases/ insect/ pest were found to be the major problem of the district.

4.9.4 General Problems

There were a few general problems which were equally important in all the blocks (Table 4.15). These problems were non-availability of good quality seed and lack of knowledge about input use particularly plant protection measures. Lack of marketing facilities in terms of storage, transportation, and packaging material were also important problems of the area.

4.9.5 Technological Interventions

Technological interventions for vegetables and spices are shown in Table 4.16.

Vegetables

Technological interventions with respect to potato were better quality seed, irrigation, demonstration, and control of diseases / insect pest, proper and adequate use of fertilizers. This was important in Kunihar block. In tomato better quality seed was found to be important in all the blocks. The demonstration of the technology for vegetable crops was important in four out of five blocks. In some of the blocks, soil health was also important for adequate and balanced use of fertilizers. In most of the blocks, this crop was grown only under irrigated conditions but in Nalagarh block farmers required increase in irrigation facilities for increasing the area as well as productivity of the crops. In case of peas also, the good quality seed and demonstration plots in the respective areas were the most required interventions. The integrated disease management and awareness about the use of balanced fertilizers were the other interventions required for the crop. The interventions required for cabbage and cauliflower were the same as in case of other vegetables. The good quality seed and integrated pest management were required in all the blocks. The demonstration pots were needed in Solan, Kunihar and Nalagarh blocks of the district. Better quality seed and integrated pest management were the important interventions required for capsicum.

Spices

In these crops also, the intervention with respect to quality seed was important in all the blocks. Demonstration plots and integrated pest management were other important interventions required wherever these crops were grown on commercial scale.

4.9.6 General Interventions

Marketing of produce was an important aspect for remunerative returns from the crops. The cultivators were facing the problem of regulated markets for sale of vegetables. Regarding marketing, the interventions required were adequate transportation facilities, packing material, storage facilities, etc (Table 4.16). Information about prices in different markets would also help in increasing the area under vegetables and thus augment the farm income.

4.10 Extension Gaps

- 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
- Promotion and strengthening the public- private partnership for ensuring delivery of need based inputs and technologies

4.11 Researchable Issues

- Characterization and classification of soils
- 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
- Formulation of biointensive IPM strategies for the management of *Helicoverpa armigera* (tomato and gram), white grubs (potato, maize, peas, ginger, cabbage etc), diamondback moth and cabbage caterpillar (cole crops), shoot and fruit borer (brinjal and okra), leaf miner and pod borer (peas), plant parasitic nematodes (cereals and vegetables)
- Insect pest and nematode management under protected cultivation situations.
- Management of insecticide resistance in field populations of *Helicoverpa armigera, Spodoptera litura, Plutella xylostella, Leucinodes orbonalis, Trialeurodes vaporariorum*.
- 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 and quality analysis of honey from different sources for value addition.

- Identification and management of insect-pests of medicinal, aromatic and ornamental plants.
- 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.
- Standardization of agro-technology for organic vegetable production.
- Development/refinement of production technology in ginger.
- 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 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. The focus will be on the development of improved varieties of various niche 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 maize, remunerative pulses like mash in low and mid hills; green soybean and dual purpose linseed in low and mid hills and under utilized but highly nutritive crops like rice bean, fababean and adzuki beans in low and mid hills.
- Survey and surveillance of major diseases of important crops.
- Pathogenic and genetic diversity in pathogens associated with major crops diseases like bacterial wilt of solanaceous vegetables.
- Identification of resistant sources and study of genetics of resistance.
- 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 like Important seed and soil borne diseases (Pea root rot and wilt complex, bacterial wilt, bean mosaic, urd bean leaf crinkle, bacterial blight, potato viruses etc.).
- Development of IDM module for important diseases of major crops.
- Analyzing trends and patterns of demand , prices and markets of emerging crops and enterprises in the context of ongoing process of globalization
- Understanding economic implications of climate change towards cropping systems, cropping patterns and livelihoods of the farmers

- Assessing impact of the ongoing process of commercialization 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

Table 4.1: Block Wise Land Utilization Pattern (Ha)

Sr. No.	Particulars	Solan	Kandaghat	Kunihar	Nalagarh	Dharampur	District
1	**Total geographical area**	21,053	20,722	39,403	70,620	29,132	1,80,930
2	**Forests**	451	495	6,936	10,165	3,880	21,927
	Productive	451	400	6,236	4,000	2,471	13,558
	Degraded	-	95	700	6,165	1,409	8,369
3	**Barren and uncultivable land**	2,533	734	918	5,937	1,095	11,217
	Rocky	1,925	734	918	5,937	1,095	10,609
	Stony	608	-	-	-	-	608
4	**Land put to non-agricultural uses**	1,488	820	1,343	1743	1,056	6,450
	Buildings	572	350	543	650	320	2,435
	Roads/paths/channels	916	470	800	1,093	736	4015
5	**Culturable waste**	2,359	1,015	1,282	6,229	1,695	12,580
	Weed/bush infested	1,402	915	420	3,229	945	6,911
	Area prone to animal menace	957	100	862	3,000	750	5,669
6	**Permanent pastures and other grazing lands**	11,636	13,899	19,015	16,093	14,680	75,323
	Productive	10,000	13,000	11,410	4,000	10,000	48,410
	Degraded	1,636	899	7,605	12,093	4,680	26,913
7	**Land under miscellaneous tree crops and groves**	231	12	-	338	21	602
8	**Fallow land**	620	532	852	2,518	1,184	5,706
	Current fallow	290	470	852	2,243	247	4,102
	Other fallow	330	62	-	275	937	1,604
9	**Cultivated land**	3,366	2,844	8,518	18,017	5,521	38,266

Source: Field survey, 2007-08

Table 4.2 Problems and Interventions for Land Development

Sr. No.	Problems	Interventions	Solan	Kandaghat	Kunihar	Nalagarh	Dharampur	District
1.	Sloping land	Land levelling	√	√	√	√	√	√
		Cultivation of fruit plants	√	√	-	-	√	√
		Awareness about contour cultivation	√	√	√	√	√	√
2.	Weed infestation	Reduction in fallow land	-	√	√	√	√	√
		Weed management/ control	√	√	√	√	√	√
		Weeds *(Lantana camara, Parthenium hysterophorus,Ageratum hostonianum,Bidens pilosa, Zizyphus rotundifolia, Cirsium arvense, Artemwasia sp., Equisetum typhoides, Rumex acetocella, Urtica dioca)*	√	√	√	√	√	√
3.	Overexploitation of land	Awareness about use	√	√	-	√	-	√
4.	Animal menace	Go-sadan	√	-	-	√	-	√
		Castration of monkeys	√	√	√	√	√	√
		Cultivation of fruit trees in forests	-	√	√	-	√	√
5.	Degraded land	Cultivation of fruit crops	√	√	√	-	√	√
		Awareness about its improvement	√	√	√	√	√	√

Source: Field survey, 2007-08

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

Particulars	Solan	Kandaghat	Kunihar	Nalagarh	Dharampur	District
Land levelling	112.64	302.72	214.64	369.93	205.05	1204.98
Contour bunding and terracing	28.78	48.18	310.25	155.12	73.71	616.04
Fencing (length in m)	82.14	56.07	88.92	171.88	110.37	509.38
Reclamation	112.28	107.06	170.92	256.26	88.59	735.11
Check dam (length in m)	56.29	36.42	130.81	2353.07	46.64	2623.23

Source: Field survey, 2007-08

Table 4.4 Major Cropping Systems

Cropping sequences	Solan	Kandaghat	Kunihar	Nalagarh	Dharampur
Unirrigated					
Maize-wheat	√	√	√	√	√
Maize+pulses-wheat	-	-	√	√	√
Maize-barley	-	√	√	-	√
Maize-pea	√	√	-	√	√
Paddy-wheat	-	-	√	√	-
Paddy-barley	-	-	√	-	-
Vegetable based	√	√	√	√	√
Irrigated					
Maize-wheat	-	-	-	√	-
Maize-potato	-	√	√	-	-
Paddy-wheat	-	-	√	√	-
Vegetable based	√	√	√	√	√
Ginger based	√	√	√	-	√

Source: Field survey, 2007-08

Table 4.5 Cropping Pattern (Ha)

Crops	Solan	Kandaghat	Kunihar	Nalagarh	Dharampur	District
Cereals						
Maize	1489	1007	6515	12826	2947	24784
Paddy	-	-	467	2057	-	2524
Wheat	503	372	2753	8893	1577	14098
Barley	-	229	604	-	471	1304
Pulses						
Mash	-	-	229	266	109	604
Kulthi	-	-	112	118	-	230
Oilseeds						
Sesamum	-	-	-	381	-	381
Mustard	-	117	211	642	358	1328
Linseed	-	-	167	262	128	557
Vegetables						

Potato	-	-	205	-	-	205
Peas	176	238	387	453	219	1473
Tomato	566	359	812	510	479	2726
Cabbage	12	7	20	23	11	73
Cauliflower	39	17	26	67	24	173
French bean	98	64	76	151	-	389
Capsicum	61	104	123	240	204	732
Lady finger	56	57	44	-	-	157
Brinjal	7	12	12	22	7	60
Cucurbits	-	18	16	47	-	81
Onion	-	-	15	22	-	37
Spinach	-	-	16	44	-	60
Radish/ turnip	-	8	18	58	-	84
Fruits						
Other sub-tropical fruits (mango etc)	50	64	360	295	1581	2350
Citrus	75	89	70	205	396	835
Apple	21	70	-	11	-	102
Stone fruits (peach, plum, apricot)	867	866	367	772	101	2973
Dry Fruits	27	119	19	119	31	315
Spices						
Ginger	11	43	110	176	58	398
Garlic	32	27	7	4	17	87

Source: Field survey, 2007-08

Table 4.6 Seed Use, Requirement and Gaps (Kg/ha)

Inputs	Solan			Kandaghat			Kunihar			Nalagarh			Dharampur			District		
	U	R	G	U	R	G	U	R	G	U	R	G	U	R	G	U	R	G
Maize	24.32	20	-4.32	18.51	20	1.49	22.89	20	-2.89	27.71	20	-7.71	23.75	20	-3.75	23.44	20	-3.44
Paddy	-	-	-	-	-	-	135.08	100	-35.08	143.28	100	-43.28	-	-	0.00	137.32	100	-37.32
Wheat	140.19	125	-15.19	99.54	125	25.46	120.25	125	4.75	113.46	125	11.54	130.33	125	-5.33	120.75	125	4.25
Barley	-	-	-	83.48	125	41.52	118.72	125	6.28	-	-	-	109.29	125	15.71	92.30	125	32.7
Mash	-	-	-	-	-	-	23.93	20	-3.93	18.63	20	1.37	19.37	20	0.63	22.39	20	-2.39
Moong	-	-	-	-	-	-	18.69	20	1.31	-	-	-	-	-	-	18.69	20	1.31
Kulthi	-	-	-	-	-	-	21.70	20	-1.70	22.89	20	-2.89	-	-	-	21.92	20	-1.92
Sesame	-	-	-	-	-	-	6.25	5	-1.25	6.07	5	-1.07	-	-	-	6.09	5	-1.09
Sarson	-	-	-	6.82	8	1.18	7.52	8	0.48	8.98	8	-0.98	7.70	8	0.30	8.25	8	-0.25
Linseed	-	-	-	-	-	-	42.50	50	7.50	39.54	50	10.46	43.83	50	6.17	40.37	50	9.63
Potato	-	-	-	-	-	-	2114	2000	-114	-	-	-	-	-	-	2114	2000	-114
Peas	147.54	125	-22.54	82.5	125	42.50	80.85	125	44.15	104.17	125	20.83	80.65	125	44.35	99.14	125	25.86
Tomato	0.513	0.5	-0.01	0.414	0.5	0.09	0.583	0.5	-0.08	0.521	0.5	-0.02	0.520	0.5	-0.02	0.51	0.5	-0.01
Cabbage	0.471	0.5	0.03	0.462	0.5	0.04	0.576	0.5	-0.08	0.526	0.5	-0.03	0.601	0.5	-0.10	0.53	0.5	-0.03
Cauliflower	0.608	0.5	-0.11	0.605	0.5	-0.11	0.663	0.5	-0.16	0.577	0.5	-0.08	0.527	0.5	-0.03	0.60	0.5	-0.1
Beans	87	100	13.00	76.87	100	23.13	82.89	100	17.11	73.42	100	26.58	-	-	-	78.54	100	21.46
Capsicum	0.302	0.75	0.45	0.619	0.75	0.13	0.625	0.75	0.13	0.660	0.75	0.09	0.618	0.75	0.13	0.56	0.75	0.19
Lady finger	8.94	10	1.06	8.49	10	1.51	15.47	10	-5.47	-	-	-	-	-	-	9.68	10	0.32
Brinjal	0.456	0.5	0.04	0.415	0.5	0.09	0.463	0.5	0.04	0.526	0.5	-0.03	0.459	0.5	0.04	0.46	0.5	0.04
Cucurbits	-	-	-	4.58	4	-0.58	4.30	4	-0.30	3.84	4	0.16	-	-	-	4.54	4	-0.54
Ginger	2250	2250	0	2894	2250	-644	2683	2250	-433	-	-	-	2434	2250	-184	2472	2250	-222
Garlic	-	-	-	-	-	-	630	700	70	-	-	-	-	-	-	630	700	70
Onion	-	-	-	-	-	-	-	-	-	12.71	15	2.29	-	-	-	12.71	15	2.29
Spinach	-	-	-	-	-	-	-	-	-	26.27	30	3.73	-	-	-	26.27	30	3.73
Radish	-	-	-	-	-	-	-	-	-	9.35	10	0.65	-	-	-	9.35	10	0.65

Note: U: Use; R: Requirement, G: Gap in physical values
Source: Field survey, 2007-08

Table 4.7 Yield Gaps in Important Crops (Q/ha)

Crop	Solan			Kandaghat			Kunihar			Nalagarh			Dharampur			District		
	A	P	G	A	P	G	A	P	G	A	P	G	A	P	G	A	P	G
Cereal																		
Maize	21.12	29	7.88	15.08	28	12.92	15.31	32	16.69	17.61	25	7.39	17.53	28	10.47	17.33	28	10.67
Paddy	-	-	-	-	-	-	14.82	30	15.18	15.36	30	14.64	-	-	-	15.09	30	14.91
Wheat	19.32	24	4.68	20.16	26	5.84	17.17	25	7.83	13.59	35	21.41	15.81	25	9.19	17.21	30	12.79
Barley	-	-	-	12.31	16	3.69	12.43	18	5.57	-	-	-	15.17	18	2.83	13.30	17.33	4.03
Pulses																		
Mash	-	-	-	-	-	-	3.41	4	0.59	3.12	6	2.79	4.42	5	0.58	3.65	5.0	1.35
Kulthi	-	-	-	-	-	-	2.39	4	1.61	2.88	4	1.12	-	-	-	2.64	4.0	1.36
Oilseeds	-																	
Sesame	-	-	-	-	-	-	-	-	-	4.26	5	0.74	-	-	-	4.26	5	0.74
Sarson	-	-	-	-	-	-	-	-	-	5.5	8	2.5	5	6	1	5.25	7.0	1.75
Linseed	-	-	-	-	-	-	-	-	-	4	5	1	5	6	1	4.50	5.50	1
Vegetables																		
Potato	150	300	150	200	270	70	150	200	50	100	130	30	130	150	20	146	210	64
Peas	63.86	90	26.14	60.58	90	29.42	58.31	80	21.69	60	70	10	45	60	15	57.55	78	20.45
Tomato	206.95	400	193.05	261.65	400	138.35	270.94	400	129.06	170	220	50	300	350	50	241.91	354	112.1
Cabbage	140.67	300	159.33	150	250	100	120.90	150	29.10	80	90	10	120	150	30	122.31	188	65.70
Cauliflower	176.51	200	23.49	150.09	190	39.91	179.97	225	45.10	85	100	15	100	150	50	138.31	173	34.70
Beans	80	97	17	81.59	90	8.41	68.43	80	11.57	75	90	15	70	85	15	75	88	13
Capsicum	76.29	150	73.71	74.86	160	85.14	77.35	140	62.65	71.54	130	58.46	70	100	30	74.01	136	61.99
Lady finger	93.82	120	26.18	93.21	110	16.79	102.80	120	17.20	90	120	30	85	100	15	92.97	114	21.03
Brinjal	250	280	30	180	220	40	150	200	50	90	160	70	180	200	20	170	216	46
Cucurbits	120	190	70	150	190	40	160	250	90	60.17	100	39.83	150	180	30	128.03	182	54
Onion	200	215	15	210	230	20	110.41	200	89.60	106.74	150	43.30	160	170	10	157.43	193	35.60
Spinach	80	120	40	100	140	40	117.38	150	32.70	80	100	20	-	-	-	94.35	127.50	33.15

Radish	130	146	16	140	162	22	73.62	130	56.38	100	130	30	140	150	10	116.72	144	27.30
Spices																		
Ginger	150	190	40	160	220	60	160	200	40	100	130	30	140	160	20	142	180	38
Garlic	150	165	15	165	180	15	90.22	150	59.78	120	150	30	125	150	25	130.04	159	29

Note: A= Actual, P= Progressive farmers' yield and G= Gap
Source: Field survey, 2007-08

Table 4.8 Farm Machinery Use and Gap

Machinery	Solan				Kandaghat				Kunihar			
	% users	Number			% users	Number			% users	Number		
		E	R	G		E	R	G		E	R	G
Thresher	69.72	200	250	50	78.73	125	150	25	85.02	180	250	70
Iron plough	68.58	3,375	6,000	2,625	39.11	2,750	4,500	1,750	79.98	5,134	8,000	2,866
Spray pump	60	35	150	115	40.08	27	60	33	63.92	20	50	30
Chaff cutter	41.42	1,200	1,800	600	40.92	1,200	2,200	1,000	47.33	1,800	2,500	700
Power tiller	-	-	-	-	-	-	-	-	-	-	-	-
Metal store bin	85.21	16,731	20,000	3,269	90.06	12,622	15,000	2,378	92.54	20,981	25,000	4,019

Table 4.8 contd….

Machinery	Nalagarh				Dharampur				District		
	% users	Number			% users	Number			Number		
		E	R	G		E	R	G	E	R	G
Thresher	80.77	210	250	40	69.17	85	125	40	160	205	45
Iron plough	75.49	3,459	6,000	2,541	63.93	2,525	4,500	1,975	3,448.60	5,800	2,351.40
Spray pump	63.04	72	100	28	54.79	37	60	23	38.20	84	45.80
Chaff cutter	61.61	4,240	6,000	1,760	46.98	1,660	4,000	2,340	2,020	3,300	1,280
Power tiller	-	-	-	-	-	-	-	-	-	-	-
Metal store bin	79.65	41,255	55,000	13,745	71.58	16,875	20,000	3,125	21,692.80	2,7000	5,307.20

Note: E: Existing No., R: Required No., G: Gap
Source: Field survey, 2007-08

Table 4.9 Existing Block Level Schemes for Agriculture Development

Scheme	Block	Status	Solan	Kandaghat	Kunihar	Nalagarh	Dharampur	District
Water harvesting	No. of Schemes		1	3	3	1	-	8
	Village covered		14	7	40	9	-	70
	Status	Complete (No.)	1	1	3	1	-	6
		Incomplete (No.)	-	2	-	-	-	2
	Additional funds required (Rs. Lakh)		20	30	20	40	20	130
Soil/land conservation	No. of Schemes		1	-	-	2	3	6
	Village covered		72	-	-	2	24	98
	Status	Complete (No.)	1	-	-	-	2	3
		Incomplete (No.)	-	-	-	2	1	3
	Additional funds required (Rs. Lakh)		12	10	6	12	10	50
Other agricultural schemes	No. of Schemes		7	6	7	6	7	33
	Village covered		470	250	490	645	435	2290
		Incomplete (No.)	7	6	7	6	7	33
	Additional funds required (Rs. Lakh)		325	250	255	395	280	1505

Source: Field survey, 2007-08

Table 4.10 Ground Water Resources Availability, Utilization and Stage of Development

Particulars		Solan	State total (ha m)	State total (bcm)
Annual replenishable ground water resource				
Monsoon season	Recharge from rainfall	6,060	32,721	0.33
	Recharge from other sources	60	760	0.01
Non-monsoon season	Recharge from rainfall	1,467	7,794	0.08
	Recharge from other sources	120	1,511	0.02
Total		7,707	42,785	0.43
Natural discharge during non-monsoon season		771	4,279	0.04
Net annual ground water availability		6,936	38,507	0.39
Annual ground water draft	Irrigation	718	9,122	0.09
	Domestic and industrial uses	307	2,490	0.02
	Total	1,025	11,612	0.12
Projected demand for domestic and industrial uses up to 2025		684	4,131	0.04
Ground water availability for future irrigation		5,534	25,255	0.25
Stage of ground water development (%)		15	30	30

Source: Central Ground Water Board, Ministry of Water Resources, Northern Himalayan Region, Dharamshala.

Table 4.11 Status of Irrigation Schemes

Status of scheme	Type of schemes and particulars		Solan	Kandaghat	Kunihar	Nalagarh	Dharampur	District
Schemes completed	**Lift irrigation**							
		Number	5	8	14	29	3	59
		Amount spent (Rs. Lakh)	120	205	-	-	45	370
		Villages covered	350	20	26	85	3	484
		Beneficiaries (No.)	2,000	618	1,760	2,528	52	6,958
		Command area (Ha)	213	514	556	1,897	25	3,205
		Actual irrigated area (Ha)	213	271.02	481	1,680	23	2,668.02
	Tube wells							
		Number	-	-	-	66	6	72
		Amount spent (Rs. Lakh)	-	-	-	-	48	48
		Villages covered	-	-	-	115	6	121
		Beneficiaries (No.)	-	-	-	650	80	730
		Command area (Ha)	-	-	-	31	25	56
		Actual irrigated area (Ha)	-	-	-	25	20	45

	Kuhl							
		Number	12	4	80	12	6	114
		Amount spent (Rs. Lakh)	8	5	-	-	4	17
		Villages covered	40	5	71	218	10	344
		Beneficiaries (No.)	650	789	2,650	2,250	45	6,384
		Command area (Ha)	50	123	950	1,599	52	2,774
		Actual irrigated area (Ha)	40	98.58	836	1,192	52	2,218.58
	Tank irrigation							
		Number	400	400	155	-	-	955
		Amount spent (Rs. Lakh)	0.75	0.8	-	-	-	1.55
		Villages covered	325	200	85	-	-	610
		Beneficiaries (No.)	1,000	400	925	-	-	2,325
		Command area (Ha)	40	15	46	-	-	101
		Actual irrigated area (Ha)	40	12	40	-	-	92
Functional	**Lift irrigation**							
		Number	9	8	11	29	3	60
		Amount spent (Rs. Lakh)	2	205	69	-	45	321
		Villages covered	100	20	21	-	3	144
		Beneficiaries (No.)	500	618	1,735	-	52	2,905
		Command area (Ha)	210	514	481	-	25	1,230
		Actual irrigated area (Ha)	210	271.02	481	-	23	985.02
	Tube wells							
		Number	-	-	-	66	-	66
		Amount spent (Rs. Lakh)	-	-	-	-	-	-
		Villages covered	-	-	-	-	-	-
		Beneficiaries (No.)	-	-	-	-	-	-
		Command area (Ha)	-	-	-	-	-	-
		Actual irrigated area (Ha)	-	-	-	-	-	-
	Kuhl							
		Number	12	4	73	12	5	106
		Amount spent (Rs. Lakh)	6	2.5	-	-	4	12.5
		Villages covered	50	8	64	-	10	132
		Beneficiaries (No.)	600	789	2,320	-	45	3,754
		Command area (Ha)	15	123	836	-	52	1026
		Actual irrigated area (Ha)	15	98.58	836	-	52	1,001.58
	Tank irrigation							
		Number	300	-	136	-	-	436

		Amount spent (Rs. Lakh)	0.5	-	-	-	-	0.5
		Villages covered	300	-	73	-	-	373
		Beneficiaries (No.)	600	-	850	-	-	1,450
		Command area (Ha)	25	-	40	-	-	65
		Actual irrigated area (Ha)	20	-	40	-	-	60
Non-Functional	**Lift irrigation**							
		Number	3	-	3	-	-	6
		Amount spent (Rs. Lakh)	0.4	-	-	-	-	0.4
		Villages covered	-	-	5	-	-	5
		Beneficiaries (No.)	-	-	-	-	-	-
		Command area (Ha)	-	-	75	-	-	75
		Actual irrigated area (Ha)	-	-	-	-	-	-
	Tube wells							
		Number	-	-	-	-	6	6
		Amount spent (Rs. Lakh)	-	-	-	-	48	48
		Villages covered	-	-	-	-	6	6
		Beneficiaries (No.)	-	-	-	-	80	80
		Command area (Ha)	-	-	-	-	60	60
		Actual irrigated area (Ha)	-	-	-	-	60	60
	Kuhl							
		Number	40	-	7	-	1	48
		Amount spent (Rs. Lakh)	-	-	-	-	3	3
		Villages covered	-	-	7	-	2	9
		Beneficiaries (No.)	-	-	330	-	18	348
		Command area (Ha)	-	-	114	-	9	123
		Actual irrigated area (Ha)	-	-	-	-	9	9
	Tank irrigation							
		Number	10	-	19	-	-	29
		Amount spent (Rs. Lakh)	-	-	-	-	-	-
		Villages covered	-	-	12	-	-	12
		Beneficiaries (No.)	-	-	75	-	-	75
		Command area (Ha)	-	-	6	-	-	6
		Actual irrigated area (Ha)	-	-	-	-	-	-
Ongoing schemes	**Lift irrigation**							
		Number	3	2	-	-	-	5
		Amount spent (Rs. Lakh)	35	25	-	-	-	60

		Villages to be covered	12	5	-	-	-	17
		Beneficiaries (No.)	300	169	-	-	-	469
		Command area (Ha)	22	116	-	-	-	138
		Actual irrigated area (Ha)	22	116	-	-	-	138
	Tube wells							
		Number	-	-	2	-	-	2
		Amount spent (Rs. Lakh)	-	-	47	-	-	47
		Villages to be covered	-	-	15	-	-	15
		Beneficiaries (No.)	-	-	200	-	-	200
		Command area (Ha)	-	-	12	-	-	12
		Actual irrigated area (Ha)	-	-	12	-	-	12
	Kuhl							
		Number	-	-	-	-	6	6
		Amount spent (Rs. Lakh)	20	20	15	30	12	97
		Villages to be covered	-	-	-	-	3	3
		Beneficiaries (No.)	-	-	-	-	26	26
		Command area (Ha)	-	-	-	-	9	9
		Actual irrigated area (Ha)	-	-	-	-	9	9
	Tank irrigation							
		Number	5	-	-	-	-	5
		Amount spent (Rs. Lakh)	3	-	-	-	-	3
		Villages to be covered	22	-	-	-	-	22
		Beneficiaries (No.)	130	-	-	-	-	130
		Command area (Ha)	25	-	-	-	-	25
		Actual irrigated area (Ha)	-	-	-	-	-	-

Source: Field survey, 2007-08

Table 4.12 Irrigation Schemes: Funds for Repair and Maintenance

Status of schemes	Type of scheme & particulars		Funds for	Solan	Kandaghat	Kunihar	Nalagarh	Dharampur	District
Functional	**Lift irrigation**								
		Number		13	8	14	29	3	67
		Annual funds required (Rs. Lakh)	*For maintenance*	35	35	25	50	35	180
		Funds required (Rs. Lakh)10 yrs	*For replacement*	70	40	20	12	10	152
	Tube wells								
		Number		-	-	-	-	-	-
		Annual funds required (Rs. Lakh)	*For maintenance*	-	-	50	-	30	80
		Funds required (Rs. Lakh)10 yrs	*For replacement*	-	-	50	-	30	80
	Kuhl								
		Number		-	4	80	-	6	90
		Annual funds required (Rs. Lakh)	*For maintenance*	60	40	40	75	30	245
		Funds required (Rs. Lakh) 10 yrs	*For replacement*	-	10	65	-	10	85
Non-functional	**Lift irrigation**								
	Kuhl								
		Number		-	-	-	-	1	1
		Annual funds required (Rs. Lakh)	*For maintenance*	-	-	-	-	3	3
		Funds required (Rs. Lakh)10 yrs	*For replacement*	-	-	-	-	7	7

Source: Field survey, 2007-08

Table 4.13 Varietal and Technological Problems of Cereal, Pulse and Oilseed Crops

Crop/ Problem	Solan	Kanda ghat	Kunihar	Nala garh	Dharam pur	District
Maize						
Maize stem borer	√	√	√	√	√	√
Soil health testing	√	-	√	√	-	√
Imbalanced use of fertilizer & weed problem	√	-	-	√	-	√
Sowing by traditional broadcasting method	√	√	√	√	√	√
Tall type of maize variety	-	√	√	-	√	√
Wind damage	√	-	-	√	√	√
Weed problem and water scarcity	√	-	√	√	-	√
Turcicum and maydis leaf blights	√	√	√	√	√	√
Banded leaf and sheath blight	√	√	√	√	√	√
Weeds *(Ageratum conyzoides,Commelina benghalensis,, Gallinsoga parviflora,Digitaria sanguinalis, , Echichnoloa colona)*	√	√	√	√	√	√
Stem borer, Cutworms, White grubs	√	√	√	√	√	√
Rainfed condition	√	√	√	√	√	√
Paddy						
Imbalanced use of fertilizer	-	-	√	√	-	√
Brown spot	√	√	√	√	√	√
Grain discolouration	√	√	√	√	√	√
Weed problem (*Echin.chloa crus-galli Polygonum barbatum, Cyperus iria, Paspalum conjugatum)*	-	-	√	√	-	√
Stem borer, hispa, leaf folder, planthoppers, nematodes, Grasshopper	√	√	√	√	√	√
Water scarcity	√	√	√	√	√	√
Wheat						
Loose smut	√	√	√	√	√	√
Hill bunt	√	-	-	√	-	√
Rust (yellow and leaf rust)	√	√	√	√	√	√
Imbalanced use of fertilizer	√	√	-	√	-	√
Irrigation	√	√	√	√	√	√
Weed problem (*Phalaris minor, anagallis arvensis stellaria media,vicia sativa avena ludoviciana,poa annua, , veronica persica,)*	-	-	√	-	√	√
Aphid, grasshoppers, termites	√	√	√	√	√	√
Prevalence of diseases like yellow & brown rusts, loose smut &	√	√	√	√	√	√

powdery mildew in the entire region; hill bunt in higher reaches and Karnal bunt.						
Occurrence of frequent droughts & cold at crucial crop growth stages hindering thereby the productivity	√	√	√	√	√	√
Non availability of a range of maturity groups of varieties for small and diverse pockets within one district	√	√	√	√	√	√
Lack of suitable varieties for low input management and organic farming systems	√	√	√	√	√	√
Varietal mixtures	√	√	√	√	√	√
Non availability of quality seed of improved varieties	√	√	√	√	√	√
Seed of improved varieties was required to be multiplied by the State Deptt. of Agriculture	-	-	-	√	-	√
Barley						
Imbalanced use of fertilizer	-	-	√	-	√	√
Aphid, grasshoppers, termites	√	√	√	√	√	√
Weeds	-	√	-	-	√	√
Pulses						
Imbalanced use of fertilizer	-	-	√	-	√	√
Weeds (*Commelina benghalensis Ageratum conyzoides,Digitaria sanguinalis echinchloa colona)*	√	√	√	√	√	√
Hairy caterpillar, aphid complex, til pod borer, cabbage caterpillar, painted bug	√	√	√	√	√	√
Wilting	-	-	√	√	√	√
Oilseeds						
Imbalanced use of fertilizer	-	√	√	-	√	√
Incidence of insect and pest	-	-	√	-	√	√
White rust	√	√	√	√	√	√
Downy mildew	√	√	√	√	√	√
Local variety was used	-	√	√	√	√	√
Weeds	-	-	-	-	√	√

Source: Field survey, 2007-08

Table 4.14 Technological Interventions of Cereal, Pulse and Oilseed Crops

Crop/ intervention	Solan	Kandaghat	Kunihar	Nalagarh	Dharampur	District
Maize						
Provide insecticides on subsidised rate	√	√	√	√	√	√
Demonstration	-	√	√	-	-	√
High yielding and disease resistant variety	√	√	√	√	√	√
Small processing unit	√	-	-	√	-	√
Paddy						
Demonstration	-	-	√	√	-	√
Better quality seed	-	-	√	√	-	√
Soil health card	-	-	-	√	-	√
Awareness	-	-	-	√	-	√
Balanced use of fertilisers	-	-	√	√	-	√
Wheat						
Provide fungicide on subsidies rate	√	-	-	√	-	√
Awareness	-	√	-	-	√	√
Demonstration	-	√	√	√	√	√
High yielding variety	√	√	√	√	√	√
Development of drought and cold tolerant and disease resistant wheat varieties utilizing certain Innovative biotechnological approaches	√	√	√	√	√	√
Acceleration of wheat improvement endeavors for the development of large number of targeted varieties for specific regions following chromosome elimination-mediated doubled haploidy breeding and molecular cytogenetic approaches	√	√	√	√	√	√
Development of wheat varieties specifically for low input and organic farming systems following organic plant breeding approaches	√	√	√	√	√	√
Training/encouragement to the private growers for the production foundation/certified seed	√	√	√	√	√	√
Development of quality bred wheat for nutritional security in hills	√	√	√	√	√	√
Barley						
High yielding varieties	√	√	√	√	√	√
Demonstration	√	√	√	√	√	√
Pulses						
Demonstration	-	√	-	√	√	√
Availability of HYV	-	√	√	-	-	√
Oilseeds						
Demonstration/ high yielding varieties	-	√	√	√	√	√
FLD & OFT are required	-	√	-	√	-	√

Source: Field survey, 2007-08

Table 4.15 Varietal and Technological Problems of Vegetable and Spice Crops

Crop/ problem	Solan	Kanda ghat	Kunihar	Nalagarh	Dharam pur	District
Potato						
Disease and insects/ pests	-	-	√	-	-	√
Late blight						
Non-availability of CAN	-	-	√	-	-	√
Irrigation	-	-	√	-	-	√
Frost injury	-	-	√	-	-	√
Cutworm, wireworms, hadda beetle	√	√	√	√	√	√
Tomato						
Bacterial wilt	√	√	-	√	√	√
Fruit rot						
Disease and fertilizer knowledge	√	-	√	√	-	√
Irrigation	-	√	√	-	√	√
Incidence of insect/ pest	√	-	√	√	√	√
Rotting of stem	√	√	-	√	√	√
Black rot	-	√	√	-	-	√
Cutworm, fruit fly, tomato fruit borer, serpentine leaf miner, hadda beetle, whitefly	√	√	√	√	√	√
Peas						
Bio fertiliser knowledge	√	-	-	√	-	√
Imbalance use of fertilizer	√	-	√	√	-	√
Powdery mildew	√	√	√	√	√	√
Wilt	√	√	-	√	-	√
Frost injury	-	-	-	√	-	√
Pea leaf miner, cutworms, pod borer complex, spotted mite, blister beetle, bean bug	√	√	√	√	√	√
Cabbage/Cauliflower						
Disease control	√	√	√	√	√	√
Black rot	√	√	√	√	√	√
Stalk rot	√	√	√	√	√	√
Non-availability of CAN	√	√	√	√	√	√
Caterpillar complex (Diamondback moth, cabbage caterpillar, semilooper, head borer), aphid complex, cutworms, painted bug	√	√	√	√	√	√
Capsicum						
Bacterial wilt	√	√	√	√	√	√
Fruit rot (anthracnose)	√	√	√	√	√	√
Phytophthora rot	√	√	√	√	√	√
Bacterial wilt	√	√	√	√	√	√
Cutworm, fruit fly, tomato	√	√	√	√	√	√

fruit borer, serpentine leaf miner, hadda beetle, whitefly						
Garlic						
Incidence of disease	-	-	√	-	-	√
Low germination and rolling	-	-	√	-	-	√
White grubs, onion thrips, onion maggot, aphid	√	√	√	√	√	√
Ginger						
Ginger rot	√	√	√	-	√	√
Incidence of disease/ insects pests	√	√	√	-	√	√
White grubs, onion thrips, onion maggot, aphid	√	√	√	√	√	√
General problems						
Non-availability of good quality seed	√	√	√	√	√	√
Lack of marketing and its related facilities	√	√	√	√	√	√
Lack of knowledge about plant protection measures	√	√	√	√	√	√
Weeds (*Commelina benghalensis Ageratum conyzoides, Gallinsoga parviflora Cenchrus sp, Medicago denticulata Gallinsoga parviflora,Corono.pus didymu,Poa annua,Stellaria media,Veronica persica)*	√	√	√	√	√	√

Source: Field survey, 2007-08

Table 4.16 Technological Interventions of Vegetable and Spice Crops

Crop/intervention	Solan	Kandaghat	Kunihar	Nalagarh	Dharampur	District
Potato						
Demonstration	-	-	√	-	-	√
Irrigation schemes	-	-	√	-	-	√
Better quality seed	-	-	√	-	-	√
Control of disease / insect	-	-	√	-	-	√
Education for balanced use of fertilisers	-	-	√	-	-	√
Tomato						
Improved action system for vegetable	√	-	-	√	-	√
Demonstration	√	√	-	√	√	√
Augmentation of water resources	-	-	-	√	-	√
Integrated disease management	-	√	√	√	√	√
Better quality seed	√	-	√	√	√	√
Soil health card	√	√	-	√	-	√
Education for balanced use of fertilisers	√	√	-	√	-	√
Peas						
Demonstration	√	√	√	√	√	√
Integrated disease management	√	-	√	√	-	√
Better quality seed	√	√	√	√	√	√
Soil health care	√	-	√	√	-	√
Education for balanced use of fertilisers	√	-	√	√	-	√
Cabbage/Cauliflower						
Better quality seed	√	√	√	√	√	√
Soil health care	√	-	-	√	-	√
Integrated disease management	√	√	√	√	√	√
Demonstration	√	-	√	√	-	√
Education for balanced use of fertilisers	√	√	-	√	-	√
Capsicum						
Better quality seed	√	√	√	√	√	√
Pest/ disease control	√	-	√	√	-	√
Garlic						
Good quality seed	√	√	√	√	√	√
Demonstration	√	-	-	-	-	√
IPM	-	√	-	-	-	√
Ginger						
Provide spray pump	√	√	-	-	-	√
Demonstration	√	√	-	-	-	√
Supply of quality seed	√	√	-	-	-	√
Disease management	-	√	-	-	-	√

General interventions						
Marketing facilities	√	√	√	√	√	√
Transportation	√	√	√	√	√	√
Adequate packaging material	√	√	√	√	√	√
Storage facilities	√	√	√	√	√	√
Information about prices (within and outside the state)	√	√	√	√	√	√

Source: Field survey, 2007-08

Table 4.17 Reasons for Gap in Cropping Pattern and Input Use

Reason	**Solan**	**Kandaghat**	**Kunihar**	**Nalagarh**	**Dharampur**	**District**
Maize						
Low use of FYM	√	√	√	√	√	√
Rainfed cultivation	-	√	-	√	√	√
Low use of fertilizers	√	√	√	√	√	√
Lack of irrigation facilities	√	√	√	√	√	√
Lack of awareness	√	√	√	√	√	√
Monkey menace	√	-	√	√	-	√
Poor management	√	√	√	√	√	√
Lodging	-	√	√	√	-	√
Paddy						
Lack of awareness	-	-	√	√	-	√
Poor management	-	-	√	√	-	√
Scarcity of water	-	-	√	√	-	√
Low fertilizer use	-	-	√	√	-	
Lack of variety	-	-	√	√	-	
Wheat						
Sowing depends upon rain	√	√	√	√	√	√
Lack of awareness	√	√	√	√	√	√
Low use of fertilizers	√	√	√	√	√	√
Monkey menace	-	√	-	√	√	√
Lack of variety	√	√	√	√	√	√
Poor management	√	√	√	√	√	√
Barley						
Lack of awareness	-	√	√	-	-	√
Low fertilizer use	-	√	√	-	-	√
Lack of variety	-	√	√	-	-	√
Mash						
Lack of awareness	-	-	√	√	√	√
Low fertilizer use	-	-	√	√	√	√
Lack of variety	-	-	√	√	√	√
Sarson						
Lack of awareness	-	√	√	√	√	√
Local variety are grown	-	√	√	√	√	√
Potato						
Lack of awareness	-	-	√	-	-	√
Poor management	-	-	√	-	-	√

Peas						
Damping off disease	√	-	√	√	√	√
Poor seeds	-	√	√	-	√	√
Poor management	√	√	√	√	√	√
Tomato						
Hybrid seed	√	√	√	√	√	√
Lack of assured irrigation	-	√	-	√	√	√
Lack of awareness	√	√	√	√	√	√
Poor management	√	√	√	√	√	√
Beans						
Poor management	√	√	√	√	√	√
Cabbage						
Better seed	√	√	√	√	√	√
High fertilizer use	-	√	√	-	√	√
Poor management	√	√	√	√	√	√
Cauliflower						
Poor management	√	√	√	√	√	√
Lack of irrigation facilities	-	√	√	-	√	√
Lady finger						
Poor management	√	√	√	√	-	√
Lack of awareness	√	√	√	√	-	√
Brinjal						
Poor management	√	√	√	√	√	√
Lack of awareness	√	√	√	√	√	√
Capsicum						
High fertilizer use	√	-	√	√	-	√
Poor management	√	√	√	√	√	√
Lack of irrigation	-	√	-	√	-	√
Onion						
Lack of awareness	-	-	√	√	-	√
Spinach						
Poor management	-	-	√	√	-	√
High fertilizer use	-	-	√	√	-	√
Radish						
Poor management	-	√	√	√	-	√
Spices						
Ginger						
Lack of awareness	√	√	√	-	√	√
Poor management	√	√	√	-	√	√
Garlic						
Lack of awareness	-	-	√	-	-	√
Flower cuttings/ bulbs						
Cool chain	√	√	√	√	√	√
Poor packaging system	√	√	√	√	√	√
Refrigerators for marketing	√	√	√	√	√	√
2. Manure and fertilizers						
Urea						
Use of imbalance fertilizer	√	√	√	√	√	√
Lack of awareness	√	√	√	√	√	√

Low purchasing power	√	√	√	√	√	√
CAN						
Water scarcity	-	√	-	√	-	√
Use of imbalance fertilizer	√	√	√	√	√	√
Lack of awareness	√	√	√	√	√	√
Low purchasing power	√	√	√	√	√	√
Vermi-compost						
Less vermi-compost availability	√	√	√	√	√	√
Required vermin-compost training	√	√	√	√	√	√
Lack of awareness	√	√	√	√	√	√
FYM						
Low availability	√	√	√	√	√	√
Pesticides						
Lack of purchasing power	√	√	√	√	√	√
Lack of knowledge	√	√	√	√	√	√

Source: Field survey, 2007-08

Chapter V

ALLIED AGRICULTURAL SECTORS

5.1 Horticulture

5.1.1 Existing Status and Potential for Horticultural Crops

There were five horticultural schemes in the district (Table 5.1). The number of villages covered under horticultural schemes was 2,020. The total area under horticulture was 6,575 ha. The maximum area was in Dharampur block (2,109 ha) followed by Nalagarh and Kandaghat block whereas the production of fruits was highest in Solan block (2,588 mt) comprising of 47% of total fruit production of district followed by Kandaghat and Nalagarh. There existed a lot of potential for horticultural crops in the district. About 2,240 ha more area could be put under fruit which would lead to increase in production by about 1,765 mt. In Solan district, the maximum area was under other temperate fruit (2,973 ha) followed by other subtropical fruit (2,350 ha) and citrus fruit (835 ha) (Table 5.2). The area under apple and dry fruit was only 102 ha and 315 ha, respectively. There was scope for increasing area under temperate fruit and citrus fruit because of climatic conditions.

5.1.2 Varietal and Technological Problems of Fruit Crops

The main problem in fruit crops was the lack of regular bearing varieties and non-availability of seedlings of good varieties. The other problems were lack of awareness, frost injury and water stress. In case of citrus fruit the problem of citrus canker was prominent in the area.

5.2 Animal Husbandry

The indigenous cows both male and female were higher in all the tehsils of the district. For district as a whole, the indigenous female cattle were 41.16 per cent higher than cross bred cattle. The female cross bred were significantly higher in all the tehsils as compared to males whereas the indigenous male cattle were higher except in Kandaghat. The female buffalo population was much higher than male population in all the tehsils of the district. The goat population was higher in Nalagarh Tehsil. The sheep population was found to be highest in Arki.

5.2.1 Incidence of Livestock Diseases

In case of cattle and buffalo, most of the animals are infected with ectoparasites and endoparasites (70-80%) but the mortality was maximum in case of calf scour (25%). This disease was absent in Kandaghat block. The other important diseases were FMD, diarrhoea/ dysentery, repeat breeding and tympany but the mortality was very low as the treatment was available for all the diseases in the district. Mastitis disease was observed only in Nalagarh block but the mortality with the disease was nil. In case of sheep and goat, maximum were infected with lice and ticks followed by PPR/ CCPP and endoparasites. It was observed that the incidence of these diseases was mainly in Kunihar, Nalagarh and Dharampur blocks. The mortality was maximum in case of diarrhoea/ dysentery.

5.3 Fisheries

Data on fisheries are presented for the district as a whole as the data were not available block wise. In case of fisheries, there were 12 schemes out of which 10 were complete (Table 5.3). At present, the area under fisheries was around 40 ha and about 150 persons are involved in this sector. The annual fish production was 660 qt which was collected from 40 ponds in the district. The district also had a great potential for fish production of around 400 qt. This target could be fulfilled by making additional 30 ponds covering an area of around 10 ha which would generate employment to about 150 households.

5.4 Poultry

Poultry did not find significant role in the district. However, the poultry production in the district came out to be 236.4 eggs/bird /yr. Nalagarh tehsil topped in poultry accounting for 87 per cent of the total poultry in the district. In case of poultry diseases, coccidiosis was important which was observed only in Kunihar block. The mortality with these diseases was very high in Kunihar block.

5.5 Mushroom

Mushroom was important in some of the important niches of the district. There were 245 mushroom units in the district and they were catering the local needs and exporting to other states and nearby cities like Chandigarh, etc. Even the mushroom was being exported to Delhi market also.

5.6 Agricultural Marketing

5.6.1 Production, Disposal and Post Harvest Losses

Cereals

Maize, paddy, wheat and barley constitute the total cereals. The total production of cereals was estimated to be 69,017 tonnes and the entire was consumed at home (Table 5.5). The production was found to be highest in Nalagarh followed by Kunihar. This was mainly because of higher area. In pulses also, Nalagarh and Kunihar produced the pulses with a marginal proportion at Dharampur. The pulses were not sufficient to be sold in the market. The main products to be sold in the market were the vegetables. A small proportion of total vegetable production was consumed. There were about 10 per cent losses in transportation whereas the post harvest losses were also observed. Total marketed surplus was estimated to be 77,425 tonnes for vegetables. The contribution of Nalagarh was found to be largest. The marketable surplus of vegetables in Solan block was 13,297. The farmers of Kandaghat also made use of the Solan market for the sale of vegetables. The vegetables were sold in local and distant markets within as well as outside markets.

Fruit

The total fruit production was estimated to be 5,484 tonnes and the contribution of Solan block was about half of this production. Kandaghat and Nalagarh share was 1041 tonnes and 893 tonnes, respectively. The marketable surplus was estimated to be 92 per cent of total production in Solan block. In general, about 10 per cent of production was wasted in transportation and post

harvest losses and rest was the marketable surplus. The local as well as distant markets were used for the sale of fruit crops.

Spices

In case of spices the share of Kunihar block was found to be the maximum followed by Nalagarh. Consumption was estimated to be about 37 per cent and rest of the production was sold in local as well as distant market. A small portion of total production was found as post harvest losses. There were no transportation losses in this case.

5.6.2 Production and Disposal of Livestock and Their Products

The main products sold in the market are milk and wool. It was observed that about 60 per cent of the milk was consumed at home (Table 5.6). It was common for all the blocks. The liquid milk was first choice of the consumers particularly when it was sold at their door step; the rest of the milk was sold in the local market. Wool was another important commodity being sold in the market. Its consumption at home was very low since the woollen clothes were available in the market. The consumption was only in high hills. The local traders purchased the wool and sold it to wholesalers. About 80 per cent of total wool was marketed.

5.7 Agricultural Infrastructure

5.7.1 Physical and Institutional

The agro sale centres in the district were 118 and the required number was 163. The existing number was highest in Kandaghat followed by Kunihar (Table 5.7). There was sufficient scope for increasing the number of agro-sale centres. As far as cooperatives were concerned, in public sector the required number was 6 as against the existing level of one. In the private sector the requirement was given for Kandaghat (5 units) and 2 in Dharampur block. In case of farmers' cooperatives, the major requirement for additional units was found for Nalagarh (7 units).

5.7.2 Human Resource Development

The existing human resource for agriculture has been depicted in Tables 5.8 to 5.10.

5.8 Rural Enterprises

There were about more than 15,000 youth unemployed in the district (Table 5.11). Vermi-compost gave employment to one person in each case. There were 210 vermi-compost units. Nalagarh topped the list with 100 units followed by Solan with 50. It was new enterprise, thus, there was sufficient potential in each block of the district. Similar was true for mushroom. Nearly 245 mushroom units already existed and there was scope of 750 more (Table 5.12). This would create an additional employment to about 1,100 persons. There existed 30 units of rural craft giving an employment to 100 persons; 10 units were in Solan block and there was potential of 15 more in this block. All the blocks showed inclination for additional rural craft except Dharampur. Nursery rising was found only in Kunihar, Nalagarh and Dharampur blocks. The potential was for 27 more nursery units. This was expected to generate an additional employment for 100 persons. For flower nursery, Nalagarh and Dharampur block had 5 and 12 units respectively and there was further scope for 11 more units. As far as seed production was concerned, Solan block

did not have any unit at present but there was a potential for 25 units each unit employing one person. Pottery had a little scope in the district. Shawl weaving and woollen garments was another field. Existing status showed that there were eleven units in the district and there existed further potential of 8 more (Table 5.13). The additional employment will be to the tune of 75 persons. The share of Solan block was the highest in this regard.

5.9 Agro-Processing

There were 287 atta chakkis in the district out of which 140 were in Nalagarh block. In general, about 2 persons were employed in this profession. There was still scope for increasing the number. The oil expellers were only 24. About 3 persons per oil expeller were employed. There was potential for 150 oil expellers in Nalagarh block. Since paddy cultivation was limited, the farmers were satisfied with existing 10 rice shellers and there was no scope for additional requirement. As far as bakery was concerned, there were 7 units in the entire district giving employment to 71 persons. There was a potential for increasing the units by 4 numbers in Solan block with employment opportunities to 15 persons. Regarding fruit and vegetable processing unit, there existed one in Solan block and another two in Dharampur block. Still there was a potential for one each in Solan, Kandaghat and Dharampur block. This was expected to generate an additional employment to about 50 persons. The existing number, requirement and gaps of agribusiness establishments were given in Table 5.14.

5.10 Drudgery of Women

Agriculture

The females took part in almost in all the activities of agriculture. More than 80 per cent of clod breaking work was performed by females (Table 5.15). In transplanting, 71 per cent and 52 per cent of female performed this work in Kunihar and Nalagarh block of the district. As far as manuring and fertilizer was concerned, there existed wide fluctuations. In Kunihar block, the entire work was performed by females whereas in Nalagarh block only 43 per cent of work was done by females. On an average for the district as a whole, two third of the total work was performed by females. The intercultural operations were manually done by females and 71 per cent of work was done through them. Threshing and winnowing were done through power machinery but here again the supplementary work like transplantation, loading/ unloading of produce was performed by females. About 85 per cent of total harvesting in all the crops was done by females in the district, which was the highest in Dharampur block (90 per cent) and lowest in Kunihar (76 per cent).

Livestock Rearing Operations

Fodder was not grown in any block of the district. It was *Ghasni* from where the fodder was collected. About 60 per cent of the females were engaged for this. The fodder cutting was done by sickles by the females. In Kunihar block, 100 per cent work was done by females while in Solan block, 76 per cent of work was performed by females. On an average 75 per cent of fodder cutting work was performed by females with traditional tools. Similarly, major work of transportation from field to home was done by females on head/ back load. Some of the families had the chaff-cutter and the work was done by the males. The family where the chaff cutter was

not available, about 73 per cent of fodder chaffing was done by females. In Solan district, the feeding of animals both inside manger and on floor was used. The former was mostly performed by males and latter by females. Eighty per cent of stall feeding was done by females in Solan and Kandaghat block, 79 per cent in Nalagarh block and about 70 per cent in Kunihar and Dharampur block of the district. For grazing, both male and female children took part although the female share was higher (62 per cent) for the district. For animal waste disposal, there was no biogas plant. For using it as FYM, transportation to field, the major work (86 per cent) was performed by females. It was almost 100 per cent in Solan, Kandaghat and Kunihar block whereas in Nalagarh and Dharampur block, the share of females was more than 90 per cent. Milking operation was entirely done by females by hand in all the blocks. When milk was sold in local market/ village, female contribution was about 75 per cent in the district. It was highest in Dharampur block (84 per cent) followed by Kandaghat (81 per cent). The milk sold at the distant market was generally done by male members of the households. Eighty five per cent of females were doing the milk churning manually. It varied between 90 per cent in Solan and 82 per cent in Nalagarh block of the district.

5.11 Input Use and Gaps

The fodder requirement of cross bred cow was significantly higher than the local cow. The concentrates given were also higher for cross bred cows except in Nalagarh and Dharampur block. Minerals were given to cross bred cows only. The fodder requirement of buffalo was quite high (5.46 kg green fodder and 5.29 kg dry fodder). The concentrate fed to buffalo was also higher than the cows (Table 5.16). The fodder fed to bullocks was 5.79 kg of green fodder and 5.49 kg of dry fodder. The fodder fed to the unproductive animals was comparatively low. No concentrates and minerals were fed to young stock and unproductive animals in all the blocks of the district. Among different blocks, among cows the maximum fodder was fed to cross bred cows in Nalagarh followed by Solan and Kandaghat whereas in Dharampur block minimum fodder was given. No minerals were given to local cow and bullocks in all the blocks whereas in case of buffalo, the minerals were fed in all blocks except Kunihar and Dharampur.

5.12 Yield Gap Analysis

Horticultural Crops

The yield gap at district level was positive in all the fruit crops except other temperate fruit and dry fruit in Solan, citrus fruit in Kandaghat and apple and citrus fruit in Nalagarh (Table 5.17). The existing yield in the district was 0.33 mt/ha for apple, 2.454 mt/ha for other temperate fruit, 1.08 mt/ha for dry fruit, 0.936 mt/ha for citrus fruit and 0.904 mt/ha in other subtropical fruit. The yield gap was maximum in other temperate fruits (2.406 mt/ha) followed by dry fruit and citrus fruit.

Animal Husbandry

The actual yield per animal per day at district level and in all the blocks was less than the potential yield (Table 5.18). In case of milch animals, the gap was maximum for crossbred cows (3.94 l/day) followed by buffaloes. The yield of cross bred cows was maximum in Nalagarh block (7.50 l/day) whereas the yield of local cows was maximum (3.90 l/day) in Solan block and

goats in Nalagarh block (1.58 l/day). The wool production in the district was 0.85 kg/sheep/year and highest wool production was observed in Nalagarh block (0.96 kg/year).

5.13 Reasons for Gap

Horticultural Crops

The main reasons advocated for the gap were old varieties, old plantation, imbalanced use of fertilizers, lack of better management, inadequate nutrition, lack of regular bearing varieties and lack of irrigation during critical periods (Table 5.21). These were the common problems for all the blocks. However, more emphasis was given on old plantation and lack of regular bearing varieties.

Animal Husbandry

The dominance of local cows, lack of fodder and lack of awareness about the importance of concentrates and minerals were found to be the major reasons for gap in milk yield. Among sheep, the small size of the herd did not allow the farmers to opt for better breed which led to low wool production.

5.14 Interventions for the District

Horticulture

To overcome the problems of fruit crops various interventions were suggested like organising camp training and demonstration for generating awareness among farmers regarding the latest techniques for cultivation of fruit crops and providing them better seedlings for replacement of old varieties.

Animal Husbandry

To improve the livestock health in the district, improved variety of fodder and roads to pasture lands were important for all the blocks (Table 5.23). Availability of fodder in Solan and Nalagarh block and fodder collection centres in Kunihar and Dharmpur block were also needed. In case of feed, awareness about feed and subsidy on feed and mineral mixtures were important in all the blocks. The veterinary services required in the district were vaccination, ensured medicine, and one dispensary in each panchayat, better germplasm and frequent animal health camps. There were some other interventions like milk collection and processing centres, etc. The veterinary services were found to be important equally in all the blocks. In two blocks viz, Kunihar and Dharampur, cowshed improvement at farmer's level was also one of the interventions. The other interventions needed in all the blocks were mobile van, operation theatre, vaccination, ensured medicine and better germplasm. The frequent animal health camps should also be organized to make people aware of the animal health.

Cultured Fisheries

For increasing the fish production in the district, renovation of ponds, regular and clean water supply, better infrastructure, and adequate security in the fish catchment area during breeding season were the main interventions which should be taken care of (Table 5.24).

5.15 Extension Gaps

Livestock

- Need for marketing support in far flung areas of the district.
- Popularization of cultivation of fodder/ fodder trees.
- Strengthening of infrastructure for fodder availability.
- Provision of one dispensary with staff at panchayat level.
- Provision of mobile van at block level and operation theatre at district level.
- Awareness/ training/ visit regarding diseases and prevention measures.
- Development of new high yielding fodder crop varieties with nutritive value.

Horticulture

- Enhance water availability through various schemes/ watershed programmes.
- Awareness/ training/ demonstration about balanced fertilizer use, diseases, insect-pests and other intercultural activities.
- Provide transport and storage facilities for marketing of horticultural crops.
- Introduction of regular bearing varieties.
- Timely and adequate availability of fertilizers.

Fisheries

- Strengthening of department with adequate staff.
- Awareness/ training/ demonstration in pond fisheries.
- Provision of fish culture.

5.16 Researchable Issues

- Replacement of old cultivars of plum, peaches, apricot with new improved varieties with a view to overcome non.-bearing varietal situation, on-farm testing of persimmon and pomegranate varieties with better yield and quality for fruit crop diversification.
- Development of efficient propagation techniques for walnut, pecan nut and persimmon.
- Development of modules for INM for different fruit crops.
- Standardization of agro-techniques to control irregular bearing in olive.
- Research on organic farming in horticultural crops.
- Identification of areas/ locations suitable for different flower crops.
- Maintaining authentic and quality germplasm/ planting material of various flower crops to the growers at the affordable prices.

- Development of flower varieties/ production technology, standardization of planting time & nutrients, integrated nutrient and pest management, irrigation management and flower regulation as per market demand.
- Studies on post harvest management and maintaining the cool chain.
- Nutrient indexing and improvement of soil health.
- Irrigation water requirement & scheduling under conventional and high tech systems.
- Development of resource conservation horticultural practices.
- Development of technology for Integrated Nutrient Management (INM) in fruit and vegetables.
- Protected cultivation technology and monitoring of soil health in poly houses.
- Management of green peach aphid in capsicum under protected cultivation.
- Generation of data base of pollinator diversity in different horticultural crops.
- Safe waiting periods of pesticides on horticultural crops.
- Disease management in pomegranate, stone fruit and ornamental plant crops like gladiolus, carnation, chrysanthemum, etc.
- Development of strategies for bean rust, bacterial spot of bell pepper and cucumber downy mildew.
- Constraint identification in different horticultural crops.
- Development of improved commercially profitable dairy husbandry practices / technology.
- Identification of the critical technical gaps in attaining the profitability under cattle production system.
- Development of nutritious fodder grasses
- Development of an integrated livestock and poultry production model (ILPM).
- 'Monkey menace': socio-biological causes, economic implication and remedial strategy to tackle it.
- The stray cattle menace: A technical study in to its genesis and for its sustainable remedy.
- Development of suitable horticultural varieties keeping into view the climatic changes in the region.
- Working out nutritional requirements of the plants.
- Standardizing the intercultural operations in the fruit crops.
- Introducing new breeds in fisheries which give higher yields.
- Formulation of biointensive IPM strategies for the management of fruit flies (cucurbits and tomatoes)

- Analyzing trends and patterns of demand , prices and markets of emerging crops and enterprises in the context of ongoing process of globalization
- Understanding economic implications of climate change towards cropping systems, cropping patterns and livelihoods of the farmers
- Assessing impact of the ongoing process of commercialization 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

Table 5.1 Existing Block Level Schemes for Horticulture Development

No. of Scheme		1	1	1	1	1	5
Village covered		170	210	512	672	456	2020
Status	Complete (No.)	-	-	-	-	-	-
	Incomplete (No.)	1	1	1	1	1	5
Additional funds required (Rs. Lakh)		170	182	165	170	139	826

Source: Field survey, 2007-08

Table 5.2 Existing Status and Potential for Horticulture Development

Crop	**Status**	**Parameter**	**Solan**	**Kandaghat**	**Kunihar**	**Nalagarh**	**Dharampur**	**District**
Apple	Existing	Area (ha)	21	70	-	11	-	102
		Production (mt)	7	12	-	8	-	27
		No. of households	72	215	-	34	-	321
	Potential	Area (ha)	20	50	-	10	-	80
		Production (mt)	6.67	8.57	-	7.27	-	21.18
		No. of households	105	289	-	63	-	457
Other temperate fruit (plum, peach, apricot, pear etc.)	Existing	Area (ha)	867	866	367	772	101	2973
		Production (mt)	2490	728	61	458	133	3870
		No. of households	1738	2480	1057	3497	419	9191
	Potential	Area (ha)	100	300	150	300	50	900
		Production (mt)	287.20	252.19	24.93	177.98	65.84	1171.54
		No. of households	656	1728	935	1596	331	5246
Dry fruit	Existing	Area (ha)	27	119	19	119	31	315
		Production (mt)	28	60	-	30	8	126
		No. of households	47	373	59	396	87	962
	Potential	Area (ha)	15	50	10	50	15	140
		Production (mt)	15.56	25.21	-	12.61	3.87	56.00
		No. of households	95	311	42	306	83	837
Citrus fruit	Existing	Area (ha)	75	89	70	205	396	835

		Production (mt)	51	223	22	224	67	587
		No. of households	171	259	216	732	1414	2792
	Potential	Area (ha)	25	35	40	75	125	300
		Production (mt)	17.00	87.70	12.57	81.95	21.15	210.90
		No. of households	160	201	260	432	766	1819
Other subtropical fruit (mango, etc.)	Existing	Area (ha)	50	64	360	295	1581	2350
		Production (mt)	12	18	216	173	455	874
		No. of households	117	266	1182	1059	6508	9132
	Potential	Area (ha)	20	25	100	75	600	820
		Production (mt)	4.80	7.03	60.00	43.98	172.68	304.97
		No. of households	131	147	672	466	3342	4758

Source: Field survey, 2007-08

Table 5.3 Existing Block Level Schemes for Livestock and Fisheries Development

Fisheries (Pond construction)		**Status**	**Solan**	**Kandaghat**	**Kunihar**	**Nalagarh**	**Dharampur**	**District**
	Village covered		2	-	3	2	5	12
	Status	Complete (No.)	-	-	-	-	-	22
		Incomplete (No.)	-	-	-	-	-	10
	Additional funds required							20
Livestock improvement schemes	Additional funds required (Rs. Lakh)		100	80	80	125	60	445

Source: Field survey, 2007-08

Table 5.4 Status and Potential for Cultured Fisheries

Particular		Solan	Kandaghat	Kunihar	Nalagarh	Dharampur	District
Households engaged (No.)	E	-	-	-	-	-	150
	P	-	-	-	-	-	150
Fish production (q)	E	-	-	-	-	-	660
	P	-	-	-	-	-	400
Ponds (No.)	E	-	-	-	-	-	40
	P	-	-	-	-	-	30
Ponds (Area ha)	E	-	-	-	-	-	40
	P	-	-	-	-	-	10
Note: E – Existing, P – Potential							

Source: Field survey, 2007-08

Table 5.5 Production and Disposal of Agricultural Products (Tonnes)

Commodities	Solan	Kandaghat	Kunihar	Nalagarh	Dharampur	District
Cereals						
Total production	4,117	2,550	16,144	37,832	8,374	69,017
Consumption	4,117	2,550	14,149	12,432	7,857	41,105
Marketed surplus	-	-	1,995	25,400	517	27,912
Where sold	-	-	-	-	-	-
Local (within the area)	-	-	1,995	10,160	517	12,672
Distant (state)	-	-	-	15,240	-	15,240
Distant (outside state)	-	-	-	-	-	-
PHL (%)	-	-	0.10	0.40	0.15	0.23
Pulses						
Total production	-	-	105	117	48	270
Consumption	-	-	105	117	48	270
Marketed surplus	-	-	-	-	-	-
Oilseeds						
Total production	3	2	44	134	3	186
Consumption	3	2	44	134	3	186
Marketed surplus	-	-	-	-	-	-
Vegetables						
Total production	15,644	13,625	30,887	16,639	17,282	94,077
Consumption	2,347	2,861	6,177	2,329	2,938	16,652
Marketed surplus	13,297	10,764	24,710	14,310	14,344	77,425
Local (within area)	1,064	861	242	859	717	3,743
Distant (within State)	9,574	7,750	4,700	7,727	6,455	36,206
Distant (outside State)	2,659	2,153	19,768	5.724	7,172	37,476
PHL (%)	6.80	4.09	7.13	5.27	5.80	5.84

Fruits						
Total production	2,588	1041	299	893	663	5,484
Consumption	29.4	72.9	17.9	53.6	46.4	320.2
Marketed surplus	2,380.9	916.1	260.1	794.8	583.4	4,935.3
Markets where sold						
Local (within area)	214	82	23	72	53	444
Distant (within state)	1,928.90	742.10	211.10	643.80	472.40	3998.30
Distant (outside state)	238	92	26	79	58	493
Spices						
Total production (q)	645	1,134	1,823	1,808	1,024	6,434
Consumption (q)	645	1,134	345	478	409	3,011
Marketed surplus (q)	-	-	1,478	1,330	615	3,423
Markets where sold						
Local (within area)	-	-	522	299	205	1,026
Distant (within state)	-	-	956	747	205	1,908
Distant (outside state)	-	-	-	284	205	489
PHL (%)	-	-	2.40	2.06	2.89	2.48

Source: Field survey, 2007-08

Table 5.6 Production and Disposal of Livestock Products

Particular	Solan	Kandaghat	Kunihar	Nalagarh	Dharampur	District
Milk (l/day)						
Total production	4,264	29,303	88,515	1,17,117	27,945	3,02,857
Consumption	2,558	18,168	56,650	71,441	16,767	1,65,584
Marketed surplus	1,705	11,135	31,865	45,676	11,178	1,37,274
Wool (q/yr)						
Total production	23.36	23.78	42.57	4.93	18.56	113.20
Consumption	21.02	21.40	38.31	4.44	16.70	101.87
Marketed surplus	2.34	2.38	4.26	0.49	1.86	11.33

Source: Field survey, 2007-08

Table 5.7 Marketing Infrastructure

Particular	Existing/ required	Solan	Kandaghat	Kunihar	Nalagarh	Dharampur	District
Agricultural produce (fruit & vegetable collection centres	E	1	1	1	1	1	5
	R	-	-	-	-	-	-
Market sub-yard & market information centre	E	1	2	2	1	2	8
	R	-	-	-	-	-	-
Storage/ godown (hi-tech) Control Atmosphere Store (CAS)	E	-	-	-	-	-	-
	R	1	-	1	-	1	3
Milk collection centre	E	1	-	-	-	-	1
	R	-	1	2	-	1	4
Co-operative marketing society	E	2	3	2	3	3	13
	R	-	-	-	-	-	-
Agri/horti input supply centre including PACS	E	3	5	5	3	4	20
	R	8	42	42	42	42	176
Banking and insurance facility							
Co-operative banks	E	4	2	1	6	4	7
	R						
Lead bank	E	1	-	4	1	1	7
	R						
Commercial banks	E	29	10	11	29	19	98
	R						

Source: Field survey, 2007-08

Table 5.8 Existing Human Resource for Agricultural Development (No.)

Particular		Solan	Kandaghat	Kunihar	Nalagarh	Dharampur	District
SMS (Agri)	S	1	1	1	1	1	5
	P	1	1	1	-	1	4
	R	2	2	2	2	2	10
	G	1	1	1	1	1	5
ADOs	S	2	2	2	2	2	10
	P	-	-	1	2	2	5
	R	4	4	4	4	4	20
	G	2	2	2	2	2	10
AEOs	S	10	8	10	10	10	48
	P	3	1	6	2	3	15
	R	12	10	12	12	12	58
	G	2	2	2	2	2	10
SMS (Horti)	S	1	1	1	1	1	5
	P	-	-	-	-	-	-
	R	2	2	2	2	2	10
	G	1	1	1	1	1	5
HDOs	S	1	1	1	1	1	5
	P	-	-	-	-	-	-
	R	1	1	1	1	1	5
	G	0	0	0	0	0	0
HEOs	S	7	10	12	4	8	41
	P	3	4	6	4	4	21
	R	10	10	12	6	8	46
	G	3	-	-	2	-	5
Sr. veterinary officers	S	1	1	1	1	0	4
	P	1	1	1	-	-	3
	R	1	1	1	1	1	5
	G	-	-	-	-	1	1
Veterinary doctors	S	2	3	6	-	5	16
	P	2	2	4	-	5	13
	R	2	3	6	1	6	18
	G	-	-	-	1	1	2
Veterinary pharmacist	S	26	20	39	60	35	180
	P	26	20	39	56	35	176
	R	35	24	45	69	38	211
	G	9	4	6	9	3	31
Extension specialists for							
Bee keeping	S	-	-	-	-	-	-
	P	-	-	-	-	-	-
	R	1	1	1	1	1	5

	G	1	1	1	1	1	5
Mushrooms	S	-	-	-	-	-	-
	P	-	-	-	-	-	-
	R	1	-	-	1	-	2
	G	1	-	-	1	-	2
Floriculture	S	-	-	-	-	-	-
	P	-	-	-	-	-	-
	R	1	1	1	1	-	4
	G	1	1	1	1	-	4
Fisheries	S	-	1	1	-	1	3
	P	-	1	1	-	1	3
	R	-	1	1	1	1	4
	G	-	-	-	1	-	1
Sericulture	S	-	-	1	-	-	1
	P	-	-	1	-	-	1
	R	-	-	1	-	-	1
	G	-	-	-	-	-	-
Assistant agriculture development officer	S	-	-	1	-	-	1
	P	-	-	1	-	-	1
	R	-	-	1	-	-	1
	G	-	-	-	-	-	-

Note: S – Sanctioned, P – Position, R – Required, G – Gap
Source: Field survey, 2007-08

Table 5.9 Additional Requirement of Human Resource for Agricultural Development

Particular	Solan	Kandaghat	Kunihar	Nalagarh	Dharampur	District
SMS (Agri)	1	1	1	1	1	5
ADOs	2	2	2	2	2	10
AEOs	2	2	2	2	2	10
SMS (Horti)	1	1	1	1	1	5
HDOs	-	-	-	-	-	-
HEOs	3	-	-	2	-	5
Sr. veterinary officers	-	-	-	-	1	1
Veterinary doctors	-	-	-	1	1	2
Veterinary pharmacist	9	4	6	9	3	31
Extension specialist for:						
Bee keeping	1	1	1	1	1	5

Mushrooms	1	-	-	1	-	2
Floriculture	1	1	1	1	-	4
Fisheries	-	-	-	1	-	1
Sericulture	-	-	1	-	-	1

Source: Field survey, 2007-08

Table 5.10 Financial Estimates for Required Human Resources (Rs./month)

Particular	Rate (Rs/ month)	Solan	Kandaghat	Kunihar	Nalagarh	Dharampur	District
SMS (Agri)	30,000	0.3	0.3	0.3	0.3	0.3	1.5
ADOs	25,000	0.5	0.5	0.5	0.5	0.5	2.5
AEOs	15,000	0.3	0.3	0.3	0.3	0.3	1.5
SMS (Horti)	30,000	0.3	0.3	0.3	0.3	0.3	1.5
HDOs	25,000	-	-	-	-	-	-
HEOs	15,000	0.45	-	-	0.3	-	0.75
Sr. veterinary officers	45,000	-	-	-	-	0.45	0.45
Veterinary doctors	14,000	-	-	-	0.14	0.14	0.28
Veterinary pharmacist	12,000	1.08	0.48	0.72	1.08	0.36	3.72
Extension specialist for:							
Bee keeping	30,000	0.3	0.3	0.3	0.3	0.3	1.5
Mushrooms	30,000	0.3	-	-	0.3	-	0.6
Floriculture	30,000	0.3	0.3	0.3	0.3	-	1.2
Fisheries	20,000	-	-	-	0.2	-	0.2
Sericulture	20,000	-	-	0.2	-	-	0.2
Total budget	Per month	3.83	2.48	2.92	4.02	2.65	15.9
	Per year	45.96	29.76	35.04	48.24	31.8	190.8
	5 years	229.8	148.8	175.2	241.2	159	954.0

Source: Field survey, 2007-08

Table 5.11 Unemployment Status (No.)

Education	Sex	Solan	Kandaghat	Kunihar	Nalagarh	Dharampur	District
Matriculate	M	1,280	956	1,252	1,722	871	6,081
	F	752	643	747	1,276	528	3,946
	T	2,032	1,599	1,999	2,998	1,399	10,027
Plus two	M	671	456	453	815	371	2,766
	F	462	244	266	634	108	1,714
	T	1,133	700	719	1,449	479	4,480
Graduate	M	382	155	107	117	77	838
	F	150	94	72	78	23	417
	T	532	249	179	195	100	1,255
Post graduate	M	91	53	39	47	39	269
	F	42	27	20	30	14	133
	T	133	80	59	77	53	402
Tech. trained	M	60	57	32	136	37	322
	F	39	42	21	84	20	206
	T	99	99	53	220	57	528

Note: M – Male, F – Female, T – Total
Source: Field survey, 2007-08

Table 5.12 Status of Enterprises

Particular			Solan	Kandaghat	Kunihar	Nalagarh	Dharampur	District
Atta chakki	Existing	No. of units	13	15	54	140	65	287
		Person employed	18	22	60	200	118	418
		Investment (Rs. Lakh)	0.15	0.20	0.60	0.20	0.25	1.40
		Prod/day/seas/yr	0.5	0.75	0.6	-	-	0.37
	Potential	No. of units	15	5	-	200	70	290
		Employment (man days)	20	10	-	400	130	560
		Investment (Rs. Lakh)	0.22	0.18	-	0.24	0.30	0.94
Oil expeller	Existing	No. of units	4	-	5	15	-	24
		Person employed	13	-	12	55	-	80
		Investment (Rs. Lakh)	0.20	-	0.20	0.80	-	1.20

		Prod/day/seas/yr	0.75	-	2	-	-	0.55
	Potential	No. of units	6	-	10	150	-	166
		Employment (man days)	15	-	25	300	-	340
		Investment (Rs. Lakh)	2.50	-	2	225	-	6.75
Rice sheller	Existing	No. of units	-	-	5	5	-	10
		Person employed	-	-	6	100	-	106
		Investment (Rs. Lakh)	-	-	0.75	0.30	-	1.05
		Prod/day/seas/yr	-	-	2	-	-	0.4
	Potential	No. of units	-	-	-	-	-	-
		Employment (man days)	-	-	-	-	-	-
		Investment (Rs. Lakh)	-	-	-	-	-	-
Bakery	Existing	No. of units	4	-	1	-	7	12
		Person employed	23	-	20	-	28	71
		Investment (Rs. Lakh)	3.36	-	1.0	-	0.30	4.66
		Prod/day/seas/yr	-	-	-	-	-	-
	Potential	No. of units	4	-	-	-	-	4
		Employment (man days)	15	-	-	-	-	15
		Investment (Rs. Lakh)	3.50	-	-	-	-	3.50
Vermi-compost	Existing	No. of units	50	35	25	100	-	210
		Person employed	50	35	25	100	-	210
		Investment (Rs. Lakh)	0.75	0.50	0.40	1	-	2.65
		Prod/day/seas/yr	-	-	-	-	-	-
	Potential	No. of units	100	250	200	400	100	1050
		Employment (man days)	100	250	200	400	100	1050
		Investment (Rs. Lakh)	1	5	3	6	1	16
Mushroom compost	Existing	No. of units	100	50	50	40	5	245
		Person employed	100	50	50	50	10	260

		Investment (Rs. Lakh)	1	0.50	0.50	0.40	0.05	2.45
		Prod/day/seas/yr	-	-	-	-	-	-
	Potential	No. of units	200	150	150	150	100	750
		Employment (man days)	300	200	200	250	150	1100
		Investment (Rs. Lakh)	1.6	1.2	1.2	2	1.2	7.2
Rural craft	Existing	No. of units	10	-	-	15	5	30
		Person employed	45	-	-	35	20	100
		Investment (Rs. Lakh)	2	-	-	1	0.25	3.25
		Prod/day/seas/yr	-	-	-	-	-	-
	Potential	No. of units	15	5	3	4	-	27
		Employment (man days)	50	12	12	25	-	99
		Investment (Rs. Lakh)	5	1.5	1.5	2	-	10
Nursery raising	Existing	No. of units	-	-	5	4	5	14
		Person employed	-	-	25	8	20	53
		Investment (Rs. Lakh)	-	-	2.5	0.25	0.70	3.45
		Prod/day/seas/yr	-	-	-	-	-	-
	Potential	No. of units	10	2	-	10	5	27
		Employment (man days)	40	20	-	25	15	100
		Investment (Rs. Lakh)	1	0.60	-	0.75	0.50	2.85
Flower nursery	Existing	No. of units	-	-	-	5	12	17
		Person employed	-	-	-	10	40	50
		Investment (Rs. Lakh)	-	-	-	0.50	0.80	1.30
		Prod/day/seas/yr	-	-	-	-	-	-
	Potential	No. of units	3	-	-	5	3	11
		Employment (man days)	12	-	-	20	10	42
		Investment (Rs. Lakh)	0.50	-	-	1	0.50	2

Seed production	Existing	No. of units	-	-	-	3	20	23
		Person employed	-	-	-	50	30	80
		Investment (Rs. Lakh)	-	-	-	1	3	4
		Prod/day/seas/yr	-	-	-	-	-	-
	Potential	No. of units	25	-	-	5	-	30
		Employment (man days)	25	-	-	50	-	75
		Investment (Rs. Lakh)	15	-	-	5	-	20
Pottery	Existing	No. of units	-	-	-	-	3	3
		Person employed	-	-	-	-	20	20
		Investment (Rs. Lakh)	-	-	-	-	0.20	0.20
		Prod/day/seas/yr	-	-	-	-	-	-
	Potential	No. of units	-	5	-	-	5	10
		Employment (man days)	-	20	-	-	30	50
		Investment (Rs. Lakh)	-	0.25	-	-	0.25	0.50
Fruit and vegetable processing	Existing	No. of units	1	-	-	-	2	3
		Person employed	6	-	-	-	15	21
		Investment (Rs. Lakh)	8.96	-	-	-	0.30	9.26
		Prod/day/seas/yr	-	-	-	-	-	-
	Potential	No. of units	1	1	-	-	1	3
		Employment (man days)	25	12	-	-	15	52
		Investment (Rs. Lakh)	10	12	-	-	12	34
Honey processing	Existing	No. of units	-	-	-	-	-	-
		Person employed	-	-	-	-	-	-
		Investment (Rs. Lakh)	-	-	-	-	-	-
		Prod/day/seas/yr	-	-	-	-	-	-

	Potential	No. of units	-	-	-	-	-	-
		Employment (man days)	-	-	-	-	-	-
		Investment (Rs. Lakh)	-	-	-	-	-	-
Cotton carding	Existing	No. of units	1	-	-	-	2	3
		Person employed	2	-	-	-	4	6
		Investment (Rs. Lakh)	0.33	-	-	-	0.10	0.43
		Prod/day/seas/yr	-	-	-	-	-	-
	Potential	No. of units	-	-	-	-	-	-
		Employment (man days)	-	-	-	-	-	-
		Investment (Rs. Lakh)	-	-	-	-	-	-
Shawl, woolen garments	Existing	No. of units	7	-	2	-	2	11
		Person employed	58	-	25	-	15	98
		Investment (Rs. Lakh)	6	-	2.50	-	1.50	10
		Prod/day/seas/yr	-	-	-	-	-	-
	Potential	No. of units	5	-	-	2	1	8
		Employment (man days)	30	-	-	25	20	75
		Investment (Rs. Lakh)	5	-	-	3	2	10

Source: Field survey, 2007-08

Table 5.13 Potential Enterprises for Unemployed and Assistance Required

Sr. No.	Enterprise	Mandays/year	Assistance required	
			Training	Credit
1	Agro-processing units	350	√	√
2	Pharmaceutical industry	350	√	√
3	Agriculture	200	√	√
4	Non-farm industry	350	√	√

Source: Field survey, 2007-08

Table 5.14 Agri-Business Establishments (No.)

Particulars		Solan			Kandaghat			Kunihar			Nalagarh			Dharampur			District		
		E	**R**	**G**	**E**	**R**	**G**	**E**	**R**	**G**	**E**	**R**	**G**	**E**	**R**	**G**	**E**	**R**	**G**
Agro sale centres		26	35	9	40	40	0	30	40	10	18	40	22	4	8	4	118	163	45
PACS		45	50	5	30	30	0	40	40	0	-	-	-	23	23	0	138	143	5
Cooperatives																			
	Public	-	-	-	0	5	5	-	-	-	-	-	-	1	1	0	1	6	5
	Private	-	-	-	0	5	5	-	-	-	-	-	-	2	2	0	2	7	5
Farmers co-operatives		-	-	-	30	30	0	8	10	2	3	10	7	-	-	-	41	50	9
Others		7	7	0	-	-	-	-	-	-	-	-	-	-	-	-	7	7	0

Note: E-Existing, R-Required, G-Gap
Source: Field survey, 2007-08

Table 5.15 Drudgery of Women (Per Cent Response)

Particular	Mode of operation	Solan	Kandaghat	Kunihar	Nalagarh	Dharampur	District
Agricultural operations							
Clod breaking	Manually	88.06	87.07	80.03	77.95	73.14	71.25
	Using digging hoe	-	-	-	-	-	-
Paddy transplanting	Manually	-	-	71.87	51.62	-	63.25
Manuring & fertilization	Manually	82.84	52.54	100	42.57	98.18	65.26
	Power machinery	-	-	-	-	-	-
Intercultural operations	Manually	71.47	71.87	72.88	89.07	98.18	70.64
	Power machinery	-	-	-	-	-	-
Threshing & winnowing	Manually	24.17	55.33	34.9	45.23	11.42	34.21
	Power machinery	62.27	77.21	50.35	67.5	88.58	59.12
Harvesting	Manually	89.28	82.11	75.76	86.22	90.40	84.74
Livestock rearing operations							
Fodder resources	Cultivated	-	-	-	-	-	-
	Ghadni	59.72	76.37	70.03	64.33	81.82	60.45
	Both	-	-	-	-	-	-
Fodder cutting	Traditional tools	76.11	82.15	100.00	83.07	83.90	75.04
	Improved Tools	-	-	-	-	-	-
Fodder transportation	On head/Backload	79.72	87.44	85.76	68.49	90.32	72.34
	Tractor-trolley	-	-	-	-	-	-
Fodder chaffing	Chaff cutter	28.86	32.64	27.29	17.10	25.15	16.28
	Without chaff-cutter	71.14	67.36	72.71	82.90	74.85	73.72
Feeding system	Inside Manger	48.27	38.1	45.23	20.12	18.07	23.95
	On floor	51.73	61.9	54.77	67.85	81.93	53.63
Feeding practices	Stall feeding	81.42	82.89	68.04	78.94	70.36	76.33
	Grazing	68.58	59.26	52.11	60.27	69.13	61.87
	Both	-	11.23	100	29.55	20.51	32.28
Animal waste disposal	Bio-gas plant	-	-	-	-	-	-
	Head/back-load to field	65.89	71.52	68.09	75.46	91.82	74.56
	FYM	98.58	76.79	88.51	77.06	96.57	82.50
Cleaning of animals & sheds	Manually	100	97.18	100	92.46	92.73	96.47
	Water pressure jet	-	-	-	-	-	-
Milking operation	Hand milking	100	100	100	100	100	100
	Machine milking	-	-	-	-	-	-

Selling of milk	Within village	72.17	81.29	63.85	69.30	84.36	74.19
	Distant market	5.11	7.90	5.36	12.68	11.12	8.43
Churning of milk	Manually	89.19	83.39	84.44	81.70	82.41	84.26
	Using machine	-	-	-	-	-	-

Source: Field survey, 2007-08

Table 5.16 Livestock Feeding Practices (Kg/animal/day)

Type of animal	Fodder/feed	Solan	Kanda ghat	Kunihar	Nalagarh	Dharam pur	District
Crossbred cows	Green fodder	9.00	8.63	4.66	10.52	5.27	7.62
	Dry fodder	3.12	4.32	4.29	6.31	5.54	4.72
	Concentrate	2.50	2.21	1.79	1.05	1.54	1.82
	Minerals	0.043	0.032	0.044	0.022	0.020	0.032
Local cow	Green fodder	4.55	3.60	2.54	3.01	0.17	2.77
	Dry fodder	3.21	3.86	3.07	3.18	2.99	3.26
	Concentrate	0.90	1.93	1.76	2.17	1.63	1.68
	Minerals	-	-	-	-	-	-
Buffalo	Green fodder	7.63	5.26	2.77	6.36	5.29	5.46
	Dry fodder	4.14	6.16	6.44	5.14	4.58	5.29
	Concentrate	2.45	1.98	1.79	2.38	1.90	2.1
	Minerals	0.032	0.069	-	0.022	-	0.025
Young stock	Green fodder	5.30	6.21	5.86	5.43	4.86	5.53
	Dry fodder	2.10	2.40	2.64	3.07	2.04	2.45
	Concentrate	-	-	-	-	-	-
	Minerals	-	-	-	-	-	-
Bullocks	Green fodder	6.56	5.39	4.14	7.89	4.97	5.79
	Dry fodder	4.16	5.35	5.73	4.44	7.77	5.49
	Concentrate	0.81	0.63	0.54	0.80	0.68	0.692
	Minerals	-	-	-	-	-	-
Unproductive	Green fodder	2.12	2.43	2.82	2.56	2.17	2.42
	Dry fodder	2.53	1.96	2.10	1.91	1.76	2.05

Source: Field survey, 2007-08

Table 5.17 Yield Gap in Fruit Crops (MT/ha)

Crops		Solan	Kandaghat	Kunihar	Nalagarh	Dharampur	District
Apple	E	0.33	0.17	0.50	-	-	0.33
	P	1.00	1.50	1.50	-	-	1.33
	G	0.67	1.33	1.00	-	-	1.00
Other temperate fruit (plum, peach, apricot, pear etc.)	E	2.87	3.50	2.50	1.00	2.40	2.45
	P	6.0	6.0	4.70	2.00	4.6	4.86
	G	3.63	2.50	2.20	1.00	2.20	2.41
Dry fruit	E	1.00	0.90	1.50	-	0.90	1.08
	P	2.00	2.50	2.50	-	1.50	2.12
	G	1.00	1.60	1.00	-	0.60	1.04
Citrus fruit	E	0.68	0.60	1.00	1.50	0.90	0.94
	P	1.50	1.00	2.00	3.00	1.50	1.80
	G						
Other subtropical fruit (mango, etc.)	E	0.24	0.28	1.00	2.00	1.00	0.90
	P	0.60	0.60	2.00	3.50	1.90	1.72
	G	0.36	0.32	1.00	1.50	0.90	0.82

Note: E – Existing yield, P – Potential yield, G – Gap
Source: Field survey, 2007-08

Table 5.18 Livestock Production Estimates (Units/animal/day)

Product/type of animal	Solan			Kandaghat			Kunihar			Nalagarh			Dharampur			District		
	A	P	G	A	p	G	A	P	G	A	P	G	A	P	G	A	P	G
Milk (l/day)																		
Crossbred cow	6.39	10.00	3.61	7.00	10	3.00	4.34	10	5.66	7.50	10	2.50	5.08	10	4.92	6.06	10	3.94
Local cow	3.90	5	1.1	3.65	5	1.35	2.06	5	2.94	2.35	5	2.65	2	5	3	2.79	5	2.21
Buffalo	5.67	8	2.33	5.96	8	2.04	3.15	8	4.85	5.1	8	2.9	5.62	8	2.38	5.10	8	2.9
Goat	1.25	2.00	0.75	1.37	2.00	0.63	1.45	2.00	0.55	1.58	2.00	0.42	1.43	2.00	0.57	1.42	2.00	0.58
Wool (kg/yr)																		
Sheep	0.85	1.5	0.65	0.76	1.5	0.74	0.79	1.5	0.71	0.96	1.5	0.54	0.91	1.5	0.59	0.85	1.5	0.65
Poultry (yield, eggs/year/bird)	215	275	60	237	275	38	236	275	39	249	275	26	245	275	30	236.4	275	38.6
Broilers (yield, meat/bird)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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

Source: Field survey, 2007-08

Table 5.19 Varietal and Technological Problems of Fruit Crops

Crop/ problem	Solan	Kanda ghat	Kunihar	Nalagarh	Dharam pur	District
Lack of regular bearing varieties	√	√	√	√	√	√
Non-availability of good variety seedlings	√	√	√	√	√	√
Lack of awareness	√	√	√	√	√	√
Frost injury	√	√	√	√	√	√
Water stress	√	√	√	√	√	√
Citrus cancer	√	√	√	√	√	√

Source: Field survey, 2007-08

Table 5.20 Technological Interventions for Fruit Crops

Crop/ intervention	Solan	Kandaghat	Kunihar	Nalagarh	Dharampur	District
Organise camp	√	√	√	√	√	√
Demonstration	√	√	√	√	√	√
Training	√	√	√	√	√	√
Better seedling	√	√	√	√	√	√
Replacement of old varieties	√	√	√	√	√	√

Source: Field survey, 2007-08

Table 5.21 Reasons for Gap in Horticultural Crops

Reason	Solan	Kandaghat	Kunihar	Nalagarh	Dharampur	District
Old varieties	√	√	√	√	√	√
Old plantation	√	√	√	√	√	√
Unbalanced use of fertilizers	√	√	√	√	√	√
Better management	√	√	√	√	√	√
Inadequate nutrition	√	√	√	√	√	√
Lack of regular bearing varieties	√	√	√	√	√	√
Irrigation during critical period	√	√	√	√	√	√

Source: Field survey, 2007-08

Table 5.22 Incidence of Livestock Diseases (Per Cent)

Type of animal	Disease	Solan			Kandaghat			Kunihar			Nalagarh			Dharampur			District		
		I	M	TA	I	M	TA	I	M	TA	I	M	TA	I	M	TA	I	M	TA
Cattle and Buffaloes	a. FMD	-	-	-	10	0	y	-	-	-	20	0	y	2	0	Y	13	0	Y
	b. Tympany	2	0.5	y	2	0	y	12	20	y	10	2	y	2	0	Y	8	5	Y
	c. Pneumonia	-	-	-	5	0	y	10	30	y	2.3	4	y	4	0	Y	6	8	Y
	d. Diarrhoea/ dysentery	10	0.5	y	10	0	y	40	5	y	35	2	y	2	0	y	24	3	Y
	e. Calf scour	40	10	y	-	-	-	20	50	y	10	5	y	1	0	Y	20	25	Y
	f. Endoparasites	90	0	y	100	0	y	80	10	y	10	0	y	40	0	Y	72	2	Y
	g. Ectoparasites	90	0	y	100	0	y	90	2	y	75	0	y	30	0	Y	80	1	Y
	h. Repeat breeding	20	0	y	20	0	y	30	0	y	60	0	y	5	0	Y	31	0	Y
	i. Mastitis	-	-	-	-	-	-	-	-	-	30	0	y	-	-	-	30	0	Y
Sheep & Goats	a. PPR/CCPP	-	-	-	-	-	-	-	-	-	50	2	y	-	-	-	50	2	Y
	b. Mange	-	-	-	-	-	-	20	0	y	27.5	0	y	-	-	-	25	0	Y
	c. Lice and ticks	-	-	-	-	-	-	90	2	y	60	0	y	4	0	Y	65	1	Y
	d. Endoparasites	15.2	0	y	-	-	-	80	10	y	40	0	y	20	0	Y	38	3	Y
	e. Diarrhoea/dysentery	-	-	-	-	-	-	20	5	y	20	20	y	7	0	Y	19	10	Y
Poultry	a. Coccidiosis	-	-	-	-	-	-	30	20	y	-	-	-	-	-	-	30	20	Y
Equine	a. Respiratory distress	5	1	Y	-	-	-	10	30	y	5	20	y	3	0	Y	9	15	Y
	b. Colic	15	1	Y	-	-	-	30	60	y	30	5	y	5	0	Y	28	20	Y
	c. Internal parasites	25.25	0	y	-	-	-	60	10	y	50	0	y	3	0	y	40	4	Y

Note: I= Infected, M= Mortality and TA=Treatment Available
Source: Field survey, 2007-08

Table 5.23 Intervention for Livestock Diseases and Feed and Fodder Development

Intervention	Solan	Kandaghat	Kunihar	Nalagarh	Dharampur	District
Fodder						
Availability of fodder	√	-	-	√	-	√
Improved variety of fodder	√	√	√	√	√	√
Collection centres for fodder	-	-	√	-	√	√
Roads to pasture lands	√	√	√	√	√	√
Feed						
Feed for calf and milch	-	√	√	-	-	√
Subsidy on animal feed and mineral mixture	√	√	√	√	√	√
Awareness about feed	√	√	√	√	√	√
Veterinary services						
Vaccination required	√	√	√	√	√	√
Ensured medicine	√	√	√	√	√	√
One despensary at each panchayat along with staff - pharmasist and class-iv, gosadan,mobile van,operation theatre	√	√	√	√	√	√
Better germplasm	√	√	√	√	√	√
Animal health camp should be arranged	-	√	√	-	√	√
Improved breed of animal	√	√	√	√	√	√
Mobile van	√	√	√	√	√	√
Operation theatre	√	√	√	√	√	√
Others						
Cow shed improvement	-	-	√	-	√	√
Milk collection centre	√	√	√	-	√	√
Processing of milk	-	√	√	√	-	√

Source: Field survey, 2007-08

Table 5.24 Interventions for Cultured Fisheries

Intervention	District
Renovation of ponds	√
Regular and clean water supply	√
Infrastructure availability	√
Availability of quality fish seed	√
Adequate security in the fish catchment area during breeding season	√

CHAPTER VI

DISTRICT PLAN

6.1 District Plan and Sectoral Outlays

Budget outlay has been proposed for eight different sectors viz; interventions to improve and enhance sustainability of crop production system, need based infrastructure development in the areas of irrigation, rural markets and roads connectivity, natural resource conservation management, niche based enterprises for rural entrepreneurs, fruit production, livestock, poultry & fisheries, human resource and research & extension activities. Within the sub sectors and main sectors as a whole, the budget provision for five years and its yearly allocation has been shown in Table 6.1. The total budget for the plan has been proposed at Rs 270.03 crores.

6.2 Growth Drivers

The availability of suitable agro-climatic conditions to grow high value cash crops particularly vegetables and flowers in AES IV are the major growth drivers of the crop sector. Likewise, emerging urbanization and industrialization in the district has raised substantial demand for liquid milk. Thus, animal husbandry is another sector for development of the economy of the district. The availability of basic infrastructural facilities like education, assured irrigation, rural roads, markets, extension facilities, etc in some niches of the district are the important growth drivers for different sectors. The development and diffusion of new agricultural technologies to increase yield levels, eradicate weeds to improve the productivity of support and pasture lands and animal menace management are other important growth drivers for realizing the rich potential available in the district.

6.3 Innovative Schemes

As a result of PRA with the panchayat level functionaries, the progressive farmers and NGOs, etc the following innovative schemes have been identified for achieving a reasonable growth in agriculture sector and for the overall development of the district. The innovative schemes for agriculture and rural development and irrigation development have been given in Table 6.2 and Table 6.3. There were 36 new schemes for water harvesting in the district out of which one third were operating in Kunihar block. The total villages covered under the scheme were 136 with potential area of 7,400 ha. There were about 22 schemes for land/ soil conservation and 6 schemes for horticultural development in the district. All the blocks of the district were covered under these schemes. In case of pond fisheries, the funds required were Rs 60 lakh for ponds and Rs 80 lakh for others in Nalagarh block. Six livestock improvement schemes were also operating in the district covering 2,397 villages and 55,650 beneficiaries. There was a great need for the development of rural markets in the district. Keeping this in view, 26 new markets should be opened which require about Rs 240 lakh. For polyhouse construction, Rs 960 lakh and for organic farming Rs 130 lakh were required in different blocks. The funds were also required for the development of rural roads and bridges which would help in transportation and marketing of the produce. The financial estimates for such schemes have been given in Table 6.1. The innovative schemes include:

- Provision of irrigation in terms of Kuhls and incentives for the utilization of rain water harvesting technology.
- Development of suitable crop varieties for meeting the changing environmental conditions.
- Protection of crops against biotic and abiotic stresses.
- Horticultural development through supply of seedlings, disease and inter-culture management and efficient marketing.
- Livestock development (management/ improvement and fodder development, supply of feed kits, mobile veterinary services).
- Organic farming and production of vermi-compost.
- Diversified farming through protected cultivation.
- Development of rural infrastructure (rural markets/ storage, rural roads, bridges, etc.).
- Agricultural mechanization (incentives on improved tools like power tillers, sprayers, clod breakers, chaff cutters, milk churners, etc.).

6.4 Projected Outcomes and Growth Rates

- Foodgrain production shall increase from 97,467 metric tonnes to 1, 28,097 metric tonnes after the implementation of the plan recording a growth rate of 6.29 per cent per annum in scenario I. Even in scenario II when 20 per cent of irrigated land was shifted to vegetable production, the growth rate in foodgrains production shall be 5.92 per cent per annum (Table 6.5)
- Production of vegetables would increase from 1, 66,172 metric tonnes to 2, 06,816 metric tonnes in scenario I registering a growth rate of 4.89 per cent per annum when the proportion of area under these crops remains same and to 3, 60,713 metric tonnes recording a growth rate of 23.41 per cent per annum in scenario II when 20 per cent of the irrigated area was brought under these crops. This will generate a marketable surplus of 3,24,641 metric tonnes which in monetary terms amounts to Rs. 324.64 crores. In addition, it will generate huge employment opportunities through backward and forward linkages (Table 6.5).
- The apple production is expected to grow at a rate of 7.41 per cent per annum, other temperate fruit by 4.47 per cent and dry fruits at a rate of 11.37 per cent per annum (Table 6.6).
- The milk production was expected to increase by 7.42 per cent, 9.42 per cent and 11.98 per cent for cow, buffalo and goat, respectively (Table 6.7).
- The production of different crops is projected to grow at a different rates varied from 3.47 per cent in case of sesame to as high as 19.76 per cent per annum in case of paddy (Table 6.8).
- Irrigation potential shall be created which will provide irrigation to an area of 7,805 hectares.

- Available water potential shall be exploited and thereby 7,805 hectares of land shall be brought under protective and assured irrigation (Table 6.9).
- With the implementation of plan, 20.40 per cent of the arable land will have been assured irrigation facilities compared to existing 16.08 per cent.
- A huge chunk of land amounting to 1,14,780 hectares prone to soil erosion, stream bank erosion, etc shall be treated by adopting soil conservation measures.
- Support land (private grasslands) of 75,326 hectares shall be treated against invasive weeds and shrubs. This shall improve the fodder production to the approximate level of 7,532.60 metric tonnes (Table 6.9).
- The demand for UREA, MOP, IFFCO and 15:15:15 mixture is projected to increase to 6323.54 41.98, 2247.80 and 1761.27 metric tonnes respectively in scenario I, 6641.28, 44.01,2358.84 and 1815.02 metric tonnes respectively in scenario II and 7315.07, 48.30, 2594.07 and 1926.45 metric tonnes respectively in scenario III (Table 6.10).
- With the effective implementation of plan, agriculture sector as whole is expected to grow at a rate of 9.73 per cent per annum as against the targeted 4 per cent. Different allied sectors, namely, agriculture, horticulture and livestock are projected to grow at 10.55 per cent, 19.43 per cent and 8.70 per cent per annum, respectively (Table 6.11).

6. 5 Vision of Next Plan

Infrastructure in the lower parts of the district is well developed. This has led to diversion of agricultural land to non-agricultural purposes particularly to the industry. This has its implications. On the positive side, the industry has been able to take out labour from the agricultural sector and absorbed a large number of workers. It provides both direct and indirect employment. On the negative side, the industry has been developed on the cultivated land which could have been used for self-sustainable agriculture. The social cost may be, in terms of, pollution, etc. Thus, in this area there is need to restrict the industrial development to the unculturable waste lands. In addition, agricultural marketing sector can be developed because of infrastructural availability. There is a need for the market which will cater to the needs not only of this district but of other adjoining districts like Shimla/ Bilaspur also.

In the mid and upper hills, the vegetables are being taken up at a very fast rate. The gap between average yield and potential yield of progressive farmers is substantial in most of the vegetable crops. This can be easily attained through better management. It is expected that there will be sufficient marketable surplus of these crops. Among horticultural crops, plum and nuts are playing very important role. Not only the district is expected to achieve the potential yield but the area under horticultural crops is also expected to increase. The total advantage is in terms of increase in total production and thus higher returns to the farmers. There is shortage of water which can be met through rain water harvesting. The use of drip/ sprinkler irrigation can help in better utilization of water. The farmers are very much interested in polyhouses. The results of these polyhouses have shown substantial economic benefits. Further, because of decreasing economic holding, the use of polyhouses is expected to utilize the resources efficiently and increase income substantially. The state government is also taking care of both the irrigation aspect as well as the polyhouses. It is expected that in near future the district will be a leading

vegetable production district of the state. This will further require the storage and transportation facilities. The marketing, as suggested earlier, needs to be taken up at the lower belt of the state.

In the high hills, the floriculture and vegetable production are becoming popular. Flowers being very perishable needs to be immediately marketed. The local market for the flowers has neither been developed nor there is immediate scope for the same. Thus, the transportation of flowers needs immediate attention of the government. This needs refrigerated/ cooling vans. The farmers for floriculture need to be identified for taking up it in a big way.

The animal menace has been a big problem for agricultural development. Many farmers have even left farming because of this. It is expected that government will take effective measures for its control so that farming can be taken up on commercial level. In all the crops there has been problem of availability of HYV seeds. However, in a few crops, these are available but the availability is poor because of seed multiplication while in some other cases, the new varieties are in pipeline. It is expected that the state government will provide adequate funds for research and development to take care of new varieties, control of weeds, diseases, insect/ pest and also the animal diseases. Further, there is need to provide veterinary vans at each block, besides one dispensary, so that milk production can achieve the growth rates as expected. The departments of agriculture/ horticulture need to be strengthened for better extension services which are a must for the agricultural development of the district. Go-sadans may bring some relief from animal menace.

In the high hills, there is a good potential for organic farming. But due to lack of adequate local market the produce has to be sold in the cities. It is expected that the state government will take adequate steps in collaborating with the private sector for proper marketing of organic products of the district.

Female drudgery has been high in the district. It is expected that the machines for clod breaking and grass cutter, sickles, etc. will be developed and will be extensively used. The roads will also be developed so that the distance to fetch grasses on head/back load is minimized. In the end it can be visualized that if the proposed scheme, is implemented in the district, the expected growth rate will be much higher than the expected growth rate of 4 per cent.

6.6 Prioritization of Schemes

According to the survey, the main requirement of the area in case of agriculture is the proper irrigation facilities followed by quality seed material availability, marketing facilities, subsidized farm inputs and control of monkey menace. In case of horticulture also, similar problems were observed which need the attention of the government. Along with these, provision of cheap loans for horticulturists and for green houses in floriculture, post harvest management facilities need to be supplied on priority in the area. For animal husbandry, there is a need of one dispensary at panchayat level along with staff followed by ensured medicine, vaccination and animal health camps.

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

Sr. No.	Schemes	Total Plan Outlay	Yearly Allocation				
			I	II	III	IV	V
I	**Interventions to Improve and Enhance Sustainability of Crop Production System**	**2530**	**379.5**	**506**	**506**	**506**	**632.5**
1	Improvement of productivity of cereals, pulses, oilseeds, vegetable and spice 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.	150	22.5	30	30	30	37.5
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	900	135	180	180	180	225
	(i) Sprinkler	700	105	140	140	140	175
	(ii) Drip	200	30	40	40	40	50
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	45	6.75	9	9	9	11.25
6	Protected (poly house) cultivation to minimize risk factors and enhance quality and productivity	960	144	192	192	192	240
7	Strengthening and improvement of quality control infrastructure (seed, pesticides and fertilizer testing laboratories)	45	6.75	9	9	9	11.25
8	Strengthening of seed production farms and promotion of infrastructure to improve seed production and replacement	30	4.5	6	6	6	7.5
II	**Need Based Infrastructure Development**	**1901**	**285.15**	**380.2**	**380.2**	**380.2**	**475.25**
1	Irrigation	614	92.1	122.8	122.8	122.8	153.5
2	Improvement of on-farm water delivery and efficiency of existing irrigation systems	327	49.05	65.4	65.4	65.4	81.75
3	Rural markets	240	36	48	48	48	60
4	Rural roads for connectivity	720	108	144	144	144	180
III	**Natural Resource Conservation and Management**	**18960**	**2844**	**3792**	**3792**	**3792**	**4740**
1.	Soil conservation of arable and Non-arable land through engineering measures	330	49.5	66	66	66	82.5

2.	Water harvesting check dams, ponds, tanks, etc	18630	2794.5	3726	3726	3726	4657.5
IV	**Niche Based Enterprises for Rural Entrepreneurs**	**130**	**19.5**	**26**	**26**	**26**	**32.5**
	(i) Organic farming	130	19.5	26	26	26	32.5
V	**Fruit Production**	**1061**	**159.15**	**212.2**	**212.2**	**212.2**	**265.25**
VI	**Livestock, Poultry & Fisheries**	**1050**	**157.5**	**210**	**210**	**210**	**262.5**
1	Livestock improvement	890	133.5	178	178	178	222.5
2	Fisheries	160	24	32	32	32	40
VII	**Human Resources**	**983**	**147.45**	**196.6**	**196.6**	**196.6**	**245.75**
1	Additional man power requirement	954	143.1	190.8	190.8	190.8	238.5
2	Capacity building of extension personnel	29	4.35	5.8	5.8	5.8	7.25
VIII	**Research & Extension**	**388**	**58.2**	**77.6**	**77.6**	**77.6**	**97**
IX	**All Sectors & Schemes**	**27003**	**4050.45**	**5400.6**	**5400.6**	**5400.6**	**6750.75**

Table 6.2 New Schemes for Agriculture and Rural Development

Development Scheme	Block	Solan	Kandaghat	Kunihar	Nalagarh	Dharampur	District
Watershed harvesting schemes, including ponds, tanks, check dams, etc.	No. of units	6	10	12	5	3	36
	Village (No.)	32	24	28	30	22	136
	Beneficiary families (No.)	1,500	1,500	850	1,600	475	5,925
	Potential area (ha)	800	700	1,600	3,500	800	7,400
	Funds required (Rs. Lakh)	2,000	1750	4,000	8,750	2,000	18,500
Soil/land conservation schemes	No. of units	4	5	6	3	4	22
	Village (No.)	20	20	45	25	14	124
	Beneficiary families (No.)	100	225	500	800	638	2263
	Potential area (ha)	20	30	15	25	20	110
	Funds required (Rs. Lakh)	60	40	50	70	60	280
Fruit production	No. of units	2	1	1	1	1	6
	Village (No.)	420	450	512	672	456	2510
	Beneficiary families (No.)	1,200	1,670	1,850	3,200	3,250	11,170
	Potential area (ha)	20	15	10	10	15	70
	Funds required (Rs. Lakh)	45	60	50	50	30	235

Fisheries (pond constructions)	Funds required (Rs. Lakh)	-	-	-	-	-	-
	For ponds	-	-	-	60	-	60
	Others	-	-	-	80	-	80
Livestock improvement schemes	No. of Schemes	6	6	6	6	6	6
	Village (No.)	483	274	512	672	456	2,397
	Beneficiary families (No.)	7,850	6,200	9,000	23,000	9,600	55,650
	Funds required (Rs. Lakh)	100	80	80	125	60	445
Rural markets	No. of units	5	8	5	5	3	26
	Village (No.)	15	20	30	18	10	93
	Beneficiary families (No.)	500	350	400	700	450	2400
	Funds required (Rs. Lakh)	50	40	35	80	35	240
Polyhouse	No. of units	200	150	100	150	100	700
	Village (No.)	70	50	40	50	40	250
	Beneficiary families (No.)	200	150	100	150	100	700
	Potential area (ha)	12	9	6	9	6	42
	Funds required (Rs. Lakh)	240	200	180	200	140	960
Organic farming	No. of units	-	-	-	-	-	-
	Village (No.)	-	-	-	-	-	-
	Beneficiary families (No.)	-	-	-	-	-	-
	Potential area (ha)	150	75	100	120	125	570
	Funds required (Rs. Lakh)	35	20	20	25	30	130
Rural roads (kms)	No. of untis	6	8	6	7	8	35
	Village (No.)	50	30	25	35	35	175
	Beneficiary families (No.)	1,800	1,500	1,200	2,500	1,650	8,650
	Funds required (Rs. Lakh)	75	75	60	150	100	460
Bridges (No.)	No. of units	3	4	3	5	4	19
	Village (No.)	10	10	8	16	12	56
	Beneficiary families (No.)	250	200	120	350	225	1,145
	Funds required (Rs. Lakh)	60	50	50	60	40	260

Source: Field survey, 2007-08

Table 6.3 Potential/ New Irrigation Schemes

Particular	Solan	Kandaghat	Kunihar	Nalagarh	Dharampur	District
Lift irrigation						
Number	5	1	5	20	-	31
Amount required (Rs. Lakh)	82.5	135	82.5	58.5	45	404.5
Villages to be covered	35	19	18	32	-	104
Beneficiaries (No.)	50	336	300	400	-	1086
Command area (ha)	55	90	55	39	30	269
Groundwater use						
Number	2	-	-	-	-	2
Amount required (Rs. Lakh)	40	-	-	68	-	108
Villages to be covered	8	-	-	10	-	18
Beneficiaries (No.)	40	-	-	75	-	115
Command area (ha)	20	-	-	34	-	54
Kuhl						
Number	-	-	-	-	1	1
Amount required (Rs. Lakh)	18.75	21.25	18.75	27.5	16.25	102.5
Villages to be covered	10	8	15	12	10	55
Beneficiaries (No.)	150	100	120	200	150	720
Command area (ha)	15	17	15	22	13	82

Source: Field survey, 2007-08

Table 6.4 Prioritizations of Schemes/ Works (Rank)

Priority	Solan	Kandaghat	Kunihar	Nalagarh	Dharampur
Agriculture					
Improve irrigation facility	1	1	1	1	1
Planting and quality seed material	2	2	2	2	2
Marketing facility	3	7	4	3	-
Subsidized farm inputs	4	3	-	6	4
Insurance cover to all crops	7	-	6	-	3
Awareness through visit and demonstration	8	5	-	-	5
Cheaper loans for green house	5	4	3	4	6
Control of monkey menace	6	6	5	5	-

Horticulture					
Improve irrigation facility	1	1	1	1	1
Planting and quality seed material	2	2	-	-	2
Marketing facility	3	-	2	-	-
Post harvest management	4	-	-	2	-
Productivity and protection facility	5	3	-	-	3
Awareness through visit and demonstration	6	-	-	5	-
Cheaper loans for horticulturist	-	-	-	3	-
Vermin compost unit	-	5	4	-	-
Integrated pest management	-	6	-	-	4
Green house, subsidy on floriculture	-	4	3	4	-
Animal husbandry					
One dispensary at each panchayat along with staff -pharmacist and class-iv	1	1	1	1	1
Gosadan	6	6	7	7	6
Mobile van	7	4	2	4	-
Operation theatre					
Vaccination	2	3	6	5	2
Ensured medicine	3	2	3	2	3
Better germplasm	4	5	4	3	4
Animal health camp should be arranged	5	-	5	6	5

Source: Field survey, 2007-08

Table 6.5 Projected Output Growth of Agriculture in District Solan

Crops	Existing			Potential Production (mt)		Growth (% p. a)	
	Area (ha)	Production (mt)	Yield (q/ha)	Scenario I	Scenario II	Scenario I	Scenario II
Maize	21,775	38,392	17.63	46,629	45,935	4.29	3.93
Paddy	4,719	10,351	21.93	16,758	16,571	12.38	12.02
Wheat	23,894	45,945	19.23	60,619	59,789	6.39	6.03
Barley	1,573	1,799	11.44	2,084	2,051	3.16	2.80
Pulses	2,789	959	3.44	1,111	1,094	3.16	2.80
Food grains	54,750	97,467	17.80	1,28,097	1,26,334	6.29	5.92
Vegetables	6,982	1,66,172	238.00	2,06,816	3,60,713	4.89	23.41

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

Table 6.6 Projected Output Growth in Fruit Production (MT)

Particulars	Actual production	Potential production	Growth rate (% p.a.)
Apple	27	51	7.41
Other temperate fruit	3,870	5,946	4.47
Dry fruit	126	236.25	7.29
Citrus fruit	587	835	3.52
Other subtropical fruit	874	1410	12.27

Note: For computation of growth rates, 12 years period was taken for harnessing the potential production

Table 6.7 Projected Output Growth in Milk Production (T/animal/year)

Livestock	Actual production	Potential production	Growth rate (% p.a.)
Crossbred cow	2211.90	3650.00	13.00
Local cow	1018.35	1825.00	15.84
Buffalo	1861.50	2920.00	11.37
Goat	518.30	730.00	8.17

Table 6.8 Projected Output and Growth in the Production of Different Crops

Crop	Current production (quintals)	Projected production (quintals)	Growth rate (% p.a.)
Maize	429507	703866	12.78
Paddy	38087	75720	19.76
Wheat	242627	422940	14.86
Barley	17348	22598	6.05
Mash	2205	3020	7.40
Kulthi	606	920	10.36
Sesame	1623	1905	3.47
Sarson	6972	9296	6.67
Linseed	2507	3064	4.44
Potato	29930	43050	8.77
Peas	84771	114894	7.11
Tomato	919250	1345200	9.27
Cabbage	8929	13724	10.74
Cauliflower	23928	29929	5.02
Beans	29177	34388	3.57
Capsicum	54174	99552	16.75
Bhindi	14596	17898	4.53
Brinjals	10200	12960	5.41
Curcubit	10371	14742	8.43
Onion	5825	7141	4.52
Spinach	5661	7650	7.03
Radish	9805	12062	4.61
Ginger	56516	71640	5.35
Garlic	11314	13833	4.45

Table 6.9 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
Solan	3,366	2,989	10,000	1,639	321	90	800
Kandaghat	2,844	1,547	13,000	899	652	107	700
Kunihar	8,518	2,134	11,410	7,605	1,552	70	1,600
Nalagarh	18,017	8,747	4,000	12,093	3,527	95	3,500
Dharampur	5,521	2,879	10,000	4,680	102	43	800
District	38,266	18,296	4,8410	26,916	6,154	405	7,400

Table 6.10 Fertilizer Demand, Actual Supply and Projections for 2012-13 (MT)

Year	CAN	Urea	SSP	MOP	12:32:16	15:15:15
2003-04	286.05	5,454.65	42.55	24.70	1,640	11.20
2004-05	287.80	5,182.55	16.50	43.45	1,592	69.40
2005-06	49.05	5452.05	28.95	29.95	1,963.75	89.75
2006-07	50.05	5,580.75	12.40	26.30	1,602	113.05
2007-08	15.65	5,873.05	25.60	32.20	1,920	140.45
Growth rate (% p. a)	-	1.49	-	5.45	3.20	65.83
Projection for 2012-13	-	6,323.54	-	41.98	2,247.80	1,761.27
Projection making allowance for crop diversification @ 1%	-	6,641.28	-	44.01	2,358.84	1,815.02
Projection making allowance for irrigation @ 2%	-	7,315.07	-	48.30	2,594.07	1,926.45

Source: (i) Data on demand of fertilizers, Deputy Director Office, Solan

(ii) Projections by the consultant following methodology adopted by Fertilizers Association of India, New Delhi

Table 6.11 Projected Value of Output and Growth of Agriculture and Allied Sectors (Rs. Lakhs)

Sectors	Current value of output	Projected value of output	Growth rate (% per annum)
Agriculture	16497.11	25196.50	10.55
Horticulture	1209.22	2383.69	19.43
Livestock	24514.16	3580.75	8.70
Overall	42220.50	62760.94	9.73

APPENDIX TABLES

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

Sr. No.	Particular		Solan	Kandaghat	Kunihar	Nalagarh	Dharampur	District
1.	Gram panchayats		35	24	45	69	38	211
2.	Villages		483	274	512	672	456	2,397
3.	Households		9,082	6,731	11,660	29,222	12,386	69,081
4.	Total population	Male	29,907	18,474	39,981	81,730	47,325	2,17,417
		Female	27,357	17,429	40,372	71,563	43,636	2,00,357
		Schedule caste	23,588	13082	22,956	23,756	3,590	86,972
		Schedule tribe	146	50	102	-	295	593
		Rural	42,675	35,903	80,353	1,23,222	90,961	3,73,114
		Urban	14,589	-	2,877	32,044	-	49,510
		Sex ratio	932	943	1009	910	922	943.2
5.	Literacy rate	Male	87.7	88.2	72	75	81	80.78
		Female	72.5	72.5	60	61	64	66
		Schedule caste	-	60	60	52	54	45.2
6.	Households economic status	Antodaya households	892	1,496	2,292	1,230	2,000	7,910
		BPL households	2,107	2,377	3,460	6,425	3,170	17,539
		APL1 households	6,083	1,175	8,260	10,459	9,266	35,243
		APL2 households	-	2,212	-	-	-	2,212
7.	Village amenities	Connected with pucca roads	435	249	498	627	290	2,099
		Connected with kuchha roads	30	35	11	32	138	246
		Connected with no roads	8	-	3	13	28	52
		Drinking water supply	450	274	512	609	276	2,121
		Villages electrified	483	274	512	672	456	2,397
		Tel connection	35	24	45	69	30	203

		to panchayats						
		Post office	35	29	44	63	23	194
		Fair price shops						
		Co-op depots	15	14	10	30	23	92
		Private dealers	43	16	38	32	27	156
8.	Educational and health institutions	Primary schools	119	111	159	234	130	753
		Middle schools	20	25	43	39	40	167
		High schools	16	14	19	36	26	111
		Technical institutions						
		Polytech/ Engg	-	1	-	1	-	2
		ITI	1	-	1	2	-	4
		Nurshing TI	-	-	-	1	-	1
		College of Education	1	-	-	1	1	3
		PHC	1	2	6	12	6	27
		Dispensaries	-	10	25	29	-	64
		Sub-health centers	23	23	36	-	39	121
		Community HCs	0	2	1	-	1	4
		Hospitals	1	1	3	1	2	8
		Medical college cum hospitals	-	-	-	1	-	1
		Veterinary hospitals	20	8	6	1	4	39
		Veterinary dispensaries	-	24	27	46	25	122
		Gosadan	-	-	-	1	-	1
		Other health institutions	9	10	-	-	-	19
		Anganwaries/balwaries	78	111	274	441	160	1,064
9.	Village/ community organizations	Mahila mandals	109	111	202	191	37	650
		Self help groups	83	72	585	350	47	1,137

		Youth clubs	-	20	-	-	-	20
		NGOs	3	-	5	-	-	8
		Farmers co-operatives	-	20	-	-	-	20
10	Banking institutions	Commercial banks	23	9	10	45	-	87
		Central co-operative banks	5	3	4	6	4	22
		Co-operative credit societies	-	-	-	23	18	41
		Any other	-	5	1	1	-	7

Source: Field survey, 2007-08

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

Classification	Type	Solan	Kandaghat	Kunihar	Nalagarh	Dharampur	District
Workers	Agri. labour	12,539	8,805	10,395	23,308	9,937	64,984
	Household industry	7,942	4,974	10,630	22,599	17,583	63,728
	Others	-	-	-	-	-	-
	Total	42,249	28,066	42,421	92,652	55,336	2,60,724
	Main workers	21,768	14,287	21,396	46,745	27,816	1,32,012
	Marginal workers	20,481	13,779	21,025	45,907	27,520	1,28,712
Cultivators	Marginal	5,526	3,880	4,581	10,272	4,379	28,638
	Small	3,350	2,353	2,778	6,228	2,655	17,364
	Large	3,663	2,572	3,036	6,808	2,903	18,982
	Total	12,539	8,805	10,395	23,308	9,937	64,984

Source: Field survey, 2007-08

Appendix 3 Status of Migrant Labour (No.)

Origin	Status	Solan	Kandaghat	Kunihar	Nalagarh	Dharampur	District
HP							
	Skilled	-	-	-	-	-	-
	Semi skilled	-	-	-	-	-	-
	Unskilled	-	-	-	-	-	-
	Total	-	-	-	-	-	-
Other States							
	Skilled	-	-	-	-	-	-
	Semi skilled	-	-	-	-	-	-
	Unskilled	4,900	2,460	4,163	3,450	2,755	17,728
	Total	4,900	2,460	4,163	3,450	2,755	17,728
Total							
	Skilled	-	-	-	-	-	-
	Semi skilled	-	-	-	-	-	-
	Unskilled	4,900	2,460	4,163	3,450	2,755	17,728
	Total	4,900	2,460	4,163	3,450	2,755	17,728

Source: Field survey, 2007-08

Appendix 4 Farm Gate Prices of Different Crops

Sr. No.	Crops	Price (Rs/q)
1	Maize	650
2	Paddy	850
3	Wheat	1,000
4	Barley	1,500
5	Mash	3,500
6	Kulthi	2,500
7	Sesame	4,500
8	Sarson	3,000
9	Linseed	1,500
10	Potato	400
11	Peas	1,500
12	Tomato	700
13	Cabbage	400
14	Cauliflower	600
15	Beans	800
16	Capsicum	1,800
17	Lady finger	800
18	Brinjal	500
19	Cucurbits	700
20	Onion	500
21	Spinach	300
22	Radish	300
23	Ginger	2,000
24	Garlic	2,500
25	Apple	1,500
26	Other temperate fruits	1,000
27	Dry fruits	5,000
28	Citrus fruits	1,200
29	Other subtropical fruits	1,000
30	Milk	1,500