



Department of Agriculture  
Himachal Pradesh

# **DISTRICT AGRICULTURE PLAN**

## **CHAMBA, HIMACHAL PRADESH**

### **Volume - II**



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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 Chamba was prepared by Dr. Ashok Kumar and Dr. K. D. Sharma. 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

Based upon the potential of agriculture, horticulture, livestock and allied activities in Chamba district, the comprehensive budget outlay and yearly allocation under various schemes/interventions have been given below. The plan envisages budget allocation among VIII major components of agricultural sector comprising crop improvements, infrastructure, natural resource conservation/management and niche based potential enterprises, development of horticulture, livestock improvement, human resource development and finally research and extension needs. Each component has been further divided into different sub components/interventions to achieve desirable growth in agriculture. The funding proposal for the next five year period has been extracted from the comprehensive district agriculture plan. The total plan outlay for the comprehensive district plan has been estimated at Rs 69,973 lakhs. The yearly allocation came out to be about Rs 10,495.95 lakhs in the first year, Rs 13,994.60 lakhs in the second, third and fourth years of implementation and remaining Rs 17,493.25 lakhs in the fifth and final year of execution of this plan.

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

Sr. No.	Schemes	Total Plan Outlay	Yearly Allocation				
			I	II	III	IV	V
<b>I</b>	<b>Interventions to Promote Sustainability of Crop Production System</b>	<b>2620</b>	<b>393</b>	<b>524</b>	<b>524</b>	<b>524</b>	<b>655</b>
1	Improvement in productivity of cereals, pulses, oilseeds, vegetables and spices crops through promotion of HYV seeds including hybrids	250	37.5	50	50	50	62.5
2	Improvement of soil health through vermi-omposting, bio-fertilizers, micro nutrients, soil testing etc.	200	30	40	40	40	50
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	500	75	100	100	100	125
	(i) Sprinkler	450	67.5	90	90	90	112.5
	(ii) Drip	50	7.5	10	10	10	12.5
5	Agricultural mechanization through popularization of improved tools and hill specific machinery like power tillers, tractors, crop planters/harvesters, sprayers, etc. clod breakers and gender friendly post harvesting equipments etc. (to remove women drudgery)	150	22.5	30	30	30	37.5

6	Protected (poly house) cultivation to minimize risk factors and enhance quality and productivity	1200	180	240	240	240	300
7	Strengthening and improvement of quality control infrastructure (seed, pesticides, fertilizer testing laboratories)	150	22.5	30	30	30	37.5
8	Strengthening of seed production farms and promotion of infrastructure to improve seed production and replacement	20	3	4	4	4	5
<b>II</b>	<b>Need Based Infrastructure Development</b>	<b>2838</b>	<b>425.7</b>	<b>567.6</b>	<b>567.6</b>	<b>567.6</b>	<b>709.5</b>
1	Improvement of on-farm water delivery and efficiency of existing irrigation systems	2769	415.35	553.8	553.8	553.8	692.25
2	Rural markets	69	10.35	13.8	13.8	13.8	17.25
<b>III</b>	<b>Natural Resource Conservation and Management</b>	<b>22348</b>	<b>3352.2</b>	<b>4469.6</b>	<b>4469.6</b>	<b>4469.6</b>	<b>5587</b>
1.	Soil conservation of arable and non-arable land through engineering measures	2251	337.65	450.2	450.2	450.2	562.75
2.	Water harvesting check dams, ponds, tanks, etc.	8374	1256.1	1674.8	1674.8	1674.8	2093.5
3.	Land improvement	11723	1758.45	2344.6	2344.6	2344.6	2930.75
<b>IV</b>	<b>Niche Based Enterprises for Rural Entrepreneurs</b>	<b>968</b>	<b>145.2</b>	<b>193.6</b>	<b>193.6</b>	<b>193.6</b>	<b>242</b>
	(i) Organic farming	822	123.3	164.4	164.4	164.4	205.5
	(ii) Agro-tourism	84	12.6	16.8	16.8	16.8	21
	(iii) Medicinal and aromatic plants	62	9.3	12.4	12.4	12.4	15.5
<b>V</b>	<b>Fruit Production</b>	<b>2413</b>	<b>361.95</b>	<b>482.6</b>	<b>482.6</b>	<b>482.6</b>	<b>603.25</b>
<b>VI</b>	<b>Livestock, Poultry &amp; Fisheries</b>	<b>20720</b>	<b>3108</b>	<b>4144</b>	<b>4337.6</b>	<b>4337.6</b>	<b>5180</b>
1	Livestock Improvement	20458	3068.7	4091.6	4091.6	4091.6	5114.5
2	Fisheries	262	39.3	52.4	52.4	52.4	65.5
<b>VII</b>	<b>Human Resource Development</b>	<b>2445</b>	<b>366.75</b>	<b>489</b>	<b>489</b>	<b>489</b>	<b>611.25</b>
1	Additional man power requirement	2374	356.1	474.8	474.8	474.8	593.5
2	Capacity building of Extension Personnel	71	10.65	14.2	14.2	14.2	17.75
<b>VIII</b>	<b>Research &amp; Extension</b>	<b>978</b>	<b>146.7</b>	<b>195.6</b>	<b>195.6</b>	<b>195.6</b>	<b>244.5</b>
<b>IX</b>	<b>All Sectors &amp; Schemes</b>	<b>55330</b>	<b>8299.5</b>	<b>11066</b>	<b>11066</b>	<b>11066</b>	<b>13832.5</b>

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

## II. Comprehensive District Agriculture Plan: Sectoral Outlays and Yearly Allocation (Rs. Lakh)

Sr. No.	Schemes	Total Plan Outlay	Yearly Allocation				
			I	II	III	IV	V
<b>I</b>	<b>Interventions to Promote Sustainability of Crop Production System</b>	<b>2620</b>	<b>393</b>	<b>524</b>	<b>524</b>	<b>524</b>	<b>655</b>
1	Improvement in productivity of cereals, pulses, oilseeds, vegetables and spices crops through promotion of HYV seeds including hybrids	250	37.5	50	50	50	62.5
2	Improvement of soil health through vermi-omposting, bio-fertilizers, micro nutrients, soil testing etc.	200	30	40	40	40	50
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	500	75	100	100	100	125
	(i) Sprinkler	450	67.5	90	90	90	112.5
	(ii) Drip	50	7.5	10	10	10	12.5
5	Agricultural mechanization through popularization of improved tools and hill specific machinery like power tillers, tractors, crop planters/ harvesters, sprayers, etc. clod breakers and gender friendly post harvesting equipments etc. (to remove women drudgery)	150	22.5	30	30	30	37.5
6	Protected (poly house) cultivation to minimize risk factors and enhance quality and productivity	1200	180	240	240	240	300
7	Strengthening and improvement of quality control infrastructure (seed, pesticides, fertilizer testing laboratories)	150	22.5	30	30	30	37.5
8	Strengthening of seed production farms and promotion of infrastructure to improve seed production and replacement	20	3	4	4	4	5
<b>II</b>	<b>Need Based Infrastructure Development</b>	<b>9107</b>	<b>1366.05</b>	<b>1821.4</b>	<b>1821.4</b>	<b>1821.4</b>	<b>2276.75</b>
1	Irrigation	2400	360	480	480	480	600
2	Improvement of on-farm water delivery and efficiency of existing irrigation systems	2769	415.35	553.8	553.8	553.8	692.25
3	Rural markets	138	20.7	27.6	27.6	27.6	34.5
4	Rural roads for connectivity	3800	570	760	760	760	950

<b>III</b>	<b>Natural Resource Conservation and Management</b>	<b>30722</b>	<b>4608.3</b>	<b>6144.4</b>	<b>6144.4</b>	<b>6144.4</b>	<b>7680.5</b>
1.	Soil conservation of arable and non-arable land through engineering measures	2251	337.65	450.2	450.2	450.2	562.75
2.	Water harvesting check dams, ponds, tanks, etc.	16748	2512.2	3349.6	3349.6	3349.6	4187
3.	Land improvement	11723	1758.45	2344.6	2344.6	2344.6	2930.75
<b>IV</b>	<b>Niche Based Enterprises for Rural Entrepreneurs</b>	<b>968</b>	<b>145.2</b>	<b>193.6</b>	<b>193.6</b>	<b>193.6</b>	<b>242</b>
	(i) Organic farming	822	123.3	164.4	164.4	164.4	205.5
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1	Additional man power requirement	2374	356.1	474.8	474.8	474.8	593.5
2	Capacity building of Extension Personnel	71	10.65	14.2	14.2	14.2	17.75
<b>VIII</b>	<b>Research &amp; Extension</b>	<b>978</b>	<b>146.7</b>	<b>195.6</b>	<b>195.6</b>	<b>195.6</b>	<b>244.5</b>
<b>IX</b>	<b>All Sectors &amp; Schemes</b>	<b>69973</b>	<b>10495.95</b>	<b>13994.6</b>	<b>13994.6</b>	<b>13994.6</b>	<b>17493.25</b>

### III. Projected Output Growth and Diversification of Agriculture in District Chamba

Crops	Existing			Potential Production (MT)		Growth rate (% p.a.)	
	Area (Ha)	Production (MT)	Yield (Q/ha)	Scenario I	Scenario II	Scenario I	Scenario II
Maize	28261	71191	25.19	84537	83016	3.75	3.32
Paddy	2774	4214	15.19	6362	6272	10.20	9.77
Wheat	16974	26087	15.37	31593	31036	4.22	3.79
Barley	3105	4150	13.37	4764	4675	2.96	2.53
Pulses	3217	2255	7.01	2589	2541	2.96	2.53
Foodgrains	55807	108823	19.50	132948	128482	4.43	3.61
Vegetables	1920	22078	115.00	26873	54694	4.34	29.55

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



#### IV Projected Output Growth in Field Crops in Chamba District (Quintals)

Crops	Existing production	Potential production	Growth rate (% p.a.)
Maize	518622	658993	5.41
Paddy	24486	51397	21.98
Wheat	268675	448918	13.42
Barley	16374	28224	14.47
Millets	5077	14404	36.74
Rajmash	9091	18912	21.60
Mash	6426	11862	16.92
Sarson	1285	3366	32.38
Toria	804	1919	27.72
Potato	237952	363518	10.55
Peas	174954	238778	7.30
Tomato	15717	37259	27.41
Cabbage	7482	20222	34.05
Cauliflower	2296	5357	26.67
Beans	9915	18872	18.07
Capsicum	1390	2755	19.66
Bhindi	730	1327	16.36
Brinjal	714	1960	34.92
Cucurbits	1502	2113	8.13
Onion	4259	5814	7.30
Ginger	389	583	10.00
Garlic	16663	28429	14.12

Note: Estimated on the basis of actual and potential yields

Source: Field Survey, 2007-08

#### V Projected Growth in Horticulture (Quintals)

Fruit	Existing	Potential	Growth rate (% p.a.)
Apple	198114	424169	9.50
Stone fruits	44498	72552	5.25
Walnut	20817	35061	5.70
All fruits	263429	531782	8.49

Note: Growth rates computed on the basis of 10 year period

#### VI Projected Growth in Livestock Production in Chamba District (Quintals)

Livestock products	Existing	Potential	Growth rate (% p.a.)
Milk			
Crossbred cows	244754	478455	19.10
Local cow	278507	443045	11.82
Buffaloes	219498	488622	24.52
Goats	33873	63691	17.61
Total milk	776633	1473813	17.95
Wool	4106	6315	10.76
Meat	18481.28	26587	8.77
Eggs (Lakh No.)	139	163	3.50

Note: Estimated on the basis of actual and potential yields of animals

Source: Consultant's own calculations

## VII Existing and Potential Gross Value of Output and Expected Sectoral Growth in Chamba District (Rs. Lakh)

Sectors	Existing	Potential	Growth rate (% p.a.)
Agriculture	11516.03	17349.89	10.13
Horticulture	2223.74	4457.34	8.37
Animal Husbandry	20749.18	38419.29	17.03
All Sectors	34488.95	60226.52	14.92

Source: Field Survey, 2007-08

## VIII Fertilizer Demand, Actual Supply and Projections for 2012-13 (M.T.)

Year	CAN	UREA	SSP	MOP	12:32:16	15:15:15
2003-04	216.55	1970.85	68.85	33.85	184.20	3.55
2004-05	120.65	1949.85	81.35	36.05	211.20	3.35
2005-06	18.60	2018.10	98.65	48.80	223.25	0.00
2006-07	43.20	2146.00	86.05	26.95	278.61	0.00
2007-08	14.15	2175.90	53.80	34.90	185.00	0.00
Growth rate (% p. a)	-18.69	2.08	-4.37	0.62	0.09	
Projection for 2012-13	5.02	2411.80	43.02	33.83	185.79	
Projection making allowance for crop diversification @2%	4.44	2657.50	38.71	39.71	205.11	
Projection making allowance for irrigation @2%	3.91	2922.85	34.75	43.74	226.01	

### 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 issued 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 and implements to reduce labour and drudgery of 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
- Accelerating the process of replacing indigenous breed of sheep and goat with improved breeds
- Promoting health care system of sheep and goat
- Provision of quality plant material to promote fruit production and harness available potential
- To strengthen the existing marketing infrastructure for high value cash crops including vegetables and fruit
- Provision of quality plant material to promote fruit production and harness available potential
- Construction of adequate number of CAS (Control Atmosphere Storage) at critical points
- To install anti-hail guns at critical points

#### **IX Research and Extension Support**

- Refinement and validation of technologies for different agro-ecological situations
- *Ex-situ* and *in situ* conservation of minor millet cereals
- 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
- To provide technical know how to farmers about the orchard management techniques like cutting, pruning, grafting and marketing operations like grading, packaging, etc.

## X 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
Bharmour	4103	1635	136000	1362	222	352	700
Bhatiyat	9060	920	6055	24219	1917	222	900
Chamba	6874	395	8427	8427	3306	285	800
Mehla	6976	1070	25063	0	120	350	1200
Salooni	6002	2383	34212	0	97	350	1500
Tissa	5822	1205	71925	0	234	347	1500
District	38837	7608	281682	34008	5896	1906	6600

## 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 and weeds, etc.
- Use of water potential to provide assured irrigation to rain-fed areas
- Water harvesting to create water potential for irrigation and to augment ground water
- Improvement of pastures and restoration and protection of forest grazing rights of *Gaddi* and *Gujjar* communities

## XI Potential Enterprises for Gainful Employment

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

## XII Human Resource Requirement (No.)

Block	Crop production	Horticulture	Animal husbandry	Others	Total
Bharmour	7	4	25	4	40
Bhatiyat	13	8	0	6	27
Chamba	8	2	1	0	11
Mehla	13	11	33	3	60
Salooni	11	0	2	0	13
Tissa	13	13	25	20	71
District	65	38	86	33	222

## **Interventions**

- 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

## **XIII Researchable Issues**

The research and development issues that emerged from close perusal of agricultural scenario and potential in the district are given below.

### **Natural Resource Management**

- Assessment and harnessing of water potential to provide assured irrigation to rain-fed areas. Water harvesting to create water potential for irrigation and to augment ground water
- Improvement of pastures and restoration and protection of forest grazing rights of shepherd community.
- Characterization, classification and fertility maps of soils
- 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
- Development of technologies to harness trout fish production potential and also providing technical know how to the fish farmers
- To spread red clover and white clover through sheep droppings to improve the productivity of alpine pastures and other grazing lands in higher hills.
- Base line survey of river catchments and assessment of ground water potential
- Studies on climate change and its impact on agro-geology and to devise suitable strategies to tackle various problems emerging out of climatic change.

### **Crop Improvement**

- 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

- Varietal development in under utilized but highly nutritive crops like amaranths, cheeney, buckwheat and other millets as well as in high value and low volume crops like kalazira in Pangi
- Effective selection, conservation, evaluation, documentation and utilization of genetic resources ensuring wider coverage under improved crop varieties with major emphasis on quality seed production.
- Refinement and validation of technologies for major crops
- *Ex-situ* and *in situ* conservation of minor millet cereals
- Transfer of technologies through extension interventions like trainings, demonstrations, exposure visits, replication of success stories, etc. Creation of farmers' advisory system to address their day - to - day queries
- Validation of ITKS and use of IT for technology dissemination by creating IT hubs at focal points
- To promote and strengthen the public- private partnership for ensuring delivery of need based inputs and technologies
- Integrated nutrient management technology demonstration on farm/field and looking into issues in solid waste management and standardization of agro-technology for organic farming
- Development/identification of hybrids and varieties of potential vegetable crops, standardization of production technology of hybrids and development of hybrids and production technology for protected cultivation
- Refinement of green house/poly house technology for temperate region
- Studies on economic and marketing aspects of cash crops

### **Crop Protection**

- Survey and surveillance of major diseases and pests of important crops
- Identification of resistant sources and study of genetics of resistance against pests and diseases
- Marker assisted selection of resistance genes using molecular markers and their use in gene pyramiding for resistance in commercial varieties
- Development of integrated disease and pest management modules suitable for organic and protected agriculture conditions
- Development of detection techniques for pathogens of quarantine importance and certification purposes relating to important seed and soil borne diseases (pea root rot and

wilt complex, bacterial wilt, bean mosaic, urdbean leaf crinkle, bacterial blight, potato viruses etc.)

- Formulation of bio-intensive IPM strategies for the management of *Helicoverpa armigera* (tomato, fruit flies (cucurbits and tomatoes), cut worms (vegetables); plant parasitic nematodes (cereals and vegetables), insect pest and nematode management under protected cultivation situations
- Collection and utilization of local strains of entomopathogenic organisms for insect pest management under organic farming situations
- Identification and utilization of native botanicals for eco-friendly pest management.
- Safe management alternatives for the stored grain pests.
- Identification and management of diseases and insect-pests of medicinal, aromatic and ornamental plants.
- Weed management studies in major crops

### **Horticultural Crops**

- Identification of niche area and remapping of different fruit growing belts.
- Diversification of fruit and their varieties with under utilized fruit.
- Rejuvenation of old and senile apple orchards
- Development of technology for frost injury management.
- Generation of data base of pollinator diversity in different horticultural crops.
- Awareness of pollinator conservation and use of honey bees in crop pollination for increased crop productivity.
- Identification of potential bee-keeping belts in different blocks.
- Safe waiting periods of pesticides on horticultural crops.
- Development of management strategies for apple scab and premature leaf fall including their curative control strategies.
- Management of diseases of ornamental crops like gladiolus, carnation and lilium etc.
- Evaluating the efficacy of newly developed fungicides, monitoring of resistant strains and breeding for disease resistance against apple scab and premature leaf fall.
- Survey and surveillance of economic and marketing aspects in horticultural crops.
- Quality nursery production of fruit crops.
- Integrated pest/ disease management

- To evolve improved frost protection technology for subtropical areas.
- Crop diversification under frost prone agro-eco system through low chilling temperate fruit.
- Integrated nutrient management.
- To develop technology for improving water use efficiency and fertigation in different fruit crops.
- Constraint identification in different horticulture crops.
- Strengthening farmers training facilities and transfer of technology.
- Management of irregular bearing in pomegranate.
- Refinement of spray schedules in apple.
- Assessment of soil health and amelioration of nutrient deficiencies.
- Establishment of *ex-situ* germplasm bank of sub temperate fruit crops.
- Impact assessment and policy evaluation in horticultural sector.
- Study of supply chain management and emerging marketing systems.
- Standardization of agro forest models for different agro-ecological situations.

### **Animal Husbandry**

- Identification of indigenous livestock health practices and documentation of the prevailing indigenous technical knowledge (ITK)
- Identification and nutritional evaluation of the high nutrition fodder grasses having adaptation to pasture for migratory animals and development of feed blocks, silage practices and strategic mineral supplements to improve nutrition of animals
- Surveillance, monitoring and control of the diseases of animals and birds including wild fauna.
- Development of herbal nutraceuticals for health and production of farm animals and toxicological studies on the poisonous plants and characterization of their toxic principles and anti nutritional factors.
- Preparation and testing of multiserotype vaccine against H.S. Serosurveillance of some important infectious diseases in livestock.
- Investigations on the epidemiology and serodiagnosis of *Mycobacterium bovis* infection in bovines in Himachal Pradesh. Molecular diagnosis and genetic diversity analysis of important pathogens responsible for major animal diseases and zoonoses
- Evaluation of medicinal plants/herbs utilized in soft and hard tissue healing in animals.



- Standardization and further application of endoscopic and laproscopic techniques in clinical cases of abdominal disorders in small and large animals.
- Evaluation of various prosthetics and biomaterials in the management of abdominal trauma/fracture/muscular skeletal disorders in animals.
- Studies on socio-economic aspect of *Gaddi* and *Gujjars* and processing and marketing aspects of livestock products

### **Other Allied Areas**

- Varietal development in pseudo-cereals.
- Standardisation of cultivation techniques for medicinal and aromatic plants
- Development of suitable agro forestry models
- Studies on diseases and pests in important tree species particularly willow, poplars and junipers
- Genetic improvement for variety, yield and quality traits in potato.
- Research on suitable engineering designs for water harvesting and protected cultivation
- Research on development of hill specific suitable models/designs of mechanical tools and equipments for improving efficiency in various farm operations
- Studies on honey bees and rearing practices to popularise garden bee colonies
- Socio demographic and nutritional studies of households
- Scope and potential for household tourism and non farm enterprises
- Studies on climate change, hydrology and glacial regimes
- Impact assessment of different programmes/schemes and policy implications

### **XIV Some Quantitative Outcomes**

- Irrigation potential shall be created which will provide irrigation to an area of 8,506 hectares. In this way, available water potential shall be exploited and thereby additional 8,506 hectares of land shall be brought under protective and assured irrigation. With the implementation of plan 21.90 per cent of the arable land will have assured irrigation facilities compared to existing 15.18 per cent.
- A huge chunk of land amounting to 11,651 hectares infested with soil erosion, stream bank erosion, etc shall be treated by adopting soil conservation measures.
- Support land (private grasslands) of 3, 15,690 hectares (2, 81,682 hectare productive support land and 34,008 hectare potential support land) shall be treated against invasive

weeds and shrubs. This shall improve the fodder production to the approximate level of 31,569 metric tonnes.

- Foodgrain production shall increase from 1,08,823 metric tonnes to 1, 32,948 metric tonnes after the implementation of the plan recording a growth rate of 4.43 per cent per annum in scenario I. Even in scenario II when 20 per cent of irrigated land is shifted to high value cash crops production, the growth rate in foodgrain production shall be fairly high at 3.61 per cent per annum
- Production of vegetables would increase from 22,078 metric tonnes to 26,873 metric tonnes in scenario I registering a growth rate of 4.34 per cent per annum when the proportion of area under these crops remains same and to 54,694 metric tonnes recording a growth rate of 29.55 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 49,225 metric tonnes which in monetary terms amounts to Rs 49.22 crores. The disposal of this surplus shall generate huge employment opportunities for rural unemployed youth.
- The growth rates for apple, stone fruits, walnut and all fruits were computed as 9.50, 5.25, 5.70 and 8.49 respectively.
- There is potential to increase the production of all the field crops as the existing yield levels are much below the potential achieved by progressive farmers in different blocks. In this way, the production of maize, paddy and wheat can be increased at the annual rate of about 5 per cent, 22 per cent and 13 per cent, respectively. The production of pulses and oilseeds also has tremendous growth potential keeping in view the existing low yield of crops. There will be more impressive growth in vegetable crops. The production of pea and potato would increase by about 7 per cent and 11 per cent per annum while other vegetable crops would get big boost with the improvement in irrigation and marketing infrastructure
- Chamba district has a great potential for horticulture development. The fruit production in the district may increase from the existing level of 26,343 tonnes to 51,176 tonnes with annual growth of 20.37 per cent. The most impressive growth can be achieved in apple production that may increase at the rate of around 23 per cent per annum from existing 19,811 tonnes to 42,417 tonnes. Similarly, stone fruit and walnut may increase by 13 to 14 per cent annually.
- With the improvement in livestock breeds, fodder availability and rearing practices, there will be increase in livestock production in the district. The milk, meat and wool production would increase at the annual rate of 17.95 per cent, 8.77 per cent and 10.76 per cent, respectively
- The projected fertilizer requirement in the district by 2012-13 would be around 2,412 tonnes of urea, 186 tonnes of IFFCO (12:32:16). In case of increased irrigation and more

diversification, the requirement of Urea would be 2,657 tonnes and that of IFFCO 205 tonnes. However, on the basis of field survey, requirement of IFFCO is much higher (1,597 tones).

- The strengthening of marketing and R&D institutions would anchor the agricultural development process through need based and location specific interventions.
- With the implementation of District Agricultural Plan, there shall be increase in the gross value output of all the primary sectors in the district. The value output of agriculture, horticulture and animal husbandry will grow with annual rate of 10 per cent, 20 per cent and 17 per cent, respectively. The gross value of all the primary sectors will increase from existing level of Rs 34,489 lakh to Rs 60,226 lakh registering the annual growth of about 15 per cent over the plan period.

### **XV 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 vegetables and other niche based enterprises generating adequate 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 focused 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 decentralised planning in the subsequent plans. The importance of preparing panchayat/block/district plan lies in involving the people at the grassroots/stakeholders level and those who are responsible for implementing these plans. The Administrative Reforms Commission in 1967 highlighted that planning needed to be focussed in those areas where local variations in pattern and process of development were likely to yield quick results. The Planning Commission issued guidelines to the state governments for formulating district plans in 1969. These guidelines provided details regarding the concept and methodology for drawing up these plans in a framework of annual, medium and perspective plans. The recommendations of several other Committees, namely, Danatwala (1978), Hanumantha Rao (1984) and GVK Rao 1985 were instrumental in the concretisation of the idea and concept of District Plans.

The preparation of these plans assumed special significance in the aftermath of the 73<sup>rd</sup> and 74<sup>th</sup> 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 priorities 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 be preceded, 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, technology fatigue versus policy fatigue and persistent neglect of agriculture and gradual withdrawal of state from active participation in development activities. It is evident from declining plan outlay, declining public sector capital formation, dwindling credit supply which is manifested in fact that the growth rate of institutional credit to agriculture has declined from about 6.64 per cent during 1981-91 to 2.16 per cent during 1991-99, decrease in the use of critical inputs, increase in the cost of production, faulty price policy in terms of mismatch between minimum support price (MSP) and cost of cultivation and coverage of commodities under MSP scheme. Likewise, neglect of agricultural research and extension, technology fatigue manifested in stagnation/deceleration in growth of yields of important crops like wheat, practically no increase in area under irrigation despite launching Accelerated Irrigation Benefit Programme (AIBP) in 1996-97. Between 1995-96 and 2003-04 both central and state governments have spent nearly Rs. 35,000 crores but the net irrigated area has remained static at around 53-55 million hectares, the poor growth in surface irrigation has obliged farmers to depend heavily on ground water exploitation thereby depleting ground water resources and increasing cost of production and fall in the rate of growth of employment opportunities. While the overall employment growth declined from 1.74 per cent between 1983-84 and 1993-94 to 1.08 per cent between 1993-94 and 2003-04, in agriculture it decreased from 1.41 per cent to 0.63 per cent. The net result has been dwindling income of the farmers culminating in increasing number of farmers' suicides.

The Eleventh Five -Year Plan (2007-2012) has set a target of 4 per cent for agricultural sector and 9 per cent for the economy as a whole. To accomplish this rate of growth, centre has emphasised fast and inclusive growth, especially of agricultural sector, so that the benefits of growth percolates 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 crore 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, incentives them to spend more on agricultural sector and address the agriculture and allied sectors in an integrated manner. The funds under this scheme would be provided to the states as 100 per cent grant by the central government. An outlay of Rs. 1500 crore has been approved for 2007-08. The financial assistance provided to the state governments from this centrally sponsored scheme is subject to fulfilment of certain conditions. First, the expenditure on agriculture by the state governments is higher than the base period, which is defined as the moving average of the expenditure of the preceding three years. Second, the preparation of district and state agricultural plans is mandatory. The areas like integrated development of food crops including coarse cereals, minor millets and pulses, agricultural mechanisations, 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-fertilizers 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 Himachal Pradesh State Department of Agriculture entrusted the task of preparing these plans to the Himachal Pradesh 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, input use, farm machinery, yield and input gaps, issues in livestock management, fisheries, livelihoods of local population, different ongoing irrigation and watershed programmes/schemes, potential for new schemes, post harvest operations, market infrastructure, and so on at the village/panchayats levels. The methodological framework to prepare these plans got evolved in a series of consultations with the officials of the line department like agriculture and horticulture and the scientists working at different KVKs and regional research stations. The details of the methodological framework have been discussed below.

## **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<sup>1</sup>, 2000, pp. 79-98. The present section is, therefore, devoted to explain methodological framework adopted to prepare district agricultural plan.

### 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 were 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 or 15 per cent of the total panchayats from a block was not an integer (5.5 say), in those cases the next higher integer (say 6) was to be taken. There are 7 blocks and 283 panchayats in the district out of which 6 blocks were selected (Pangi block was excluded due to inaccessibility during this survey period) and a sample of 30 panchayats was selected for detailed survey for preparation of agricultural plan for the district. The details of the sample panchayats are provided in Table 1 .1

**Table 1.1 Block-wise Distribution of Sample Panchayats in Chamba District**

<b>Blocks</b>	<b>Number of total Panchayats</b>	<b>No. of selected Panchayats</b>	<b>Name of selected Panchayats</b>
Bharmaur	29	4	Chobia, Durgathi, Khani, Nayagram
Bhatiyat	69	7	Awan, Bathri, Bhagdar, Jandroh, Kudnu, Sinhuta, Thulel
Chamba	39	4	Baraur, Dradla, Jhulara, Udaipur
Mehla	42	5	Bandla, Janghi, Kuned, Mangla, Sunara
Salooni	46	5	Manjeer, Mauda, Panjhahi, Salooni, Snooh
Tissa	42	5	Bhanjraru, Bonderi, Kalhel, Leswin, Thani Kothi
Total District	267	30	

Note: Pangi block was excluded due to inaccessibility



### **1.2.2 Survey Tools**

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

### **1.2.3 Analytical Tools**

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

### **1.2.4 Limitations**

For the preparation of the district agricultural plans strictly according to the guidelines issued by the Planning Commission, the data on different parameters should have been collected at the village level. This, however, could not be done due to time constraint. Currently, while most of the data are being collected and prepared at tehsil level, the developmental schemes are being

implemented at block level whose geographical area seldom coincides with that of tehsil. This led to some problems in generating estimates for the whole block.

#### **Note**

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

## Chapter II

### GENERAL DESCRIPTION OF THE DISTRICT

Chamba is the north-western-most district of Himachal Pradesh. The surviving ancient inscriptions in this small area are so large that in the whole of the Himalayas, Chamba is reckoned to be as important as Kashmir and Nepal for the antiquarian studies.

#### 2.1 Brief History

Chamba is bounded on north-west by Jammu and Kashmir, on the north-east and east by Ladakh area of Jammu and Kashmir State and Lahaul and Bara-Bangal area of Himachal Pradesh, on the south-east and south by District Kangra of Himachal Pradesh and Gurdaspur District of Punjab. Chamba District is situated between north latitude  $32^{\circ} 11' 30''$  and  $33^{\circ} 13' 6''$  and east longitude  $75^{\circ} 49'$  and  $77^{\circ} 3' 30''$ , with an estimated area of 6,528 square Kilometres and is surrounded on all sides by lofty hill ranges. The territory is wholly mountainous with altitude ranging from 2,000 to 21,000 feet. Regarding the early history of this region, it is believed that this area was at time inhabited by certain Kolian tribes, which were later, subjugated by the Khasas. The Khasas too after a time came under the sway of Audmabarar (2<sup>nd</sup> century B.C.). The Audmabarar had republican form of government and worshiped Shiva as their principal deity. From the Gupta period (4th Century A.D.), Chamba region was under the control of Thakurs and Ranas who considered themselves superior to the low tribes of Kolis and Khasas. With the rise of Gurjara Pratihara (7th Century A.D.), the Rajput dynasties came to power.

In circa 500 A.D., a legendary hero called Maru migrated to north-west from Kalpagrama (a mythical place from where majority of the Rajput dynasties claim their descent) and founded Brahmaputra (Bharmaur) in the valley of the Budhal River, seventy five kilometres to the east of present Chamba town. His successors continued to rule over the country from that capital city for over three hundred years until Sahilla Varman shifted his capital from Brahmaputra to the more centrally located plateau in the lower Ravi valley. He named the town after his beloved daughter Champa. His *rani* voluntarily offered herself as a sacrifice to bring water for the town's people through a running channel which takes origin at a place called Bhalota. The layout of the plan of Chamba seems to be in conformity with the ancient texts. From then on, the rajas of Chamba continued to rule from here in an uninterrupted and direct line of descent. Chamba is the only district in northern India to preserve a well-documented history from circa 500 A.D. Its high mountain ranges have given it a sheltered position and helped in preserving its centuries old relics and numerous inscriptions. The temples erected by *rajas* of Chamba more than a thousand years ago continue to be under worship and the land grant-deeds executed on copper plates by them continue to be valid under the law.

The Muslims never invaded Chamba, though it had its occasional fights with the neighbouring states in the hills having similar cultural background. Thus, the damage to Chamba from these invasions was seldom serious and never beyond the possibility of repair. Even the powerful Mughals were kept at bay on account of difficulties involved in communications and long distances. Akbar tried to extend a loose control over the hill states including Chamba and attached fertile tracts of these states to the imperial territory south of Dhauladhar. Aurangzeb once issued orders to the *raja* of Chamba Chatter Singh (1664-1694 AD) to pull down the beautiful temples of Chamba. But instead, the *raja* in clear defiance to the Mughal ruler, placed gilded pinnacles on the temples. He was ordered to come down to Delhi to face the imperial wrath. But Aurangzeb himself had to leave for the Deccan from where he could not disentangle till the end of his life. On the whole, the northern India experienced comparatively peaceful condition during the Mughal regime Raja Prithvi Singh (1641-1664 AD), a handsome and a gallant knight was favourite of Shahjahan and visited the imperial court many times. He introduced the Mughal style of court life including Mughal-Rajput art and architecture in Chamba.

By the last quarter of 18<sup>th</sup> century, the Sikhs forced the hill states to pay tribute to them. Maharaja Ranjit Singh systematically deposed the hill princes including the more powerful Kangra ruler Sansar Chand Katoch but spared Chamba in lieu of the services Wazir Nathu (of Chamba) had rendered him on two occasions. In 1809 A.D., the Wazir had made himself useful to the Maharaja by negotiating his agreement with Raja Sansar Chand Katoch of Kangra. Again in 1817 A.D., he had saved Ranjit Singh's life by offering his horse at a critical moment during former's winter campaign in Kashmir. After Ranjit Singh's death, Chamba became un-protected and was drawn into the vortex of the disintegration of the Sikh Kingdom. The Sikh army invaded the British territory in 1845 A.D. and the troops of Sikh army, which were stationed in Chamba, were withdrawn. When Sikhs were defeated it was decided to merge Chamba in Jammu and Kashmir but on account of the timely intervention of Wazir Bagha (of Chamba), it was taken under the British control and subjected to the annual tribute of 12,000 rupees. The *rajases* who saw something of British hegemony were Sri Singh, Gopal Singh, Sham Singh, Bhuri Singh, Ram Singh and Laxman Singh. Their relations with the British political officers seem to be cordial and Chamba witnessed many reforms.

On 15<sup>th</sup> April 1948 merging three principal states formed Himachal Pradesh viz; Chamba, Mandi-Suket, Sirmour and all the other state falling in Shimla hills. Before Raja Sahilla Varman came on the scene, Chamba region was divided into bits and pieces of territory called Rahnus occupied by numerous *Ranas* and petty Chieftains who carried on relentless warfare with each other. Raja Sahilla Verman subjugated the *Ranas* and unified the territory. Rajas, therefore, for better administration divided Chamba into five zones known as Mandlas. These Mandlas were later renamed as Wizarats. This five fold division of Chamba region continues till today. The Wizarats are now called Tehsils. These are Bharmaur, Chamba, Bhatiyat, Churah and Pangi.

## 2.2 Physiography

The physiographic features of district Chamba have been given in Table 2.1.

**Table 2.1 District Chamba at a Glance (2006-07)**

Sr. No.	Particulars	Units	Number
<b>1</b>	<b>Administrative set up</b>		
	Sub-divisions	Number	6
	Tehsils	Number	7
	Sub-tehsils	Number	3
	Blocks	Number	7
	Towns	Number	4
	Nagarparishads including	Number	2
	Municipal corporations	Number	
	Nagar panchayats	Number	1
	Cantonments	Number	2
	Gram panchayats	Number	283
	Assembly constituency	Number	5
	Inhabited villages	Number	1118
	Uninhabited villages	Number	473
	Total	Number	1591
<b>2</b>	<b>Population and area</b>		
	Geographical area	Sq. Kms.	6528
	Density per sq. km.	Sq. Kms.	71
	Total population	Number	460887
	Male	Number	235218
	Female	Number	225669
	Rural	Number	426345
	Urban	Number	34542
	Sex-ratio	Number	959
	Percentage of state population	%	7.58
	S.C. population	Number	92359
	S.T. population	Number	117569
	Hindus	Number	428134
	Muslims	Number	26801
	Christians	Number	1048
	Sikhs	Number	2497
	Buddhists	Number	2356
	Jains	Number	15
	Other	Number	10
	Not stated	Number	260
<b>3</b>	<b>Employment</b>		
	Applicants on the live register	Number	46033
	Applicants registered as Percentage of total population	%	9.99
	Gazetted officers	Number	477
	Non gazetted officers	Number	13159
	Total	Number	13636
<b>4</b>	<b>Land utilization pattern</b>		
	Total geographical area by village papers	000 Hectare	692.4
	Forests land	000 Hectare	272

	Barren and unculturable Land	000 Hectare	5.5
	Land put to non agricultural uses.	000 Hectare	11.7
	Permanent pastures & other grazing lands	000 Hectare	352.6
	Land under misc. tree/ crops and groves	000 Hectare	0.0
	Culturable waste	000 Hectare	6.2
	Other fallow land	000 Hectare	0.2
	Area sown more than once	000 Hectare	24.3
	Total cropped area	000 Hectare	66.2
	Normal rainfall	mm	1583.7

Source: Districts in Figures 2007 Himachal Pradesh, Department of Economics and Statistics Himachal Pradesh Shimla- 171 009

### 2.3 Soil and Climate

The soil is generally loamy in texture with a little more per centage of clay on the higher altitude as well as on the lower elevations. The soil is well supplied with organic matter. Its extent is low at mid-elevation and minimum at low-lying valleys.

There are three big valleys, i.e.

- (1) Beas valley
- (2) Ravi valley or Chamba valley, and
- (3) Chenab valley or Pangi- Chamba Lahaul valleys.

The valleys on the south -west of the district are fertile. The Ravi valley as a whole is open and presents many delightful contrasts. In the lower area of the valley, vegetation is semi tropical and at the higher elevation, the trees are belonging to *Pinus longifolia*, oak and chestnut and above these are birch and juniper. In this valley, in villages up to an altitude of 2,100 meters, two crops are sown, while in the villages above 2,100 meters only one crop is grown. The area between the Pangi and Zanskar ranges comprises the valley of Chenab, called Chandrabhaga in the higher hills. The whole area appears to be a great boon to nature. The area is sparsely populated. The winter is very severe and communication with the outside world remains cut off from October to March-April. The tract between the Hathidhar and the Dhauladhar ranges falls in the Beas valley and with the addition of a small portion of the lower Ravi valley forms the Bhatiyat tehsil and Shiunta sub-tehsil. It is the most popular and fertile valley of the district. The vegetation found in the valley is bamboo, pipal, mango, fir, barberry and the oak. Two crops are grown in a year.

There are three well defined snowy ranges of Himalayas in Chamba district. The one nearest to the plains is Dhauladhar (outer Himalaya) which separates the basin of the Beas from the Ravi. Dhauladhar represents a lofty mountain barrier with peaks from 4,300 meters to 5,200 meters. The passes are from 2,400 meters to 4,600 meters. The inner Himalaya (Zanskar range) separates Chamba and Lahaul from Zanskar and further west forms the northern boundary of the Kashmir valley. The altitude of this range varies from 5,500 meters to 6,100 meters. The passes are 5,200 meters to 5,500 meters and are more difficult due to the size of the permanent glaciers. The low range of the hills called, the Hathidhar, runs parallel to the south of Dhauladhar. The highest

point of this range is 1,615 meters above the mean sea level. District Chamba has two main rivers, i.e. Chenab or Chandrabhaga and Ravi.

## 2.4 Demographic Features

The demographic features and changes thereof over the last two consecutive censuses in Chamba district reveal that the total population of the district as per 2001 census was about 4.60 lakhs accounting for about 7.6 per cent of the total population of the state. During the decade 1991 to 2001, population increased by about 17 per cent as against 26.40 per cent during the period 1981-1991 (Table 2.2). The decadal growth in population has slowed down in the district.

**Table 2.2 Demographic Features of District Chamba**

Particulars	Population (No.)				Literacy (Per Cent)			
	Persons	% to State	Dec. growth	Density/ Sq km	Sex ratio( F/1000 M)	Male	Female	Total
<b>Chamba</b>								
1991	393286	7.61	26.40	60	932	59.96	28.57	44.7
2001	460499	7.58	17.09	71	961	77.22	49.7	63.73
<b>H. P.</b>								
1991	5170877	100.00	20.79	93	976	75.36	52.13	63.86
2001	6077248	100.00	17.39	109	970	86.02	68.08	77.13

Note: F: Female: M: Male

Source: Census of HP, 1991 & 2001

The density of population in the district was 71 that is lower than the density at the state level (109). However, the density of population showed marked increase in all the districts' thereby showing that population pressure is steadily mounting in hilly regions of the country as well. The sex-ratio was 961 as compared to 970 in the state. Literacy rate in Chamba was found the lowest among all districts. The overall literacy rate was 63 per cent as compared to 77 per cent at the state level. The female literacy rate was just 45 per cent in this district. Therefore, there is a need to bring extensive reforms in the present educational system to make the same more professional and employment-oriented.

## 2.5 Agricultural Scenario

Agriculture is the mainstay of the majority of the population in the district. Generally two crops are taken from the land. Maize is the main crop of the Kharif season and potato and paddy are also sown, where the conditions so permit. Wheat and barley are the major Rabi crops. The period of sowing and harvesting of crops depends on the elevations. Millets and coarse cereals like Ogla, Kangni, Cheeney, Chilai and Bathu constitute important crops of the cold region of Bharmaur and Pangi where maize is not sown during the Kharif. The total cultivated area in the district was 59.3 thousand hectares according to 1991-92 survey. Amongst the vegetables grown during the Kharif season are tomato, peas, potato and cabbage. Mostly these crops are grown to

meet local requirements of the cultivators, Six seed multiplication farms are functioning at Bhanota, Rajpura, Bhagat, Thullet, Ahla and Dharwas. The variations in the climatic conditions in the district present immense possibilities for the development of horticulture.

The district has suitable pockets for the production of hazenut, chilgoza, apricot, walnut, peach, apple, pear, plum and mango. The apple orchards are located mainly in Churah, Bharmaur, Chamba and Pangi tehsil and salooni sub- tehsils where delicious varieties of red, royal and golden etc. are mostly found. Walnut is grown all over the district. Chilgoza is mostly found in Pangi area and certain pockets of Bharmaur tehsil. There are three olive development centers in the district at Lanji, Sarol and Rajnagar. In order to meet the plant requirements of the cultivator, the department is maintaining progeny orchards and nurseries in the district. In order to provide a market for horticultural produce, the horticulture department of the state government has started fruit canning unit in the public sector at Rajpura and other such unit is functioning at Chamba in the cooperative sector.

Before the introduction of the Himachal Pradesh Abolition of Big Landed Estate and Land Reforms Act, 1953, there were three types of holdings in the district: (i) Zamindari, (ii) Pattedari, and (iii) Bhaichara. Now Zamindari has been abolished and tenants are the actual cultivators who have been given tenancy rights.

### **2.5.1 Changes in Land Ownership**

Himachal Pradesh is a land of small peasants but every farmer is a proud owner of landed property and this is one such state of the Indian Union where very few persons are landless due to land reform policies pursued in the past. But with increasing population pressure, there has been continuous increase in the number of holdings in all the districts. The total number of holdings at the state level increased from about 640 thousand (1980-81) to above 800 thousand in 1990-91 showing around 31 per cent increase. Contrary to this, the area operated under different holdings increased marginally by about 3 per cent over the decade. During this period, the number as well as area operated under marginal and small holdings showed marked increase while the number as well as area operated by the medium and large holdings decreased clearly showing the perpetual sub-division and fragmentation of medium and large holdings into marginal and small holdings (Table 2.3).

There was relatively smaller corresponding increase in the area operated under marginal holdings in the district. The number as well as area operated by smallholdings also increased in the district. Contrary to this, the number as well as area operated under medium and large categories declined in Chamba district. As a result of proliferation of marginal and small holdings and decline in the medium and large holdings, the average size of holdings has declined (Table 2.4).



**Table 2.3 District-Wise Pattern of Changes in Land Holdings, 1980-81 to 1995-96 (Per Cent)**

Particulars	Marginal (<1 Ha)		Small (1-2 Ha)		Medium (2-4 Ha)		Large (>4 Ha)		Total (Ha)	
	No.	Area	No.	Area	No.	Area	No.	Area	No.	Area
<b>Chamba</b>										
1980-81	58.45	25.10	27.02	34.32	12.46	30.48	2.08	10.11	51327	55163
1985-86	65.30	31.40	23.67	34.26	9.52	25.88	1.51	8.45	60187	58380
1990-91	68.12	33.28	22.42	34.41	8.21	23.95	1.25	8.36	64728	58653
1995-96	69.36	36.18	21.56	34.06	8.03	23.11	1.05	6.64	64523	56697
2000-01	72.43	38.80	19.97	33.61	6.78	21.52	0.81	6.07	68125	56227
<b>H. P.</b>										
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	978756

Note: Percentages have been worked out on the basis of total number and area (hectares) in district shown in last column of the table

Source: Directorate of Land Records, Shimla

**Table 2.4 Changes in Average Size of Holdings, 1980-81 to 1995-96**

Particulars	Marginal (<1 Ha)	Small (1-2 Ha)	Medium (2-4 Ha)	Large (>4Ha)	Overall (Ha)
<b>Chamba</b>					
1980-81	0.46	1.37	2.63	5.23	1.07
1985-86	0.47	1.40	2.64	5.44	0.97
1990-91	0.44	1.39	2.64	6.04	0.91
1995-96	0.46	1.39	2.53	5.55	0.88
2000-01	0.44	1.39	2.62	6.16	0.82
<b>H. P.</b>					
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
2000-01	0.41	1.40	2.71	6.85	0.96

Note: Medium includes semi-medium holdings also

Source: Directorate of Land Records, Shimla

At the State level, average size of holding which was 1.54 ha (1980-81) got reduced to 1.21 ha (1990-91). Due to lack of effective checks on subdivision of holdings and intense attachment of people to landed property, there is unstoppable proliferation of marginal and smallholdings in the state. The average size of land holding decreased in all the categories of holdings in the district. The non-viable farm also encouraged rural migration and absentee land ownership. Therefore, there is a need to frame an effective land reform policy to check the subdivision of agricultural land below a minimum size limit of say 'half a hectare'; otherwise by 2020, all holdings in the state would turn marginal, small and non-viable farms.

### 2.5.2 Changes in Land Use Pattern

Being hilly district, there is more pressure on land than in plains as most of the geographical area forms snow-clad mountain ranges, passes, river gorges and inhospitable terrains that can be judged from the per cent changes in the land use pattern over the years (Table 2.5).

**Table 2.5 Changes in the Land Utilization Pattern (Per Cent)**

Particulars	Forest land	Barren land	Non-agri. uses	Culturable waste	Pasture	Misc trees/groves	Current fallow	Other fallow	Net sown area
<b>Chamba</b>									
1990-91	39.22	0.69	1.72	0.91	51.05	0.00	0.33	0.05	6.03
1995-96	39.23	0.71	1.76	0.89	50.97	0.00	0.37	0.03	6.05
2000-01	39.28	0.79	1.69	0.86	50.92	0.00	0.26	0.02	6.16
2002-03	39.28	0.79	1.69	0.91	50.92	0.00	0.33	0.04	6.03
2004-05	39.28	0.79	1.69	0.90	50.92	0.00	0.32	0.03	6.05
<b>H P</b>									
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
2002-03	24.20	17.75	7.03	2.69	33.41	1.28	1.33	0.33	11.99
2004-05	24.23	14.78	10.08	2.80	33.02	1.51	1.33	0.31	11.94

Source: Directorate of Land Records, Shimla

It can be visualized that most of the geographical area of the district (around 80 per cent) is under forests and pastures. The cultivated area accounted for about 14 per cent of the reported area and about 11 per cent of the total geographical area. There has been increase in the area under forests in Chamba district due to recent reporting of more geographical area. There is increase in the land put under non-agricultural uses like roads, buildings, water reservoirs, etc, due to burgeoning needs of infrastructure and over-head facilities for economic development in the state. The limited availability of cultivable land is the basic feature of hill geography. The proportion of cultivable area declines drastically from low hills Shivalik range to high mountain alpine range. There has also been decrease in the culturable wasteland that might be due to allotment to landless farmers.

### 2.5.3 Cropping Pattern

The cropping patterns in Chamba district, Himachal Pradesh and the changes over a period of 1990-91 to 2005-06 have been shown in Table 2.6.

**Table 2.6 Changes in Cropping Pattern (Per Cent)**

Particulars	Year	Maize	Rice	Wheat	Barley	Pulses	Food-grains	Cropped area ('000 ha)
<b>Chamba</b>	1990-91	43.50	4.56	29.64	6.27	1.69	92.80	64.98
	1995-96	43.36	4.53	30.47	5.52	4.91	91.66	66.58
	2000-01	39.31	4.15	31.99	6.44	5.65	90.36	62.54
	2002-03	30.42	4.28	29.92	5.21	4.99	90.87	65.61
	2005-06	42.69	4.19	25.64	4.69	4.86	84.30	66.2
<b>H.P.</b>	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
	2002-03	30.80	8.80	38.03	2.50	3.19	85.67	945.21
	2005-06	31.00	8.32	37.59	2.65	2.88	83.66	953.6

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

Source: Annual Seasons and Crop Reports, H.P. (Various issues)

At state level, maize and wheat are the two predominant crops accounting for 29 per cent and 36 per cent of the cropped area. The area under maize and wheat increased over the years in the Chamba district. The area under paddy decreased in the Chamba district due to allocation of more irrigated area to vegetable crops. The area under barley also has declined considerably, showing the marginalization of these crops in hill farming

#### 2.5.4 Foodgrain Production Scenario

The scenario of crop production in Chamba district revealed that like area, the production of maize and wheat recorded ups and down (Table 2.7). The production of barley and pulses declined considerably in the district showing that these crops were fast losing relevance in hill farming though these crops were important from point of view of consumption and demand which presently is met mostly through imports from other states. The yields of maize and paddy increased but showed unpredictable and uncertain changes over the years in the district. Contrary to this, the yields of barley and pulses did not reveal any major breakthrough. The combined yield of all food grains showed marked increase during these two triennium periods.

**Table 2.7 Changes in Yields of Major Food grain Crops, 1975-78 to 1995-98 (Q/ha)**

Particulars	Maize	Rice	Wheat	Barley	Pulses	Foodgrains
<b>Chamba</b>						
1990-91	27.92	13.41	14.72	13.13	2.73	19.59
1995-96	30.03	15.37	19.04	10.33	3.97	22.21
2000-01	25.11	14.66	7.04	8.47	2.65	14.92
2002-03	28.19	17.80	11.67	9.53	2.78	14.86
2005-06	12.28	16.54	9.31	7.64	2.22	10.45
<b>H.P.</b>						
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
2002-03	16.60	10.33	13.79	12.97	6.37	13.83
2005-06	18.39	14.13	10.21	11.63	7.13	13.53

Source: Annual Seasons and Crop Reports, H.P. (Various issues)

**Table 2.8 Compound Growth Rates in Major Crops, 1990-91 to 2002-03 (Per Cent/Annum)**

Crops	Chamba			H. P		
	A	P	Y	A	P	Y
Maize	-0.68	-1.17	-0.49	-0.55	0.62	1.18
	(0.89)	(1.02)	(0.70)	(0.09)	(0.84)	(0.81)
Rice	-1.81	0.55	2.36	-0.23	1.39	1.62
	(1.79)	(1.77)	(0.81)	(0.21)	(0.97)	(1.02)
Wheat	0.50	-1.26	-1.76	-0.40	-0.86	-0.46
	(0.73)	(1.99)	(1.85)	(0.13)	(1.99)	(1.96)
Pulses	3.37	6.80	3.44	-2.70	7.06	9.76
	(2.28)	(3.02)	(2.12)	(0.40)	(1.56)	(1.41)
Food grains	0.23	-0.99	-1.22	-0.62	-0.33	0.29
	(0.40)	(1.05)	(0.89)	(0.11)	(0.74)	(0.76)

Note: i. Figures in Parentheses indicate the standard errors

ii. A=Area, P=Production, Y=Yield

At the state level, the area under maize and wheat decreased marginally. The area under paddy, barley and pulses declined over the year. At the state level, the area under pulses declined at the rate of 2.70 per cent per annum during the period 1990-91 to 2002-03. On overall account, the area under all food grain crops has almost stabilized in all the state as there is little scope to increase the cropped acreage. The technical progress in crop production can be judged from the growth realized in yields of different crops.

At the state level, the maximum growth of around 1.41 per cent was recorded in case of pulses. On the other hand, the growth in pulse production was quite impressive in Chamba where yield also increased significantly over the period under study. The production of barley and pulses declined mainly because of decline in area under these crops. Thus, it was observed that the production of different crops has not followed the sustained growth over the period. There was also shift in area from paddy, barley and pulses towards other crops. The overall growth in food grain production at the state level was around -0.33 per cent. Further, there was limited scope to bring additional area under food grain crops; hence, in future the emphasis needs to be given to increase the productivity of crops.

### 2.5.5 Trends in Vegetable Production

During the last one decade (1990 onwards) Himachal Pradesh has made discernible progress in the production of vegetable crops. The area and production of vegetables in the Chamba district has increased steadily as shown in Table 2.9. The cropping pattern in the district especially in mid-hills has changed with the cultivation of off-season vegetable crops. The production of vegetables in the Himachal Pradesh has increased from 64 thousand tones in 1970-71 to a record level of 520 thousand tonnes during 2000-2001. The major breakthrough came after 1985 when the vegetable production witnessed tremendous increase. This increase was attributed to area expansion as a result of major emphasis accorded to implementation of minor irrigation schemes

in different parts of the state during Seventh Plan (1985-86 to 1990-91). Further, the introduction and adoption of new hybrids of vegetable crops by the farmers fuelled high growth in vegetable production particularly in mid-hill regions of the state. During the period 1990-91 to 2000-2001, the production of vegetable crops increased significantly by 4.33 per cent per annum mainly on account of increase in the area (3.09 per cent) and partly on account of increase in the productivity (1.20 per cent).

The yields of some vegetable crops were found appreciably high due to favourable climatic conditions, irrigated farming, better use of inputs/management practices and above all the use of hybrid seeds in most of the vegetable crops. Peas and tomato were the major vegetable crops collectively accounting for about 52 per cent of the total area and 45 per cent of the total vegetable production in the Chamba district. The yield of tomato was found to be 251.22 q/ha obviously due to introduction of promising hybrids in the state. The cucurbits yield was found to be 224.85 q/ha. However, the yield of Bhindi was observed to be 90 q/ha.

**Table 2.9 Area, Production and Yield of Major Vegetables, 2005-06**

Crops	Area		Production		Yield (Q/ha)
	Hectares	% to total vegetables	Metric tonnes	% to total vegetables	
Peas (green)	870	45.31	6960	31.27	80.00
Tomato	123	6.41	3090	13.88	251.22
Beans	447	23.28	4917	22.09	110.00
Onion & garlic	62	3.23	725	3.26	116.94
Cabbage	64	3.33	1400	6.29	218.75
Cauliflower	17	0.89	255	1.15	150.00
Radish,turnip&carrot	50	2.60	900	4.04	180.00
Bhindi	62	3.23	558	2.51	90.00
Cucurbits	33	1.72	742	3.33	224.85
Capsicum & chillies	24	1.25	278	1.25	115.83
Brinjal	37	1.93	670	3.01	181.08
Other vegetables	131	6.82	1763	7.92	134.58
Total	1920	100.00	22258	100.00	115.93

Source: Department of Agriculture, H.P.

### 2.5.6 Fruit Production

The commercial production fruit in the state started much earlier than vegetables. Himachal Pradesh has made tremendous progress in fruit production and has become well known for the production of apple in the country. The total area under fruit crops in Chamba district was 13,911 ha (Table 2.10).

Apple holds the commanding position both in terms of area and production in Chamba district of Himachal Pradesh. It accounts for 71 per cent of area under fruit and about 76 per cent of total production of fruit. It can be seen that Chamba district accounted for appreciable share in the area under fruit in the state but due to low productivity of citrus and other sub-tropical fruit each of these two districts contributed only 4 to 5 per cent of the production. There is ample potential

to increase the production of fruit in the district provided proper production and marketing strategies are adopted for all types of fruit beside apple. At the state level, the area under fruit registered a significant growth rate of 4.15 per cent over the period 1980-81 to 2000-2001. This shows that despite consistent increase in area under fruits, the production has not followed sustained path of growth.

**Table 2.10 Area and Production of Fruit, 2006-07**

Fruits	Area (Ha)	% to total	Production (tonnes)	% to total
Apple	9853	70.83	3533	76.46
Other temperate fruit	1310	9.42	547	11.84
Sub tropical fruit	545	3.92	227	4.91
Nuts and dry fruit	1590	11.43	284	6.15
Citrus	613	4.41	30	0.65
Total	13911	100.00	4621	100.00

Source: District in Figures, 2007, Department of Economics and Statistics, Himachal Pradesh

### 2.5.7 Livestock Production

Livestock production is an integral part of farming in all parts of Himachal Pradesh. There is also complementary relationship between cropping system and livestock production system. The changes in livestock population between 1977, 1992 and 2003 census have been presented in Table 2.11. The total population of livestock at the state level increased by nearly 7 per cent from 4.8 million in 1977 to 5.1 million in 1992 census. The increase was higher in buffalo population (25 per cent) than cattle (2.15 per cent). Moreover, goat population increased by about 8 per cent while there was marginal increase (2 per cent) in sheep population. The density of livestock population was less than 1 per hectare of total geographical area but the density of population on operational holdings came out to be around 5 animals per hectare.

The livestock population scenario in Chamba district revealed increase in cattle population in 2003 census over 1977 census. On the other hand, there was remarkable increase in buffalo population in the district. The sheep population also revealed an increase. Goat population has also increased from 1.6 to 1.8 lakh. The livestock density was quite high in Chamba which was 1.09 due to dominance of sheep and goat population in the district. It is interesting to note that poultry population has increased appreciably in the district from 1977-1992.

Table 2.12 further shows the relative performance of milch animals in Chamba district of Himachal Pradesh. Chamba district was found to be the predominant district accounting for higher proportion of sheep and goat in the state. As per 2003 census, the cattle contributed about 36 per cent of total livestock. The share of buffalo was only 5.15 per cent, whereas, sheep and goat accounted for about 35 and 23 per cent of total livestock respectively.

**Table 2.11 Changes in Livestock Population in 1977 to 2003 (No.)**

Particulars	Cattle	Buffaloes	Sheep	Goats	Total livestock	Poultry	Livestock density (No./ha)	
							Geog. area	Opp. Holding
<b>Chamba</b>								
1977	235810	31449	273880	166316	709523	41660	1.09	13.48
1992	238988	34832	258490	175268	723024	67871	1.11	12.35
2003	290852	41432	281368	184830	804942	48166	1.16	14.20
<b>H. P.</b>								
1977	2106229	560006	1055005	1035337	4795226	329561	0.86	4.75
1992	2151616	700923	1074345	1115591	5116933	664039	0.92	5.04
2003	2196538	773229	906027	1115587	5046044	764136	1.11	5.04

Source: Livestock censuses 1977, 1992 and 2003

**Table 2.12 Composition of Livestock Population: 1977 to 2003 Census Years (Per Cent)**

Particulars	Cattle	Buffaloes	Sheep	Goats
1977	33.24	4.43	38.60	23.44
1992	33.05	4.82	35.75	24.24
2003	36.13	5.15	34.96	22.96
<b>H. P.</b>				
1977	43.92	11.68	22.00	21.59
1992	42.05	13.70	21.00	21.80
2003	43.53	15.32	17.96	22.11

## 2.6 Technological Progress

Technology has played a major role in the development of agriculture in the country. Irrigation development, extent of use of HYV seeds, fertilizers, pesticides and extent of mechanization, etc., are the major ingredients of technology. The progress on these aspects has been examined in this section.

### 2.6.1 Irrigation

The irrigated area and the changes during the periods viz 1990-91 and 2002-03 have been depicted in Table 2.13. The irrigated area at the state level was found about 19 per cent of net sown area during 2002-03. The maximum increase in irrigated was visible in maize (49 per cent) followed by wheat (23 per cent). The maximum increase in net irrigated area was observed in Chamba. There was differential pattern of increase in the irrigated area under major crops in the district. The irrigated area under maize and wheat increased in the district. On the other hand, the irrigated area under paddy showed a slight increase.

**Table 2.13 Irrigated Area under Major Crops (Per Cent)**

Particulars	Maize	Paddy	Wheat	Per cent irrigated area to net sown area
<b>Chamba</b>				
1990-91	2.47	73.87	13.17	-
1995-96	3.19	72.71	14.06	14.71
2000-01	4.56	89.28	13.62	15.45
2002-03	8.79	78.89	14.03	15.60
<b>H.P.</b>				
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: Statistical Outline of Himachal Pradesh (Various issues)

The proportion of irrigated area to area under crop was quite high in case of paddy. At the state level, about 60 per cent of the area under paddy was irrigated as against about 20 per cent under wheat and only 9 per cent under maize. Further, it can be seen that maize is generally grown under unirrigated conditions in all the districts of Himachal Pradesh, still the yield was found higher than paddy and wheat due to conducive climate and better monsoon rainfall distribution. On the other hand, the productivity of wheat was low due to the scanty rainfall during the growing season as well as due to very less irrigated area under wheat crop in the district.

### 2.6.2 Area under High Yielding Varieties

There has been appreciable adoption of high yielding varieties of crops. At the state level, the area under HYVs of maize, paddy and wheat increased considerably from 1980-81 onwards. During 1999-2000, the area under HYVs of maize, paddy and wheat was about 62 per cent, 42 per cent and 61 per cent, respectively (Table 2.14). In Chamba district too, the area under HYVs of maize has also increased. Surprisingly, the area under HYVs of paddy and wheat was also found increasing.

It needs to be mentioned here that the farmers, no doubt, are mostly using HYV seeds of maize, paddy and wheat but there has not been any remarkable improvement in the production and productivity of crops as explained earlier. The reasons are not far to seek. The main reasons are the lack of assured irrigation, use of hybrid/improved seeds of varieties not tested or recommended by the University, low use of inputs, disease/pest attacks, and low use of recommended cultural practices. Keeping this in view, there is a need to design appropriate strategy with respect to testing, recommendation and seed quarantine in the state so that farmers could be saved from the high risks emanating from spurious farm technology



**Table 2.14 Area under High Yielding Varieties of Major Crops (Per Cent)**

Particulars	Year	Maize	Paddy	Wheat
<b>Chamba</b>	1980-81	16.58	NA	12.99
	1999-2000	18.71	51.48	25.98
<b>H P</b>	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;

### 2.6.3 Fertilizer Consumption

After irrigation, fertilizer is the major ingredient of technological advancement in crop production. The fertilizer consumption has recorded remarkable increase in the district as well as state (Table 2.15).

**Table 2.15 Fertilizer Consumption**

Particulars	Year	NPK (Metric tonnes)			NPK (Kg/ha)		
		Kharif	Rabi	Total	Kharif	Rabi	Overall
<b>Chamba</b>	1980-81	195	123	318	5.19	4.63	4.96
	1991-92	601	220	821	19.06	8.81	14.53
	1998-99	717	255	972	18.44	9.29	14.65
	2005-06	794	375	1169	20.14	14.31	17.82
<b>H. P.</b>	1980-81	8155	5795	13950	15.93	13.33	14.74
	1991-92	15599	15006	30605	29.12	34.36	31.47
	1998-99	15318	19534	34852	28.88	42.85	35.33
	2005-06	19197	28776	47973	37.28	66.69	50.78

Source: Statistical Outline of Himachal Pradesh (Various issues)

At the state level, the NPK consumption increased from 15 kg/ha in 1980-81 to 35 kg/ha during 1998-99 and 51 kg/ha in 2005-06. There was more increase in the NPK consumption during Rabi season (43 kg/ha) than NPK consumption during Kharif season (29 kg/ha). Contrary to this NPK consumption was found quite low in Chamba (15 kg/ha). Thus, Chamba district can be considered for development of organic agriculture. The major quantity of nutrient applied was in the form of nitrogenous fertilizers rather than balanced use of NPK nutrients.

### 2.6.4 Extent of Mechanization

Farm mechanization has remained the major constraint in hill farming. There has been differential pattern of mechanization depending upon the topography and level of development in Chamba district and in Himachal Pradesh (Table 2.16).

**Table 2.16 Extent of Use of Implements and Machinery, 2003**

Tools/ Machinery	Chamba		Himachal Pradesh	
	Total No.	Per 1,000 ha of cropped area	Total No.	Per 1,000 ha of cropped area
Manually operated	171779	2594.85	2874660	3014.53
Animal operated	132441	2000.62	1141479	1197.02
Power operated	2460	37.16	120531	126.40

Source: 17<sup>th</sup> Livestock Census, 2003, Directorate of Animal Husbandry, Himachal Pradesh

**Table 2.17 Extent of Farm Mechanization**

Particulars	Tractor per 000' ha of cropped area	Wheat thresher per 000'ha of wheat	Sheller per 000' ha of maize	Paddy thresher per 000' ha of paddy	No of power operated farm tools per 000' ha of cropped area
<b>Chamba</b>					
1992	0.04	16.07	1.95	18.46	0.04
2003	0.51	28.50	17.77	26.79	37.16
<b>H. P.</b>					
1992	2.63	33.72	11.39	23.50	11.67
2003	3.98	53.86	29.09	15.25	126.40

Source: Agricultural Census, 1992 and 2003, Directorate of Land Records, Government of Himachal Pradesh, Shimla.

The number of tractors per thousand hectares of cropped area at the state level was only 2.63. The tractorization was almost negligible in district Chamba having undulating topography. The number of threshers/shellers at the state level was estimated at about 34 per thousand hectare of wheat area, 24 per thousand ha of the area under paddy and 11 shellers per thousand hectare of area under maize. The wheat threshers have become common and are now popular in all the districts of the state. However, the use of paddy thresher and maize sheller was not so common in district Chamba of the state.

The number of power operated cultivating implements like cultivator, disc harrow, potato planter/digger, seed drills, seed/ fertilizer drills, etc., have gained less popularity among the farmers as yet and their use also varied considerably and in accordance with the extent of mechanization and plain topography. At the state level, there were only 12 (number) implements per thousand hectare of cropped area. In Chamba district, the use of mechanized implements was either very low or non-existent.

This clearly showed low level of mechanization in agriculture in Chamba district. Most of the farm operations are still carried out manually especially by the rural women folk. The machinery and implements developed for the plain region are not suitable under hill farming conditions. Therefore, there is a dire need to give due attention to develop low cost small machinery and implements suitable under hill farming conditions.

## **2.7 Potential and Constraints**

Given the differential growth performance of different components of agricultural sector, there is a dire need to study the micro level dimensions of these components. It has been found that the transformation of agriculture has been disproportionate in Chamba district when compared to different districts of the state.

Keeping these limitations and prospects in view, the State Agricultural & Horticultural Universities and State Directorates of Agriculture, Horticulture and Animal Husbandry should formulate more coordinated action plans for overall growth and development of agricultural sector in the district as well as in the state. District Chamba on agriculture front requires productivity improvements, diversification of area, area expansion in high yielding varieties, increasing cropping intensity, improvement in seed replacement ratio, use of integrated pest management, integrated nutrient management, water use efficiency through micro-irrigation schemes, popularizing organic farming, use of farm mechanization, improvement in horticultural productivity, soil and water management which includes construction of farm ponds.

## **2.8 Sum up**

To sum up, it can be concluded that there have been lot of changes in the agricultural sector in Himachal Pradesh and Chamba district. The size of holdings has decreased while there has been proliferation of marginal and small holdings. There has been no major change in the land use statistics as the net sown area has increased marginally over the years. However, there has been differential growth pattern in different components of agriculture. The increase in productivity of wheat was recorded in the district while the yield of maize and paddy showed slow growth. The area under crops like paddy, barley and pulses recorded decrease over the years. However, there has been impressive growth in the production of vegetables, fruit and livestock products. This clearly shows that technological progress varied considerably among various components of agriculture. The discernible variations in the growth performance in the district also points towards spatial biases in the development of agriculture.



## Chapter III

### SWOT ANALYSIS OF THE DISTRICT

#### 3.1 SWOT Analysis for Improving Agricultural and Allied Sectors

The whole area of Chamba district is a great boon of nature. There are three well defined snowy ranges of the Himalayas in Chamba district. Chenab or Chandrabhaga and Ravi are the two main rivers of the district. The soil is well supplied with organic matter. Its extent is low at mid-elevation and minimum in low lying valleys. Given the physical, institutional and human resources of the district, a detailed analysis of strengths, weaknesses, opportunities and threats (SWOT) based on block level as well as panchayats level data for improving agricultural and allied sectors has been given in the present chapter.

##### 3.1.1 Strengths

- Since the altitude of the district varies from 2,000 feet (610 meters) to about 21,000 feet (6,400 meters) above the mean sea level with rainfall of 1,584 mm in 2006, it is endowed with a myriad of agro-climatic conditions conducive to grow several high value cash crops including fruit, vegetables, spices, medicinal plants, high quality pulses, etc which cannot be grown in many other districts of the state.
- The suitable agro-climatic conditions are conducive to grow high quality apple, walnut, almonds, *chilgoza*, raisin, apricot and also millets and coarse cereals.
- The district is having suitable climate for growing off-season wheat and barley for generation advancement which facilitates the breeders to shorten the time for variety development.
- The district has well drained fertile soils suitable for the cultivation of high value cash crops.
- The availability of essential infrastructural facilities like roads and ropeways including agricultural and horticultural R & D institutions
- The low fertiliser uses in the district provides a huge potential to practise organic farming.
- The market oriented farming communities are very enthusiastic and hard working to grow newer and more risky high value cash crops.
- The availability of huge pasturelands, wide spread reasonable network of veterinary health services, disease resistance of non-descript cattle and other livestock, rich biodiversity both in domestic and wild animals is yet another inherent strength of the

district to develop integrated crop livestock production systems particularly of sheep and goat based farming.

- The district has suitable conditions and water for two fish families *Salmo-fario* (Brown trout) and *Oreinius simuatus* which are found in cold waters of Chamba district.
- The Bharmaur, Holi and Chamba valleys are the most beautiful and romantic places suitable to be developed for agro-tourism

### 3.1.2 Weaknesses

- Rainfall is moderate to scanty. Most parts of the tribal areas of Bharmaur and Pangi remain buried under snow from three to six months. Hence, there is a mono-cropping season.
- The space of arable land is small and the cultivation is common on narrow strips along the browse of the mountains. The crops for the most part are poor and a great want of grain pervades.
- The soils are shallow, silt, loam deficient in N and low in fertility. Low temperature shortens the cropping season and thus affects field crop maturity. A long and typical winter season is responsible for low production
- Because of fragility, these areas are exposed to land slides and acute problems of soil erosion. Some man-made factors like unbridled exploitation of forest wealth, excessive grazing, unplanned developmental activities, unscientific cultivation practices etc have exacerbated the problem of soil erosion in the district.
- The switch over to the cultivation of high value cash crops is fast eroding the rich agro-biodiversity. Buck wheat and *amaranths* which are not only nutritious but highly durable crops should be encouraged and agro-processed.
- Lack of marketing infrastructure like adequate and efficient transport facilities stand in the way of diffusion of latest technology as well as efficient marketing of high-value cash crops, particularly high value-high volume-highly perishable crops at the time of road blockades which occur due to landslides.
- Weak extension and back-up support system as a result of which farmers are handicapped in adopting improved technologies.
- The huge livestock population coupled with unscientific rearing practices are posing a serious threat to the sustainability of integrated crop livestock production systems in the district.
- The severe climatic and geographical conditions and poor infrastructural facilities of the area pose major handicaps for the industrialization of the district.

- Lack of highly nutritive and high regenerating varieties of fodders

### 3.1.3 Opportunities

- Recent changes at national and international levels have thrown up tremendous opportunities for the cultivation and export of non-conventional high value cash crops like off season vegetables, vegetable seeds, fruit and medicinal and aromatic plants etc.
- There is a huge potential of snow water conservation/harvesting on a watershed management basis, which in the ultimate analysis, will increase the productivity of different crops tremendously and may enhance the cultivable area.
- There is a wide scope for the adoption of seed village programme through incentives particularly for the *rajmash* cash crop.
- There is also very good scope of starting agro processing units (fruit processing and canning units) for value addition in various horticultural produces like apricot, apple, almond, and barley cereal crop and also in animal products.
- Given the huge pastureland, the district has an opportunity for developing commercial dairy.
- Opportunities to practise herbal aromatic and medicinal cultivation.
- The location of the district provides opportunities for trade with Jammu and Kashmir.
- The increasing income of the people, changing consumption pattern in favour of fruit and vegetables, ongoing process of globalisation provide opportunities for the farmers to grow high value agricultural crops to earn better income.

### 3.1.4 Threats

- The huge animal population with low productivity directly competes for the limited land resources and also contributes in more than one way towards land degradation.
- Because of both natural and man made factors, the threat of soil erosion looms large which not only degrades the land but also endangers hydro-power generation due to high sedimentation rate of the reservoirs.
- Excessive and unbalanced use of chemicals and insecticides, particularly in high value cash crops like off-season vegetables and fruit has taken a heavy toll of rich bio-diversity.
- Very frequent breakdown of resistance in crop varieties by different pathogens and very high incidence of several new diseases like rotting/anthracnose mosaic root rot of rajmash and mash; leaf minor and white grub, powdery/downey mildew of peas and canker and collar rot in apples pose great danger to yield stability of new improved varieties.

- The emergence and fast spreading of weeds like *Ageratum houstonianum*, *Artemisia* sp., *Equisetum typhoides*, *Rumex acetocella*, *Urtica dioica*, *Gallinsoga parviflora*, *Echinochloa colona*, *Digitaria sanguinalis*, *Malva neglecta*, , *Malva neglecta*, *Chenopodium album*, *Artemisia* sp, *Convolvulus arvensis*, *Stellaria media*, *Ranunculus arvensis*, etc pose a serious threat to the cultivated land, pastures, grasslands and forestlands of the district.
- Lack of basic infrastructural facilities like transportation and frequent breakdown due to landslides, floods and cloud bursts hampers the quick and efficient marketing of high-value cash crops.
- Symptoms of climate change/global warming observed in terms of early snow melting, elimination of flora and fauna and receding size of glaciers may enhance the frequency and severity of diseases and pests attack particularly to the highly remunerative crops at one hand and water management issues on the other ultimately affecting the sustainability of agricultural production system.

### 3.2 Issues Emerging out of SWOT Analysis

- The need to strengthen extension facilities to support the farmers in their efforts to switch over to the cultivation of numerous high value cash crops that can be grown in the district.
- Development of disease free varieties of *rajmash* having high yield and suitability for intercropping.
- Development of improved varieties of fodders, for example, of tall *Fescu* grass and legumes viz., clovers and cultivated oats as annual fodder crop.
- Breeding for superior hulled and hullless varieties of barley for different agro-climatic zones of the district having resistance to yellow rust and barley blight.
- Development of wheat varieties having higher levels of rust resistance, amber grains, high re-generability and suitable maturity through introgression of important genes from the spring wheat following conventional and double haploidy breeding approaches.

### 3.3 Sectoral Growth Drivers.

The availability of suitable agro-climatic conditions to grow high value cash crops (fruit, vegetables, rajmash, mash and *millets*), rising demand for these crops coupled with huge market for them in the neighbouring states including Azadpur market, New Delhi are the most important growth drivers of the crop sector particularly the cultivation of high value cash crops. Likewise, emerging huge local demand for dairy products, especially milk, in the district because of lot of hydro electric projects work, is a very important potential growth driver of animal husbandry



sector. The availability of basic infrastructural facilities like assured irrigation, rural roads, ropeways, the Control Atmosphere Storage (CAS), extension facilities etc; are the important growth drivers for different sectors. The development and diffusion of new agricultural technologies to increase yield levels, eradication of weeds to improve the productivity of support and pasture lands and the reduction of the cost of cultivation is a *sine qua non* for realising the rich potential available in the district.

The district has suitable pockets for the production of hazelnut, chilgoza, apricot, walnut, peach, apple, pear, plum and mango. The production and marketing of these crops have potential to increase income and employment of the inhabitants. Walnut is grown all over the district. In order to meet the plant requirement of the cultivators, the nursery production and distribution has further to be strengthened.

The *Gujjar* tribe of Chamba district commonly known as *Bun Gujjars* are semi nomadic and rear buffalos. The improvement of the existing breeds will go a long way in ameliorating their standard of living by increased income. The same scope exists for the *Gaddi* tribe by bringing improvement in the existing breeds of sheep and goat.

The maize crop of Chamba district is known for its delicious taste and rich in nutritional elements. It is liked by most of the people of the other districts and state. Therefore, it has wider scope for marketing in and out side the state.



## Chapter IV

### DEVELOPMENT OF AGRICULTURE SECTOR

Development of agricultural sector of any region is circumscribed by a host of factors including physical, institutional, socio-economic including quality of human resource. An in-depth enquiry into all these aspects is of paramount importance to plan the strategies for development of agriculture. In this section, pertinent aspects that need thorough understanding for developing agricultural plans are described:

#### 4.1 Land Use Pattern and Soil Health

There is lot of variation in land physiographic and agro climatic conditions in Chamba district. The district harbours low hills subtropical regions of Bhatiyat block, mid hills sub humid areas of Chamba (Sadar), high hills temperate regions of Salooni, Mehla and Tissa and high land tribal areas of Bharmaur and Pangi. Consequently, land use pattern varies widely from one region to another. Land use pattern shown in Table 4.1 clearly reveals this diversity in the district. Out of the total geographical area of 5,06,899 hectares (excluding Pangi block), the cultivated area is only 38,837 hectares accounting for about 8 per cent) of the geographical area of the district. The availability of cultivable land decreases drastically from low to high hills. In the blocks like Bharmaur, Tissa and Salooni, the availability of arable land is limited due to undulating topography and hilly terrains but more area can be developed and brought under plough. The major proportion of the area falls under permanent pastures and forest lands. However, there are 2,085 hectares of culturable waste and 5,523 hectares of fallow land that can be developed and brought under cultivation which would increase the existing cultivated area by about 20 per cent.

There are number of problems in different categories of land as depicted through Table 4.2. The major problems are undulating topography leading to more soil erosion and land slides, lack of sufficient tree cover in barren lands, infestation of pasture with obnoxious weeds, uncontrolled grazing, lack of improved grasses and fodder trees. The major problem encountered in management of culturable, fallow as well as cultivated lands is lack of irrigation impeding their productive use. This may require substantial investment on reclamation, fencing/bunding and development of irrigation. The vast forest and pasture lands require conservation and can be developed into rich repository of timber trees, walnuts, wild apricot, temperate grasses and high value medicinal herbs. It needs to be mentioned here that the district harbours rich repository of medicinal herbs and vast summer green pastures sustaining large number of shepherds (*Gaddi* tribe) and migratory *Gujjars*.

Soils are vital natural resources on whose proper use depend the life-supporting system and socio-economic development of any country. As per the recent soil survey by NBSS & LUP (1997), more than 75 per cent of the geographical area of the State is suffering from one or other

soil degradation problem. The major degradation problems observed 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 agrotechnology 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 Agricultural Development plans.

The soils of Greater Himalayas (high reaches of Chamba district particularly Pangi tehsil) belong to Alpine Humus Mountain Skeletal Soils while those of Lesser Himalayas and Shiwalik regions come under Brown Forest and Humus and Iron Podzolic Soils.

Majority of forest soils (Brown Forest Soils) are characterized by the presence of mollic and argillic horizons. The soils are sandy loam to clay in texture and slightly acidic to neutral in reaction. The soils belong to Hapludalfs, Hapludolls and Eutrochrepts. Some forest soils also belong to Humus and Iron Podzols. Humus and Iron Podzols are predominantly formed under the process of podzolisation. Dark coloured A-horizon is enriched with organic matter and reddish brown to yellowish brown B-horizon contains free Fe and Al accompanied by organic matter. Typical ashy grey albic horizon (E horizon) is rather uncommon in such podzols. Profiles are marked by distinct spodic horizon underlying mollic or umbric epipedon. Soils are acidic in reaction and contain high amounts of organic matter. Sandy loam to sandy clay loam or clay loam textures is common. As per Soil Taxonomy, these soils qualify for Haplorthods, Argiudolls and Hapludolls.

The soils of Chamba district are medium to high in available nitrogen whereas available phosphorus and potassium status is low to medium. The organic carbon status is medium to high. The soils are prone to water as well as wind erosion particularly in Bharmaur and Pangi areas of the district.

**Table 4.1 Land Utilization Pattern in Different Blocks of Chamba District (Ha)**

<b>Particulars</b>	<b>Bharmaur</b>	<b>Bhatiyat</b>	<b>Chamba</b>	<b>Mehla</b>	<b>Salooni</b>	<b>Tissa</b>	<b>District</b>
<b>Total geographical area</b>	1717399	59587	32623	94324	49815	98811	506899
<b>Forests</b>							
Productive	18170	13008	3962	52853	5006	11330	104329
Degraded	7787	5575	2642	5873	0	5332	27208
<b>Barren and uncultivable land</b>							
Rocky	588	148	95	574	430	816	2651
Stony			95	0	0	0	95
Sloppy	0	591	95	0	0	0	686
<b>Land put to non-agricultural uses</b>							
Buildings	274		806	1915	1776	1293	6064
Roads/paths/channels	640		805	0	0	1078	2523
<b>Culturable waste</b>							
Weed/bush infested	425	40	65	219	57	200	1006
Area prone to animal menace	150	60	131	0	0	738	1079
<b>Permanent pasture and other grazing lands</b>							
Productive	136000	6055	8427	25063	34212	71925	281682
Degraded	1362	24219	8427	0	0	0	34008
<b>Land under miscellaneous tree crops and groves</b>	1180	11	0	1	6	10	1208
<b>Fallow land</b>							
Current fallow	299	668	178	620	2190	138	4093
Other fallow	761	152	21	231	136	129	1430
<b>Cultivated land</b>	4103	9060	6874	6976	6002	5822	38837

Source: Field Survey, 2007-08

**Table 4.2 Land Utilisation Pattern- Problems (Per Cent of Panchayats)**

Particulars	Problems	Chamba	Mehla	Bhatiyat	Salooni	Tissa	Bharmaur
<b>Forest</b>							
Productive	Unwanted grasses	75	80	85	80	80	75
Degraded	Fragile topography	75	60	70	100	80	75
	No tree cover	50	80	85	60	60	50
	Bushes	50	100	70	80	80	100
	Unwanted grasses	75	60	57	60	60	50
	Undulating	50	60	57	80	80	50
<b>Barren and uncultivated land</b>							
Rocky	Undulating	75	60	57	40	60	75
	Lack pf irrigation	75	80	70	80	80	75
	Degrading	50	80	85	80	80	75
	River bed erosion	25	40	28	40	40	50
<b>Land put to non- agri uses</b>	Diversion of productive land	100	80	85	80	80	100
<b>Culturable waste</b>							
Weed/bush infested	Weeds	50	40	57	60	60	50
		25	60	57	60	80	75
Area difficult to manage	Water logging	25	40	28	40	40	50
	Stony land	25	40	42	60	60	50
	Lack of irrigation	50	60	70	80	60	75
	Sloppy	50	60	70	80	60	75
<b>Permanent pasture and other grazing lands</b>							
Productive	Low production	75	60	85	60	80	75
	Low nutritive grasses	100	80	70	60	80	75
	Unwanted grasses	100	80	57	40	80	50
Degraded	Bushes/weeds infested	75	100	85	60	80	100
	Soil erosion	75	80	70	80	80	75
	Low nutritive grasses	100	100	70	80	60	75
	Distance from village	75	80	85	40	80	100
<b>Land under miscellaneous tree crops and groves</b>	Lack of tree cover	75	60	57	80	80	75
<b>Fallow land</b>	Undulating land	75	60	70	60	60	75
	Low soil fertility	50	60	70	80	60	50
<b>Cultivated land</b>	Non functional irrigation schemes	75	100	85	100	80	75
	Unfenced	100	80	85	80	60	75

Source: Field Survey, 2007-08

## **4.2 Water Resources and Management**

Ravi and Chenab are the major rivers of this district. The Ravi (Vedic name Purushni and in later Sanskrit Iravati) is born in Bara Banghal area of Kangra district as a joint stream formed by the glacier fed Bhadal and Tantgari. It passes through deep gorges through Bharmaur (Holi) and on the way is joined by Manimahesh Khad at Kharamukh. The river has a length of about 158 km and has a catchment area of about 5,451 km. Chamba lies on its right flank. This river has immense hydel power potential and Gigantic Chamera Hydroelectric Power Project has been commissioned on this river. River Chandrabhaga or Chenab (Vedic name Askni), the largest river (in volume of water) is formed after the meeting of 2 streams, Chandra and Bhaga originating, in Lahul. It flows 122 km and has a catchment area of 7,500 sq.km. in Himachal, before entering Kashmir. The Chandra passes through barren land in Lahaul and Pangi valley and has little economic significance to the area. Among other water bodies, Manimahesh lake is located at an altitude of 4,080 metres in the district, 35 k.m. from Bharmaur. Held sacred to Lord Shiva, this lake is located in the Bundhil valley at the foot of Manimahesh ranges. The peaks of Manimahesh Kailash are regarded as one of the mythical abodes of Shiva. This is the venue of annual Manimahesh Yatra.

The scenario of ground water availability has been depicted through ground water map prepared by Ground Water Board (NHR), Dharamshala. The district harbours alluvium, siwaliks and metamorphics. There are number of perennial and seasonal springs formed by seepage of rain/snow water. The springs form the major source of irrigation and drinking water supply in the district. The ground water has been found at a depth of 10-20 metres along the valley regions that may increase with increase in the elevation of land topography. The quality of ground water is as good as that of spring water. Dug wells have been installed successfully by the IPH department at various places in the district showing availability of ground water and sustained recharge capability. The ground water potential has not been ascertained so far and there is no major project on ground water exploitation.

### 4.2.1 Other Information about Water Sources

Major drainage	Ravi, Chenab
Rainfall	2191 mm
Temperature	-2° C to 33° C
Regional geology	Alluvium, Siwaliks, Metamorphics
Ground Water quality	Good, EC <750 $\mu$ mhos/cm at 25°C
Utilizable ground water resources	Not estimated (localized aquifers)
Stage of ground water development	Not estimated (localized aquifers)
Water shed/tehsil showing intensive ground water development	Nil

### 4.3 Cropping System and Cropping Pattern

Due to agro-climatic diversity various cropping systems are being followed in different blocks (Table 4.3).

**Table 4.3 Major Cropping Systems in Chamba District**

Sr. No.	Particulars	Chamba	Mehla	Bhatiyat	Salooni	Tissa	Bharmaur
<b>Rainfed</b>							
1	Maize-wheat	√	√	√	√	√	√
2	Maize+pulses-wheat		√	√		√	√
3	Maize-barley		√	√	√	√	
4	Maize-pea		√	√		√	
5	Maize-potato			√	√	√	
6	Maize-toria-wheat			√			
7	Paddy-wheat			√			
8	Paddy-barley			√			
9	Pulses based			√			√
10	Oilseed based	√	√	√			
11	Vegetable based	√	√	√	√	√	√
12	Spices based		√				
13	Maize-mustard				√	√	
14	Maize-fallow		√	√	√	√	√
15	Pulse-fallow						√
16	Wheat-fallow						√
<b>Irrigated</b>							
1	Maize-wheat	√	√	√			
2	Maize+pulses-wheat		√				
3	Maize-barley		√				
4	Maize-pea	√	√				
5	Maize-potato			√	√		
6	Chari-berseem			√			
7	Paddy-wheat	√	√	√			
8	Paddy-barley			√			
9	Vegetable based	√	√	√	√	√	√

Source: Field Survey, 2007-08



Since most of the cultivated area is rainfed, therefore, foodgrain based systems are more predominant in this district. Maize-wheat is the most important cropping system patronised in all the blocks. Maize+pulses-wheat is also prevalent in majority of the blocks including Bharmaur where rajmash is intercropped with maize in kharif season. Maize-barley, maize-pea and maize-potato cropping systems also exist in low and mid hills. Maize-toria-wheat and paddy wheat rotations are prevalent only in Bhatiyat. The sole cropping of pulses and oilseeds is on limited scale in the district except Bharmaur where rajmash is grown on substantial area. In higher hills particularly in Bharmaur, the single cropping of maize, wheat or pulses is observed in high hills mainly due to migration of *Gaddi* tribes to plains in winter.

Under irrigated conditions the major cropping systems are; maize-wheat, maize-potato, maize-pea and paddy-wheat. The fodder based chari-berseem cropping system is prevalent in low hill area of Bhatiyat. Number of vegetable cropping sequences are patronised on irrigated land in almost all the blocks. However, the scale of commercialisation varies in different blocks.

**Table 4.4 Cropping Pattern (Per Cent)**

Crops	Chamba	Mehla	Bhatiyat	Salooni	Tissa	Bharmaur	District
<b>Cereal</b>							
Maize	40.47	48.85	35.84	60.88	43.72	21.99	42.95
Paddy	1.14	1.06	13.90				4.10
Wheat	37.88	34.57	38.25	28.33	34.88	30.19	34.92
Barley	3.56	1.77	4.09	2.50	0.80		2.53
Millets		2.47		0.55	0.69	7.60	1.23
Pulses							
Mash	1.15	0.64	0.75		1.30	19.24	2.15
Rajmash	1.33	1.63			1.22	16.89	1.99
Oilseeds							
Sarson	1.77	3.36	0.58		0.97		1.25
Toria		0.71	2.76				0.87
<b>Vegetables</b>							
Potato	5.72	2.55	1.90	4.60	0.69	4.08	3.08
Peas	4.57	1.70	0.85	1.54	14.24		3.64
Tomato	0.58		0.11	0.37	0.76		0.30
Cabbage		0.42	0.05		0.25		0.13
Cauliflower			0.05		0.25		0.05
Beans	0.63		0.11	0.65	0.25		0.27
Capsicum	0.22						0.04
Bhindi	0.12						0.02
Brinjal	0.10						0.02
Cucurbits	0.09						0.02
Onion	0.31			0.18			0.08
<b>Spices</b>							
Ginger	0.04						0.01
Garlic	0.30	0.28	0.76	0.40			0.37
<b>Total Cropped Area (Ha)</b>	<b>10800.01</b>	<b>11881.80</b>	<b>16425.31</b>	<b>9120.14</b>	<b>8972.43</b>	<b>4629.01</b>	<b>61828.69</b>

Source: Field Survey, 2007-08

Maize and wheat are found to be the most predominant crops in all the blocks except Bharmaur collectively accounting for almost 80 per cent of the cropped area (Table 4.4). Paddy is grown in Bhatiyat accounting for about 14 per cent of the cropped area (Table 4.3). The area under barley varies from 1 to 4 per cent in different blocks. Millet crops are grown on a limited scale in high hills and the area under these traditional crops is decreasing. Mash and rajmash are the major pulses grown either mixed or as a sole crop in all the blocks. In Bharmaur, pulses hold the important place in cropping pattern accounting for one third of the cropped area. Rajmash of Bharmaur is a speciality and can be promoted as a commercial crop in this region. Oilseeds (mustard and toria) are grown on limited scale in low hills while oilseed crops are not common in high hills. Different types of vegetable crops are grown in different seasons but potato and pea are two major crops grown in all the blocks. Other vegetable crops are grown on a limited scale mainly for home consumption. Irrigation is the major limiting factor for increasing area under vegetable cultivation. The cultivation of ginger and garlic is also on a limited scale.

#### **4.4 Input Use and Gaps**

The input use pattern and gaps in the input use among average and progressive farmers have been displayed in Table 4.5. It was found that majority of the farmers are using higher seed rates in most of the crops in all the blocks. The gap in seed rate is noticed only in case of potato where average use is less than the use by progressive farmers.

However, there is wide gap in manures and fertilizers between the average use and use by the progressive farmers which along with variety and management may be the major reasons for lower average yields than potential yields of various crops. The use of major fertiliser on per hectare basis is even less than half of the quantity used by progressive farmers in the area. The gap was much more in the use of IFFCO followed by urea (Table 4.6). The total requirement of Urea, IFFCO and SSP for the entire district has been estimated at 2,934 tonnes, 1,597 tonnes and 1,546 tonnes, respectively (Table 4.7). There is also shortage of FYM. The use of pesticides and chemicals is quite low in the area. Though the occurrence of diseases and pests is relatively low but in most of the parts, the chemicals are also not available and farmers, in general, are also not aware of the right type of chemicals. The use of weedicide is almost absent in the district.

#### **4.5 Yield Gap Analysis**

The yield gap analysis has been presented in Table 4.8. It was found that average yield of the crops in different blocks in Chamba district are considerably lower than the frontier yield on progressive farmers. The yields of paddy and wheat can be doubled as the average yield of these crops is quite low in all the blocks. Similar scenario prevails in pulses and oilseeds also. The yields of vegetable crops though are higher but yet these are much below the potential level. In most of the field crops, yield can be doubled from the existing levels. This calls for greater role of R & D institutions to abridge this gap through strengthening input delivery, dissemination of technology and extension advisory services.

**Table 4.5 Seed Use, Requirement and Gaps (Kg/ha)**

Crops	Chamba			Mehla			Bhatiyat		
	U	R	G	U	R	G	U	R	G
Maize	57.3	19.89	-37.41	50	18.75	-31.25	63.7	25.33	-38.37
Paddy	40.46	28.13	-12.33				106.63	103.38	-3.25
Wheat	170.18	113.71	-56.47	150	100	-50	132.88	125	-7.88
Barley	42.31	106.8	64.49	140	100	-40	119.11	125	5.89
Berseem	32.5	26.25	-6.25						
Mash	70.23	43.25	-26.98	65.32	42.32	-23	78.19	43.75	-34.44
Rajmash	75.32	51	-24.32	74.32	45	-29.32	75	43.75	-31.25
Sarson	9.69	6.56	-3.13	11.25	6.58	-4.67	10.5	6.56	-3.94
Toria				10.36	7.54	-2.82	17.89	11.14	-6.75
Potato	2265.05	1222.79	-1042.26	2285.65	1210.65	-1075	1990.47	1319.46	-671.01
Peas	154.23	130	-24.23	150	135.23	-14.77	158	130	-28
Tomato	0.75	0.5	-0.25				0.65	0.5	-0.15
Cabbage				0.65	0.7	0.05	0.8	0.75	-0.05
Cauliflower	0.9	0.75	-0.15			0	1	0.8	-0.2
Beans	84.56	75.89	-8.67			0	82.65	74.56	-8.09
Capsicum	1.25	0.95	-0.3						
Bhindi	21.48	20.5	-0.98				25	18.75	-6.25
Brinjal	1.25	0.65	-0.6						
Cucurbits	5.68	4	-1.68						
Onion	12.5	10	-2.5				14.32	11	-3.32
Ginger	2156.25	2000	-156.25				2254	2005	-249
Garlic	1789.65	1850	60.35	2054.65	1850	-204.65	2100	1890	-210

Table 4.5 contd....

Crops	Salooni			Tissa			Bharmaur		
	U	R	G	U	R	G	U	R	G
Maize	120.23	25	-95.23	79.75	25	-54.75	27.22	20	-7.22
Paddy									
Wheat	197.07	118.11	-78.96	161.8	125.6	-36.2	53.01	120.36	67.35
Barley	179.44	110.24	-69.2	161.91	110.23	-51.68			
Berseem									
Mash				59.1	25	-34.1	25.74	15.91	-9.83
Rajmash				73.65	50	-23.65	84.56	65.23	-19.33
Sarson				23.53	6.25	-17.28			
Tortia									
Potato	2058.12	1200	-858.12	2187.67	1300	-887.67	2117.21	1351.12	-766.09
Peas	151.23	135.26	-15.97	155.69	135.62	-20.07			
Tomato	0.56	0.5	-0.06	0.75	0.5	-0.25			
Cabbage				0.6	0.7	0.1			
Cauliflower				0.95	0.7	-0.25			
Beans	82.5	70.23	-12.27	78.96	71.45	-7.51			
Capsicum									
Bhindi									
Brinjal									
Cucurbits									
Onion	11.23	10	-1.23						
Ginger									
Garlic	1935	1800	-135						

Source: Field Survey, 2007-08

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

Manures/ fertilizers	Chamba			Mehla			Bhatiyat		
	U	R	G	U	R	G	U	R	G
Urea	38.97	50.82	11.85	22.18	42.94	20.76	41.61	51.11	10.5
CAN	30.41	62.58	32.18	0	0	0	0	0	0
IFFCO	57.48	96.77	39.29	27.24	31.54	4.3	5.25	3.67	-1.57
MOP	5.83	15.1	9.27	0	0	0	0	0	0
SSP	45.54	85.36	39.82	0	0	0	0	0	0
Vermi compost	55.4	66.48	11.08	0	0	0	0	0	0
FYM	1849.61	2637.39	787.78	129.01	215.02	86.01	925.75	2059.36	1133.6

**Table 4.6 contd...**

Manures/ fertilizers	Salooni			Tissa			Bharmaur		
	U	R	G	U	R	G	U	R	G
Urea	21.78	25.81	4.03	29.36	39.23	9.87	42.65	51.18	8.53
CAN	0	0	0	6.47	7.76	1.29	76.16	91.4	15.23
IFFCO	0	0	0	0.32	0.39	0.06	0	0	0
MOP	0	0	0	0	0	0	12.19	14.62	2.44
SSP	0	0	0	0	0	0	79.21	95.05	15.84
Vermi compost	0	0	0	0	0	0	0	0	0
FYM	2561.36	3575.61	1014.25	834.42	1001.3	166.88	1462.34	1754.81	292.47

Source: Field Survey, 2007-08

**Table 4.7 Fertilizer Use, Requirement and Gaps (Tonnes)**

Manures /fertilizers	Chamba			Mehla			Bhatiyat			Salooni		
	U	R	G	U	R	G	U	R	G	U	R	G
Urea	454.62	592.87	138.24	284.10	550.02	265.91	687.56	844.54	173.50	218.13	258.49	40.36
CAN	354.76	730.06	375.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
IFFCO	670.56	1128.92	458.36	348.92	404.00	55.08	86.75	60.64	-25.94	0.00	0.00	0.00
MOP	68.01	176.16	108.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SSP	531.27	995.81	464.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vermi-compost	646.30	775.56	129.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FYM	21577.55	30767.79	9190.24	1652.49	2754.19	1101.70	15297.09	34028.86	18731.61	25652.02	35809.73	10157.71

**Table 4.7 contd...**

Manures /fertilizers	Tissa			Bharmaur			District		
	U	R	G	U	R	G	U	R	G
Urea	293.45	392.10	98.65	246.73	296.08	49.35	2184.60	2934.09	766.02
CAN	64.67	77.56	12.89	440.59	528.75	88.11	860.02	1336.37	476.41
IFFCO	3.20	3.90	0.60	0.00	0.00	0.00	1109.43	1597.46	488.09
MOP	0.00	0.00	0.00	70.52	84.58	14.12	138.53	260.73	122.26
SSP	0.00	0.00	0.00	458.23	549.86	91.63	989.50	1545.67	556.17
Vermi-compost	0.00	0.00	0.00	0.00	0.00	0.00	646.30	775.56	129.26
FYM	8340.03	10007.99	1667.97	8459.64	10151.58	1691.94	80978.82	123520.15	42541.17

Source: Field Survey, 2007-08

**Table 4.8 Yield Gap in Crops (Q/ha)**

Crops	Chamba			Mehla			Bhatiyat			Salooni		
	A	P	G	A	P	G	A	P	G	A	P	G
<b>Cereals</b>												
Maize	22.50	25.40	2.90	18.00	24.20	6.20	22.00	25.50	3.50	18.90	24.80	5.90
Paddy	10.30	19.30	9.00	8.50	19.40	10.90	9.70	20.40	10.70			
Wheat	12.30	20.60	8.30	11.64	21.40	9.76	12.20	19.78	7.58	13.41	22.25	8.84
Barley	9.46	10.52	1.06	9.84	20.20	10.36	11.27	20.35	9.08	9.70	20.94	11.24
Milletts				7.65	19.00	11.35				8.60	18.00	9.40
<b>Pulses</b>												
Rajmash	6.87	14.90	8.03	7.47	15.24	7.77						
Mash	4.39	8.72	4.33	4.78	9.20	4.42	4.57	8.23	3.66			
<b>Oilseeds</b>												
Sarson	1.53	4.45	2.92	1.74	4.50	2.76	1.74	3.50	1.76			
Toria				1.04	3.40	2.36	1.58	3.60	2.02			
<b>Vegetables</b>												
Potato	120.00	195.00	75.00	115.00	168.00	53.00	123.00	192.00	69.00	138.00	198.00	60.00
Peas	70.24	101.44	31.20	73.57	104.27	30.70	80.64	106.85	26.21	75.28	102.67	27.39
Tomato	84.00	202.00	118.00				70.00	190.00	120.00	78.00	204.00	126.00
Cabbage				94.00	250.00	156.00	86.00	240.00	154.00			
Cauliflower			-				75.08	182.00	106.92			
Beans	59.00	113.00	54.00				58.00	112.00	54.00	60.00	113.00	53.00
Capsicum	58.00	115.00	57.00									
Bhindi	55.00	100.00	45.00									
Brinjal	63.00	173.00	110.00									
Cucurbits	160.00	225.00	65.00									
Onion	83.00	114.00	31.00							86.00	116.00	30.00
<b>Spices</b>												
Ginger	80.00	120.00	40.00									
Garlic	76.00	120.00	44.00	71.00	124.00	53.00	72.00	126.00	54.00	78.00	128.00	50.00

Table 4.8 contd....

Crops	Tissa			Bharmaur			District		
	A	P	G	A	P	G	A	P	G
<b>Cereals</b>									
Maize	17.50	25.20	7.70	12.50	20.50	8.00	19.53	24.82	5.29
Paddy							9.67	20.30	10.63
Wheat	14.24	21.45	7.21	10.50	19.92	9.42	12.44	20.79	8.35
Barley	12.38	20.80	8.42				10.46	18.02	7.57
Millets	6.60	17.00	10.40	5.65	19.50	13.85	6.70	19.00	12.30
<b>Pulses</b>									
Rajmash	6.98	14.57	7.59	7.54	15.64	8.10	7.40	15.40	7.99
Mash	4.78	9.20	4.42	4.94	8.98	4.04	4.83	8.92	4.09
<b>Oilseeds</b>									
Sarson	1.53	4.45	2.92				1.66	4.36	2.69
Toria							1.50	3.57	2.07
<b>Vegetables</b>									
Potato	126.00	197.00	71.00	132.00	196.00	64.00	125.05	191.04	65.99
Peas	81.16	108.36	27.20				77.69	106.03	28.34
Tomato	96.00	209.00	113.00				85.97	203.80	117.83
Cabbage	92.00	255.00	163.00				92.63	250.33	157.70
Cauliflower	74.80	172.00	97.20				74.90	174.78	99.88
Beans	59.00	112.00	53.00				59.24	112.76	53.52
Capsicum							58.00	115.00	57.00
Bhindi							55.00	100.00	45.00
Brinjal							63.00	173.00	110.00
Cucurbits							160.00	225.00	65.00
Onion							83.99	114.66	30.67
<b>Spices</b>									
Ginger							80.00	120.00	40.00
Garlic							73.37	125.18	51.80

Source: Field Survey, 2007-08



#### 4.6 Reasons for Yield Gap

The reasons for gaps in productivity of major crops are displayed in Table 4.9. The main reasons for yield gaps in different crops were: use of seeds of low yielding local varieties of crops, non availability of critical inputs at right time, low and unbalanced use of fertilizers, infestation of diseases and pests, lack of technical know how about improved practices and disease/pest control, shortage of FYM, lack of irrigation and animal menace. The animal menace particularly monkey menace is causing colossal damage to crops especially maize which is the major crop of this district.

Besides critical inputs and cultural practices, the crop protection measures also form the major strategy to improve productivity of crops. The diseases, insects pests and weeds cause substantial reduction in yields. The major diseases of different crops in Chamba district are shown in Table 4.10. The major weeds found in different crops and support lands are enlisted in Table 4.11.

**Table 4.9 Reasons for Gaps in Crop Yields in Chamba (Per Cent of Panchayats)**

Crops	Problems	Bharmaur	Bhatiyat	Chamba	Mehla	Salooni	Tissa
<b>Cereal</b>							
Maize	Low productivity due to use of local variety			50	60	100	
	Inadequate fertilization		29	50	80	20	
	Monkey and animal menace	75	14	150	40		60
	Ageratum management		14	25			
	Cob rotting			50			
	Rainfed cultivation		14	50	80	80	80
	Porcupine problem			75	0		
	Insect and disease attack	50			40		
	Weed problem	25					20
	Blister beetle	25					
Paddy	Low productivity due to use of local variety			50			
	Insect attack		29	50			
	Weed problem		0	50			
	Inadequate fertilizer use		14	50			
	Monkey problem		14	75			
	Lack of irrigation		0	50			
	Attack of neck blast		0	50			
	Irregular supply of irrigation		0	25			
Wheat	Low yielding local variety		14	75	60	100	
	Disease and insect	25		75	100	100	
	Weed problem	75	14	100	0	100	
	Inadequate fertilizer use		29	50	60	100	
	Monkey and animal problem	50	14	75	20	0	60
	Rainfed cropping	0	14	75	80	100	80
	Loose smut	25					

	Rat problem	25					
Barley	Low productivity due to use of local variety	0	14	100	20	40	
	Problem of loose smut	0	14	25	60	40	
	Weed problem	0	0	50	0	40	
	Monkey problem	0	14	50	0	0	60
	Rainfed	0	14		60	40	80
	Local strains	25					
<b>Pulses</b>							
Mash	Insect problem	25	29	25	0	0	20
	HYV not available		14	25			
	Monkey menace		14	25			
	Irrigation problem		14	25			
	Sterility in mash	25					
Rajmash	Insect problem	0	0	25		0	20
	Irrigation problem		14				
Kulthi	HYV not available			25			
	Monkey menace			25			
	Irrigation problem			25			
Pulses	Low yielding varieties	50		0			
	Weed problem			25			
<b>Oilseeds</b>							
Sarson	Local strains	25					
	Low yield	25					
	Blister beetle	25					
	Leaf minor	25					
<b>Vegetables</b>							
Potato	Rodents problem		14	100			
	Monkey menace			75	40		60
	Lack of irrigation		43	75	20	80	80
	Late blight	75	0	25	80	80	20
	Cutworm problem			25	20	80	
	Insect problem				80	80	20
	Undulating topography						20
	Hadda beetle	25					
Peas	Irrigation is not available	0	0	25	20	60	
	Hadda beetle	50	14		40	60	
	Cut worm			50	40	60	
	Poor varieties			25			
	Disease	50	14	25	60	60	
	Monkey menace	50	14				
	Borer	25					
	Powdery mildew		14				
Tomato	Fruit drop		0	50	20	60	40
	Wilting	25	14		20	60	0
	Fruit rot		14	25	20	60	0

	Monkey menace		0	25	40	60	0
	Fruit fly		14		20	60	0
	Borer						
	Shortage of irrigation water	50					
	during peak period	0					
	Leaf minor	25					
Cabbage	Irrigation is not available		29	25			
	Wild animal			25			
Cauliflower	Irrigation is not available		29	25		20	
	Wild animals			25			
Beans	Insect and disease					20	
	Monkey menace	25					
	Irrigation	25					
Capsicum	Irrigation is not available						
Bhindi	Irrigation is not available			25			
	Stem cutter			25			
Onion	Leaf minor			25			
Radish	Irrigation is not available			25			
carrot	Irrigation is not available			25			
<b>Spices</b>							
Ginger	Non availability of irrigation		14	50			
	Soft rot problem			75			
	Lack of suitable varieties		14				
Garlic	Non availability of irrigation		29	25		20	
	Leaf minor		14	50			
	Improved varieties		14			20	
Flower cuts/ bulbs	Unirrigated area			50			
	Low yielding problem	25					
	Non availability of			25		40	
	Improved input material						
	Lack of technical know- how			25		40	
	Thrips problem			25			
	Lack of proper irrigation	25					

Source: Field Survey, 2007-08

**Table 4.10 Major Diseases Limiting Crop Production in Chamba District**

<b>Crops</b>	<b>Major diseases</b>
<b>Cereals</b>	
Maize	Bacterial stalk rot
	Turcicum and maydis leaf blights
	Banded leaf and sheath blight
Paddy	Blast
	Brown spot
	Grain discolouration
Wheat	Rusts ( yellow & leaf rusts)
	Loose smut
	Hill bunt
<b>Pulse crops</b>	
Mash & Mung	Leaf spots
Rajmash	Anthraco nose
<b>Oilseeds</b>	
Brassica oil seeds	Alternaria blight
	White rust
	Downy mildew
Linseed	Rust
Soybean	Brown spot
	Target leaf spot
	Yellow mosaic
<b>Vegetable crops</b>	
Tomato	Fruit rot
Cabbage & Cauliflower	Black rot
Cucurbits	Sudden wilt
Pea	Root rot/wilt complex
Brinjal	Bacterial wilt
	Phomosis blight & fruit rot
Potato	Late blight
Chilli and Capsicum	Bacterial wilt
	Fruit rot (Anthraco nose)
	Phytophthora rot

Source: Field Survey, 2007-08

**Table 4.11 Priority-Wise Weed Problems in Different Crops**

Crops	Weeds
Maize	<i>Commelina benghalensis</i> , <i>Digitaria sanguinalis</i> , <i>Echinochloa colona</i> , <i>Dactylactenium aegyptium</i>
Paddy	<i>Echinochloa crus-galli</i> , <i>Polygonum barbatum</i> , <i>Cyperus iria</i> , <i>Ischaemum rugosum</i>
Wheat	<i>Stellaria media</i> , <i>Ranunculus arvensis</i> , <i>Poa annua</i> , <i>Medicago denticulate</i> , <i>Veronica persica</i> , <i>Anagallis arvensis</i>
Urd bean	<i>Digitaria sanguinalis</i> , <i>Cyperus iria</i> , <i>Commelina benghalensis</i> , <i>Juncus bufoniu</i> , <i>s Eragrostis tennela</i>
Vegetables	
Kharif	<i>Commelina benghalensis</i> , <i>Digitaria sanguinalis</i> , <i>Physalis minima</i>
Rabi	<i>Poa annua</i> , <i>Medicago denticulate</i> , <i>Coronopus didymus</i>
Support lands	<i>Lantana camara</i> , <i>Parthenium hysterophorus</i> , <i>Ageratum hostonianum</i> , <i>Bidens pilosa</i> , <i>Zizyphus rotundifolia</i> , <i>Cirsium arvense</i>

Source: Field Survey, 2007-08

#### 4.7 Farm Mechanisation

Being a hilly area, farm mechanisation is quite low in Chamba district. The extent of use of machinery and improved tools has been depicted through Table 4.12.

In farm machinery, the use of tractor, thresher and spray equipments is common. However, the use was more in mid hill regions while in high hills the use of farm machinery was almost negligible except the use of wheat thresher. The progressive farmers especially fruit and vegetable growers are also using spray pumps. However, use of power tiller and iron plough is not common. The farmers in the district require more tractors than the existing numbers. The pertinent problems in the use of machinery have been given in Table 4.13

**Table 4.12 Farm Machinery Use & Gap**

Particulars	% users	Number		
		Existing	Required	Gap
<b>Chamba</b>				
Thresher	47.47	115	151	36
Tractor	45.95	38	115	77
Iron plough	88.23	1453	2132	679
Spray pump/ power sprayer	64.59	848.25	975	126.75
Chaff cutter	63.25	850	1254	404
Power tiller	2.35	50	70	20
<b>Mehla</b>				
Thresher	80.32	85	112	27
Tractor	42.65	29	53	24
Iron plough	75.65	1522	2112	590
Spray pump/ power sprayer	65.89	504	745	241
Chaff cutter	60.25	847	1379	532
Power tiller	0.24	42		

<b>Bhatiyat</b>				
Thresher	84.16	68	110	42
Tractor	51.23	48	120	72
Iron plough	76.55	1232	1958	726
Spray pump/ power sprayer	58.65	409	854	445
Chaff cutter	70.58	831	1485	654
Power tiller	2.5	85	110	25
<b>Salooni</b>				
Thresher	45.18	43	130	87
Tractor	49.25	46	138	92
Iron plough	80.69	1325	1895	570
Spray pump/ power sprayer	65.26	506	690	184
Chaff cutter	72.35	950	1597	647
Power tiller	0.48	46	90	44
<b>Tissa</b>				
Thresher	49.51	56	137	81
Tractor	46.25	40	105	65
Iron plough	69.25	905	1358	453
Spray pump/ power sprayer	65.97	462	630	168
Chaff cutter	65.23	742	1258	516
Power tiller	0.25	80	156	76
<b>Bharmaur</b>				
Thresher	41.35	45	115	70
Tractor	40.25	35	90	55
Iron plough	62.98	850	1265	415
Spray pump/ power sprayer	56.13	385	828	443
Chaff cutter	58.65	625	1120	495
Power tiller	0.28	68	90	22

Source: Field Survey, 2007-08

**Table 4.13 Problems and Interventions for Farm Machinery (Per Cent Response)**

Machinery	Problems	Interventions	Chamba	Mehla	Bhatiyat	Salooni	Tissa	Bharmaur
Thresher	Low efficiency	Improved in design	50	60	70	60	60	50
	High cost	Subsidy	50	60	57	60	60	75
Tractor	Problems of finance	Credit facility and subsidy	75	80	85	80	80	75
	Repair/maintenance	Agri workshop	75	80	85	80	80	75
	Less efficient	Hill specific design	50	60	70	80	60	75
Iron plough	Less efficient	Training and demonstration for machinery	50	60	70	60	60	50
	Non availability in local market	Self help group for timely and smooth availability of farm machinery	50	40	28	40	40	50
	Heavy	Low weight plough	25	20	42	20	20	50
Spray pump/power sprayer	Problem of finance	Credit facility and subsidy	75	80	70	80	80	75
	Non availability	More supply by agri. department	75	60	57	60	80	75
Spray pump/ power sprayer	Problem of finance	Credit facility and subsidy	75	80	57	60	60	75
	Non availability	More supply by agri. dept.	50	40	42	60	60	75
Chaff cutter	Problem of finance	Credit facility and subsidy	75	80	70	80	80	75
	Not availability	Supply by Govt. agency	75	80	57	80	80	75
Power tiller	Less efficient	Enhancing power efficiency	50	40	57	60	60	50
	Lack of suitable model	Developing hill specific and cost effective models	50	60	70	60	60	75

Source: Field Survey, 2007-08

#### 4.8 Ongoing Schemes for Agriculture and Rural Development

Agricultural and rural development forms the major component of state plan and there are various on going schemes in the district launched by the State Government for development of agriculture. Numbers of these schemes, beneficiary villages/families along with total budget outlay have been displayed in Table 4.14. These schemes include watershed development, soil conservation measures, agricultural/horticultural schemes, livestock improvement and development of rural infrastructure. In agricultural development, Chamba has remained most backward as compared to other districts. The development of rural roads and bridges has

received the top priority in remote and backward blocks obviously to connect remote villages to facilitate transportation and marketing. In the past, special central assistance was provided to Bharmaur and Pangi under tribal development programme that has made significant impact on infrastructural development in remote villages. The major proportion of funds was allocated to construction of roads and bridges. However, the funds allocation for development of markets was surprisingly negligible and in some of the blocks, no funds were diverted to the development of agricultural markets. The additional funds would also be required for completion of various schemes of rural development.

**Table 4.14 Existing Schemes for Agriculture and Rural Development**

Blocks	No. of schemes	Village covered (No.)	Population covered (No.)	Area	Beneficiary families (No.)	Status		Total budget (Rs. Lakh)	Additional funds required (Rs. Lakh)
						Completed (No.)	Incomplete (No.)		
<b>Watershed Development</b>									
Bharmaur	23	19	31251	123.00	135	23	0	15.00	20.00
Bhatiyat	180	57	35124	999.00	3600	165	15	61.26	20.00
Chamba	154	145	55214	1254.00	120	0	154	71.00	25.00
Mehla	164	155	21354	1347.00	140	0	164	78.00	150.00
Salooni	15	15	20145	1125.00	17	15	0	8.00	15.00
Tissa	4	54	10256	1146.00	900	4	0	5.00	17.50
<b>Total</b>	<b>540</b>	<b>445</b>	<b>173344</b>	<b>5994.00</b>	<b>4912</b>	<b>207</b>	<b>333</b>	<b>238.26</b>	<b>247.50</b>
<b>Soil/ Land Conservation</b>									
Bharmaur	23	19	31251	123.00	135	0	23	21.00	1500.00
Bhatiyat	116	60	32154	373.20	825	116	0	54.80	15.00
Chamba	28	28	224	70.00	224	28	0	15.83	20.00
Mehla	257	207	21053	753.00	432	0	257	70.00	125.00
Salooni	5	95	2000	50.00	60	5	0	40.00	50.00
Tissa	2	90	110	1326.00	750	0	2	10.00	45.00
<b>Total</b>	<b>431</b>	<b>499</b>	<b>86792</b>	<b>2695.20</b>	<b>2426</b>	<b>149</b>	<b>282</b>	<b>211.63</b>	<b>1755.00</b>
<b>Sericulture</b>									
Bharmaur	1	10	56	54.00	10	1	0	2.00	0.00
Bhatiyat	1	12	66	56.00	12	1	0	2.50	0.00
Chamba	1	16	80	57.00	16	1	0	2.00	0.00
Mehla	1	18	90	53.00	18	1	0	2.00	0.00
Salooni	1	12	72	55.00	12	1	0	2.00	0.00
Tissa	1	12	75	50.00	12	1	0	2.00	0.00
<b>Total</b>	<b>6</b>	<b>80</b>	<b>439</b>	<b>325.00</b>	<b>80</b>	<b>6</b>	<b>0</b>	<b>12.50</b>	<b>0.00</b>
<b>Other Agricultural Schemes</b>									
Bharmaur	11	141	3200	25.00	1388	6	5	41.00	150.00
Bhatiyat	3	56	2500	31.00	185	3	0	15.00	15.00
Chamba	1	25	2500	24.00	4500	0	1	5.00	5.00
Mehla	165	592	6715	150.00	1343	0	165	55.00	1.00
Salooni	5	50	5600	16.00	2000	5	0	35.00	30.00
Tissa	3	54	900	12.00	180	3	0	15.00	15.00
<b>Total</b>	<b>188</b>	<b>918</b>	<b>21415</b>	<b>258.00</b>	<b>9596</b>	<b>17</b>	<b>171</b>	<b>166.00</b>	<b>216.00</b>



<b>Rural Markets</b>									
Bharmaur	0	0	0	0	0	0	0	0.00	0.00
Bhatiyat	0	0	0	0	0	0	0	0.00	0.00
Chamba	1	4	560	2	95		1	3.00	3.00
Mehla	0	0	0	0	0	0	0	0.00	0.00
Salooni	1	50	15000	9	3000		1	8.50	5.00
Tissa	0	0	0	0	0	0	0	0.00	0.00
<b>Total</b>	<b>2</b>	<b>54</b>	<b>15560</b>	<b>11</b>	<b>3095</b>	<b>0</b>	<b>2</b>	<b>11.50</b>	<b>8.00</b>
<b>Roads</b>									
Bharmaur	320	131	2500	25	2820.00	100	220	900.00	1500.00
Bhatiyat	63	85	6600	12	2564.00		63	680.00	500.00
Chamba	292	80	2500	8359	8200.00		292	15000.00	100.00
Mehla	63	85	6600	12	2564.00		63	680.00	500.00
Salooni	295	253	20000	295	5000.00	3	28	925.00	2000.00
Tissa	3	42	25000	200	4500.00	20	22	100.00	1750.00
<b>Total</b>	<b>1036</b>	<b>676</b>	<b>63200</b>	<b>8903</b>	<b>25648.00</b>	<b>123</b>	<b>688</b>	<b>18285.00</b>	<b>6350.00</b>
<b>Bridges</b>									
Bharmaur	16	131	2500	23	2820	6	10	230.00	500.00
Bhatiyat	36	154	3500	35	3560	10	26	200.00	500.00
Chamba	12	80	2800	21	8200		12	4000.00	100.00
Mehla	504	101	8500	5	6658		504	23.50	100.00
Salooni	18	250	2945	21	5000	15	3	0.60	200.00
Tissa	2	24	5698	5	2654		2	100.00	1250.00
<b>Total</b>	<b>588</b>	<b>740</b>	<b>25943</b>	<b>110</b>	<b>28892</b>	<b>31</b>	<b>557</b>	<b>4554.10</b>	<b>2650.00</b>

Source: Field Survey, 2007-08

The status of irrigation in different blocks revealed non uniform pattern of development. gravity *kuhls* are the major source of irrigation in this district (Table 4.15). However, the proportion of irrigated area to the cropped area varies across different blocks. The irrigation schemes are managed mainly by the Department of Irrigation and Public Health. There are also few private schemes maintained by the farmers themselves. The flow irrigation is the major practice in all the crops though the system was found least efficient and not suited to loose and sloppy lands of this district. Therefore, there should be more thrust on water saving efficient methods like drip or sprinkler irrigation systems and the farmers should be given incentives to patronize these systems. There is ample irrigation potential in this district that, if exploited, can turn the culturable barren lands into green crop valleys or apple garden colonies.

The completed irrigation schemes in the district along with villages covered and command/actual-irrigated area have been shown in Table 4.16. There are functional as well as non-functional irrigation schemes in different blocks as given in Tables 4.17 and 4.18. The non-functional irrigation schemes would require additional funds for their revival/completion.

Besides, there are various ongoing irrigation schemes where the developmental work is in progress. Presently, limited area is irrigated, as these schemes would take time for their completion. There are various non functional schemes due to various reasons partly attributed to management issues and partly to paucity of perennial sources of water. These schemes may

require additional funds to rejuvenate and make them functional. There is no denying the fact that irrigation development should be given top priority, as without irrigation, discernible growth in crop production may not be achieved.

**Table 4.15 Status of Completed Irrigation Schemes**

Particulars	Bharmaur	Bhatiyat	Chamba	Mehla	Salooni	Tissa	District
<b>Lift irrigation</b>							
Number		10	1			1	12
Amount spent (Rs. Lakh)		145.5	5.24			1	151.74
Villages covered		10	1			1	12
Beneficiaries (No.)		500	50			8	558
Command area (ha)		276.79	29.45			2	308.24
Actual irrigated area (ha)		188.53	29.45			2	219.98
<b>Tubewell</b>							
Number							
Amount spent (Rs. Lakh)							
Villages covered							
Beneficiaries (No.)							
Command area (ha)							
Actual irrigated area (ha)							
<b>Kuhl</b>							
Number	3	73	18			2	96
Amount spent (Rs. Lakh)	40	637.569	81.7			14.576	773.845
Villages covered	3	73	18			2	96
Beneficiaries (No.)	89	174	789			40	1092
Command area (ha)	11	2610.28	351.39			43.95	3016.62
Actual irrigated area (ha)	11	1583.79	351.39			43.95	1990.13
<b>Tank irrigation</b>							
Number	0	0	3	0	250	45	298
Amount spent (Rs. Lakh)	0	43.745	1.684	0	0	22	67.429
Villages covered	0	75	3	0	0	45	123
Beneficiaries (No.)	0	716	24	0	0	133	873
Command area (ha)	0	173.15	7	0	29	183	392.15
Actual irrigated area (ha)	0	145	7	0	29	183	364
<b>Canal irrigation</b>							
Number				0	0	1	1
Amount spent (Rs. Lakh)				0	0	0.5	0.5
Villages covered				0	0	1	1
Beneficiaries (No.)				0	0	10	10
Command area (ha)				0	68	5	73
Actual irrigated area (ha)				0	68	5	73
<b>Others</b>							
Number	18	0	9	0	0	0	27
Amount spent (Rs. Lakh)	134	0	0.72	0	0	0	134.72

Villages covered	18	0	9	0	0	0	27
Beneficiaries (No.)	490	0	9	0	0	0	499
Command area (ha)	275	0	1.8	0	0	0	276.8
Actual irrigated area (ha)	211	0	1.8	0	0	0	212.8

Source: Field Survey, 2007-08

**Table 4.16 Status of Functional Irrigation Schemes**

Particulars	Bharmaur	Bhatiyat	Chamba	Mehla	Salooni	Tissa	District
<b>Lift irrigation</b>							
Number	0	10	1	0	0	0	11
Amount spent (Rs. Lakh)	0	145.5	5.24	0	0	0	150.74
Villages covered (No.)	0	10	1	0	0	0	11
Beneficiaries (No.)	0	0	50	0	0	0	50
Command area (ha)	0	276.79	29.45	0	0	0	306.24
Actual irrigated area (ha)	0	188.53	29.45	0	0	0	217.98
<b>Tube wells</b>							
Number	0	0	0	0	0	0	0
Amount spent (Rs. Lakh)	0	0	0	0	0	0	0
Villages covered (No.)	0	0	0	0	0	0	0
Beneficiaries (No.)	0	0	0	0	0	0	0
Command area (ha)	0	0	0	0	0	0	0
Actual irrigated area (ha)	0	0	0	0	0	0	0
<b>Kuhls</b>							
Number	3	73	17	4	0	0	93
Amount spent (Rs. Lakh)	40	637.569	81.8	187.59	0	0	946.87
Villages covered (No.)	3	73	17	0	0	0	93
Beneficiaries (No.)	89	174	550	150	0	0	963
Command area (ha)	11	2610.28	351.39	150	68	0	3169.67
Actual irrigated area (ha)	11	1583.79	351.39	120	68	0	2134.18
<b>Tank irrigation</b>							
Number	0	0	3	0	250	45	298
Amount spent (Rs. Lakh)	0	43.745	1.684	0	0	55	100.429
Villages covered (No.)	0	75	3	0	0	45	123
Beneficiaries (No.)	0	716	24	0	0	133	873
Command area (ha)	0	123.15	7	0	29	183	342.15
Actual irrigated area (ha)	0	145	7	0	29	183	364
<b>FIS</b>							
Number	15	0	9	0	0	0	24
Amount spent (Rs. Lakh)	114	0	0.72	0	0	0	114.72

Villages covered (No.)	15	0	9	0	0	0	24
Beneficiaries (No.)	389	0	9	0	0	0	398
Command area (ha)	243	0	1.8	0	0	0	244.8
Actual irrigated area (ha)	190	0	1.8	0	0	0	191.8

Source: Field Survey, 2007-08

**Table 4.17 Status of Non-Functional Irrigation Schemes**

Particulars	Bharmaur	Bhatiyat	Chamba	Mehla	Salooni	Tissa	District
<b>Kuhl</b>							
Number	0	0	1	0	0	0	1
Amount spent (Rs. Lakh)	0	1.72	1.72	0	0	0	3.44
Villages covered (No.)	0	1	1	0	0	0	2
Beneficiaries (No.)	0	0	50	0	0	0	50
Command area (ha)	0	9.24	20.97	0	0	0	30.21
Actual irrigated area (ha)	0	0	20.97	0	0	0	20.97
<b>Tank irrigation</b>							
Number	0	0	0	0	0	25	25
Amount spent (Rs. Lakh)	0	0	0	0	0	15	15
Villages covered (No.)	0	0	0	0	0	45	45
Beneficiaries (No.)	0	0	0	0	0	133	133
Command area (ha)	0	0	0	0	0	183	183
Actual irrigated area (ha)	0	0	0	0	0	183	183
<b>FIS</b>							
Number	3	0	0	0	0	0	3
Amount spent (Rs. Lakh)	20	0	0	0	0	0	20
Villages covered (No.)	3	0	0	0	0	0	3
Beneficiaries (No.)	101	0	0	0	0	0	101
Command area (ha)	32	0	0	0	0	0	32
Actual irrigated area (ha)	21	0	0	0	0	0	21

Source: Field Survey, 2007-08

**Table 4.18 Status of Ongoing Irrigation Schemes**

Particulars	Bharmaur	Bhatiyat	Chamba	Mehla	Salooni	Tissa	District
<b>Lift irrigation</b>							
Number	0	2	0	0	2	0	4
Amount spent (Rs. Lakh)	0	21	0	0	0	0	21
Villages covered (No.)	0	2	0	0	200	0	202
Beneficiaries (No.)	0	0	0	0	200	0	200
Command area (ha)	0	36.1	0	0	200	0	236.1
Actual irrigated area (ha)	0	69.24	0	0	0	0	69.24
<b>Kuhl</b>							
Number	0	14	0	0	0	0	14
Amount spent (Rs. Lakh)	0	252.48	0	0	0	0	252.48
Villages covered (No.)	0	14	0	0	0	0	14
Beneficiaries (No.)	0	0	0	0	0	0	0
Command area (ha)	0	301.25	0	0	0	0	301.25
Actual irrigated area (ha)	0	54.39	0	0	0	0	54.39
<b>Tank irrigation</b>							
Number	0	55	0	0	200	25	280
Amount spent (Rs. Lakh)	0	12.397	0	0	0	15	27.397
Villages covered (No.)	0	55	0	0	200	25	280
Beneficiaries (No.)	0	118	0	0	200	100	418
Command area (ha)	0	28.15	0	0	400	75	503.15
Actual irrigated area (ha)	0	27	0	0	0	75	102
<b>Soil land conservation</b>							
Number	0	28	0	0	0	0	28
Amount spent (Rs. Lakh)	0	22.38	0	0	0	0	22.38
Villages covered (No.)	0	28	0	0	0	0	28
Beneficiaries (No.)	0	229	0	0	0	0	229
Command area (ha)	0	54.79	0	0	0	0	54.79
Actual irrigated area (ha)	0	25	0	0	0	0	25

Source: Field Survey, 2007-08

#### 4.9 Interventions and Financial Estimates for Land Improvement

On the basis of extensive survey, it was estimated that as a part of land development/improvement strategy, there is a need to patronise soil conservation measures and other interventions to enhance the productive use of lands. The pertinent land development interventions are shown in Table 4.19.

The fragile topography, barren lands, weed infestation, lack of tree cover, degradation and erosion of top soil are the major impediments preventing the productive use of vast geographical area in the district. The lack of irrigation further hinders the cultivation resulting in fallow as well as culturable lands. Therefore, the major interventions in different blocks are: eradication of weeds and plantation of suitable tree species and perennial grasses. The problems of wild

animals and monkey menace are causing colossal damage to crops especially maize (being the major maize growing district). There is a need to tackle these problems through suitable interventions like fencing, sterilisation, identifying suitable areas for monkey enclosures, Gosadan for stray cattle and plantation of wild fruit tree species in forest/pasture lands. The development of land, irrigation, supply of improved inputs and dissemination of resource management practices must form the major interventions in agricultural planning.

Table 4.20 further presents the estimated land area requiring different interventions. The total land requiring land levelling is estimated 13,131 hectares while contour bunding is needed in 23,564 hectares of land. The estimated length of fencing is 2,30,822 metres while length of check dams in the district is about 4,497 metres. The water harvesting structures/tanks can be constructed in the area of 5,448 hectares mainly in Salooni, Tissa and Chamba. The funds required for land development in different blocks of Chamba district have been shown in Table 4.21. Total funds required for different land development activities would be to the tune of Rs 11,723 lakhs out of which substantial funds would be needed for construction of roads, paths and channels. The funds would also be required for repair and maintenance of certain schemes as shown in Table 4.22.

**Table 4.19 Land Utilization Pattern: Interventions for Land Improvement**

Sr. No.	Particulars	Bharmaur	Bhatiyat	Chamba	Mehla	Salooni	Tissa
1	<b>Forests</b>						
	Productive						
	(i) Eradication of weeds		√	√	√	√	
	(ii) Breeding quick growing tree varieties	√	√	√			
	(iii) Plantation of fuel and fodder trees	√	√	√	√	√	√
	(iv) Availability of quality planting material		√	√			
	Degraded						
	(i) Planting trees	√	√	√	√	√	
	(ii) Fencing		√	√			
	(iii) Watch and ward						
	(iv) Thinning/culling at appropriate stages	√	√	√	√		
2	<b>Barren and uncultivable land</b>						
	Research on developing suitable plant species that could grow on such strata		√	√	√	√	√
	Levelling of land	√				√	
	Contour bunding	√			√	√	√

3	<b>Land put to non-agricultural uses</b>						
	Buildings						
	Framing of land use policy to check conversion of productive agricultural land to non-agricultural uses		√	√		√	√
	Roads/paths/channels						
4	<b>Culturable waste</b>						
	Weed/bush infested						
	(i) Eradication of weeds	√	√	√	√	√	√
	(ii) Training in technical know-how about use of weedicides, etc		√	√			
	(iii) Research on improving available technology		√	√			
	<i>Monkey Menace</i>						
	(i) Catching monkeys and putting them in some fixed area	√	√	√		√	√
	(ii) Sterilisation of monkeys		√	√		√	√
	(iii) Popularisation of crop species which are not destroyed by monkeys		√				
	(iv) Taking up a case for export of monkeys						
	(v) Planting wild fruit trees in forests	√	√	√			
	(vi) Encouraging the people to guard their crops together		√	√	√		
	<i>Stray Cattle</i>						
	(i) Measures to check stray cattle like opening gosadan,		√	√			
	(ii) Improving fertility of unproductive animals	√	√	√			
	(iii) Fencing the areas		√	√			
	<i>Wild Boars</i>						
	(i) Permission to kill wild boars		√	√			
	(ii) Fencing the areas						
	(iii) Encouraging the people to guard their crops together		√	√			

5	<b>Permanent pasture and other grazing lands</b>						
	Productive						
	(i) Improved grass cuttings	√		√			
	(ii) Weed eradication		√	√	√	√	√
	Degraded						
	(i) Improved grass cuttings	√	√	√			
	(ii) Weed eradication		√	√			
	(iii) Research on improving available grass species		√	√			
6	<b>Land under miscellaneous tree crops and groves</b>						
	(i) Improved tree variety		√	√	√	√	
	(ii) Training on package and practices	√		√			√
7	<b>Fallow land</b>						
	Current fallow						
	(i) Irrigation facility	√	√	√	√		
	(ii) Control of wild animals		√	√	√		
	(iii) Research on dry land agriculture	√	√				
	Other fallow						
	(i) Irrigation facility	√	√	√	√	√	√
	(ii) Change in land lease policies						
	(iii) Developing suitable crop varieties		√	√	√	√	
	(iv) Introduction of perennial medicinal plant species			√	√	√	√

Source: Field Survey, 2007-08

**Table 4.20 Improvement Needed to Increase Productivity of Land (Ha)**

Particulars	Chamba	Mehla	Bhatiyat	Salooni	Tissa	Bharmaur	District
Land Levelling	1219.37	8221.46	788.67	973.2	1328.75	599.54	13130.99
Contour bunding	1410.7	8974.91	714.95	1219.31	11088.24	155.9	23564.01
Fencing (length m)	224374.8	219.1	43.78	361.89	5746.89	76.23	230822.7
Reclamation			527.7		1233.15		1760.85
Check dams (length m)	4416.31	24.17	3.03	19.28	25.63	8.28	4496.7
Water harvesting tanks	1253.31			2094.19	2100		5447.5

Source: Field Survey, 2007-08



**Table 4.21 Funds Required for Land Development (Rs. Lakh)**

Sr. No.	Particulars	Bharmaur	Bhatiyat	Chamba	Mehla	Salooni	Tissa	District
1	<b>Barren and uncultivable land</b>							
	Rocky/stony/sloppy	150	150	10	500	1850	90	2750
2	<b>Land put to non-agricultural uses</b>							
	Buildings	50	10	10	20	100	500	690
	Roads/paths/channels	1000	500	2000	600	2000	42	6142
3	<b>Culturable waste</b>							
	Weed/bush infested	10	10	5	15	200	100	340
	Area prone to animal menace	700	30	10	15	15	200	970
4	<b>Permanent pasture and other grazing lands</b>							
	Productive	150	25	10	25	20	35	265
	Degraded	50	100	20	21	25	35	251
5	<b>Land under miscellaneous tree crops and groves</b>							
6	<b>Fallow land</b>							
	Current fallow	50	50	5	15	50	10	180
	Other fallow	25	25	5	20	50	10	135
7	<b>Grand Total</b>	<b>2185</b>	<b>900</b>	<b>2075</b>	<b>1231</b>	<b>4310</b>	<b>1022</b>	<b>11723</b>

Source: Field Survey, 2007-08

**Table 4.22 Irrigation Schemes: Funds for Repair and Maintenance (Rs. Lakh)**

Schemes	Bharmaur	Bhatiyat	Chamba	Mehla	Salooni	Tissa	District
<b>Functional</b>							
<b>Lift irrigation</b>							
Number	0	10	1	0	0	0	11
Annual maintenance	0	15.3	6	0	0	0	21.3
Replacement/overhauling in 10 yrs	0	200	50	0	0	0	250
<b>Kuhl</b>							
Number	3	72	0	0	0	1	76
Annual maintenance	2.9	10.86	0	0	0	5	18.76
Replacement/overhauling in 10 yrs	500	1037.5	0	0	0	15	1552.5
<b>FIS</b>							
Number	5	0	18	0	0	0	23
Annual maintenance	15	0	40	0	0	0	55
Replacement/overhauling in 10 yrs	250	0	500	0	0	0	750
<b>Non-functional</b>							
<b>Lift irrigation</b>							
Number	0	0	0	0	0	1	1
Annual maintenance	0	0	0	0	0	0.5	0.5
Replacement/overhauling in 10 yrs	0	0	0	0	0	10	10
<b>Kuhl</b>							
Number	0	0	0	0	0	1	1
Annual maintenance	0	0	0	0	0	15	15
Replacement/overhauling in 10 yrs	0	0	0	0	0	15	15
<b>Flow Irrigation Scheme</b>							
Number	3	0	1	0	0	0	4
Annual maintenance	0	0	4	0	0	0	4
Replacement/overhauling in 10 yrs	57	0	20	0	0	0	77
Total funds for all schemes, repairs, maintenance and overhauling							2769.06

Source: Field Survey, 2007-08

#### 4.10 Research/Extension Gaps

The research and extension gaps that have emerged from the extensive survey of this district are shown in Table 4.23. The major problems in almost all the crops are lack of suitable variety, non availability of critical inputs at right time including quality seeds; lack of awareness of improved management practices, attacks of diseases and pests and wild animals (monkey menace), etc. Therefore, there is a need to strengthen research, extension and development institutions to solve the varietal and technological problems of farmers.

**Table 4.23 Technological Interventions for Cereals, Pulses and Oilseed Crops (Per Cent of Panchayats)**

Crops	Solution suggested	Bharmaur	Bhatiyat	Chamba	Mehla	Salooni	Tissa
<b>Cereal</b>							
Maize	Demonstration on HYV and IPM	0	0	25	80	100	0
	Availability of HYV to be ensured	0	0	25	80	100	0
	Training to the farmers & timely input supply	0	14	100	20	0	60
	Forest department to intervene to solve monkey menace	0	29	50	100	80	80
	Irrigation facility to be strengthened	75	14	0	0	0	0
	Subsidy on inputs	0	0	25	0	0	0
Paddy	Demonstration on HYV and IPM	50	0	50	0	0	0
	Availability of HYV to be ensured	0	14	25	0	0	0
	Training to the farmers	0	14	75	0	0	0
	Development of resistant varieties	0	14	75	0	0	0
Wheat	Demonstration on HYV and IPM	0	14	75	80	100	0
	Availability of HYV to be ensured	0	14	25	60	100	0
	Training to the farmers on weedicides use	0	14	75	20	100	0
	Irrigation facilities	0	14	75	20	0	60
	Subsidy on inputs	0	14	100	80	100	80
Barley	Demonstration on HYV and IPM	0	14	75	40	40	0
	Availability of HYV to be ensured	0	14	50	0	0	60
	Irrigation facilities	0	14	0	60	40	80
<b>Pulses</b>							
Mash	Supply of improved seeds	0	14	25	0	0	20
	Irrigation facilities	0	0	25	0	0	0
Rajmash	Improved variety	0	0	25	0	0	20
	Diseases/pest control	0	14	0	0	0	0
<b>Vegetables</b>							
Potato	Timely supply of seed potato	0	14	100	0	0	0
	Irrigation	0	0	75	40	0	40
	Markets and marketing information	50	0	25	80	80	20
Peas	IPH Department to intervene and construct irrigation kuhls	0	0	25	20	60	0
	Improved variety	25	14	50	40	60	0
	Develop local market outlets	0	0	25	0	0	0
Other vegetables	Planting material of improved varieties	0	50	25	0	20	0
	Irrigation	0	0	25	0	0	0
	Marketing outlets	0	0	0	0	0	0
<b>Flower cuts/ bulbs</b>							
	Planting material	0	0	25	0	40	0
	Training and exposure visit	25	0	0	0	40	0
	Subsidy on greenhouse technology	0	0	0	0	0	0
	Marketing support	0	0	0	0	0	0
<b>Fruit plants</b>							
Apple	Irrigation schemes	25	0	0	80	5	0
	Training and exposure visit	0	0	0	20	0	0

	Dept. of Horticulture to intervene	0	14	25	0	0	60
	Improvement of varieties	0	0	0	0	0	0
	Animal parks	0	0	0	0	0	0
Citrus	Department of horticulture to intervene	0	0	25	0	0	0
	Irrigation	25	0	50	0	0	0
Mango	Department of horticulture to intervene	0	0	75	0	0	0
Litchi	Department of horticulture to intervene	0	0	25	0	0	0
Apricot	Forest department to intervene	0	0	25	0	0	0
Pear	Forest department to intervene	0	0	25	0	0	0
Dry fruit	Technical guidance	0	14	0	0	0	0

Source: Field Survey, 2007-08

In nutshell, the major interventions are:

- 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 issued 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 and implements to reduce labour and drudgery of 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

#### 4.11 Researchable Issues

The research and development issues that emerged from close perusal of agricultural scenario and potential in the district are:

##### Natural Resource Management

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

- Improvement of pastures and restoration and protection of forest grazing rights of shepherd community
- Characterization, classification and fertility maps of soils
- 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
- Development of technologies to harness trout fish production potential and also providing technical know-how to the fish farmers
- To spread red clover and white clover through sheep droppings to improve the productivity of alpine pastures and other grazing lands in higher hills.
- Base line survey of river catchments and assessment of ground water potential
- Studies on climate change and its impacts on agro-geology and to devise suitable strategies to tackle various problems emerging out of climatic change.

### **Crop Improvement**

- 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
- Varietal development in under utilized but highly nutritive crops like amaranths, cheeney, buckwheat and other millets as well as in high value and low volume crops like kalazira in Pangi
- Effective selection, conservation, evaluation, documentation and utilization of genetic resources ensuring wider coverage under improved crop varieties with major emphasis on quality seed production.
- Refinement and validation of technologies for major crops
- *Ex-situ* and *in situ* conservation of minor millet cereals
- Transfer of technologies through extension interventions like trainings, demonstrations, exposure visits, replication of success stories, etc. Creation of farmers' advisory system to address their day - to - day queries
- Validation of ITKS and use of IT for technology dissemination by creating IT hubs at focal points

- To promote and strengthen the public- private partnership for ensuring delivery of need based inputs and technologies
- Integrated nutrient management technology demonstration on farm/field and locking into issues in solid waste management and standardization of agro-technology for organic farming
- Development/identification of hybrids and varieties of potential vegetable crops, standardization of production technology of hybrids and development of hybrids and production technology for protected cultivation
- Refinement of green house/poly house technology for temperate region
- Studies on economic and marketing aspects of cash crops

### **Crop Protection**

- Survey and surveillance of major diseases and pests of important crops
- Identification of resistant sources and study of genetics of resistance against pests and diseases
- Marker assisted selection of resistance genes using molecular markers and their use in gene pyramiding for resistance in commercial varieties
- Development of integrated disease and pest management modules suitable for organic and protected agriculture conditions
- Development of detection techniques for pathogens of quarantine importance and certification purposes relating to important seed and soil borne diseases (pea root rot and wilt complex, bacterial wilt, bean mosaic, urdbean leaf crinkle, bacterial blight, potato viruses etc.)
- Formulation of bio-intensive IPM strategies for the management of *Helicoverpa armigera* (tomato, fruit flies (cucurbits and tomatoes), cut worms (vegetables); plant parasitic nematodes (cereals and vegetables), insect pest and nematode management under protected cultivation situations
- Collection and utilization of local strains of entomopathogenic organisms for insect pest management under organic farming situations
- Identification and utilization of native botanicals for eco-friendly pest management:
- Safe management alternatives for the stored grain pests.
- Identification and management of diseases and insect-pests of medicinal, aromatic and ornamental plants.
- Weed management studies in major crops

## Chapter V

### ALLIED AGRICULTURAL SECTORS

Diversification of agriculture has become the most important tool for realising higher income and employment from small holdings. The typical farming system in a particular area comprises of various components allied to agriculture. Obviously, these components compete or complement the resource matrix and in a way contribute to the over all development of farm economy. The holistic development of farming system bears special significance for hilly regions having low land base, short working season and limited options of non-farm avenues of employment. At the same time, the agro-climatic specificities offer the scope for niche based farming that can ensure higher incomes to farmers.

#### 5.1 Horticulture

Horticultural development bears special significance for this district due to congenial temperate climate. There are various schemes for the development of horticulture in different blocks as shown in Table 5.1. The area under fruit in this district can be increased from existing 4,965 hectares to 7,131 hectares (Table 5.2). The production of fruit can be increased by more than two times from 20,006 tonnes to 58,455 tonnes. Apple is the major fruit grown in all the blocks except Bhatiyat followed by walnut and stone fruit. The area under apple can be increased from existing 3,976 hectares to 5,622 hectares and the production from 18,062 tonnes to 53,764 tonnes. There are 27,913 new households interested to take up fruit plantation.

**Table 5.1 Existing Schemes for Horticulture Development**

Blocks	No. of schemes	No. of villages covered	Population covered (No.)	Area (Ha)	Beneficiary families (No.)	Status		Total budget (Rs. Lakh)	Additional funds required (Rs. Lakh)
						Completed (No.)	Incomplete (No.)		
Bharmaur	1	51	1310	39.00	262	0	1	41.00	55.00
Bhatiyat	1	60	780	45.00	156	0	1	8.26	20.00
Chamba	1	12	1095	25.00	219	0	1	10.71	20.00
Mehla	1	129	1175	16.00	235	0	1	35.00	1000.00
Salooni	5	50	2500	20.00	500	5	0	2.50	0.00
Tissa	3	175	200	25.00	257	0	3	7.50	45.00
<b>Total</b>	<b>12</b>	<b>477</b>	<b>7060</b>	<b>170.00</b>	<b>1629</b>	<b>5</b>	<b>7</b>	<b>104.97</b>	<b>1140.00</b>

Source: Field Survey, 2007-08

**Table 5.2 Existing Status and Potential for Horticulture Development**

Crop	Status	Particulars	Chamba	Mehla	Bhatiyat	Salooni	Tissa	Bharmaur	District
Apple	Existing	Area (Ha)	768	777		765	802	863	3976
		Production (Q)	34574	31857		36741	36901	40549	180622
		Households (No.)	507	4263		2197	6846	9229	23042
	Potential	Area (Ha)	878	928		1225	1528	1063	5622
		Production (Q)	83410	87232		120079	151272	95648	537641
		New Households (No.)	488	5670		4830	10248	1547	22783
Stone fruits	Existing	Area (Ha)	98	21	99	4		58	280
		Production (Q)	105	11	80	7		26	229
		Households (No.)	702	420	587	460		870	3039
	Potential	Area (Ha)	180	32	170	9		72	463
		Production (Q)	190	19	183	11		102	505
		New Households (No.)	1099	480	345	490		1050	3464
Walnut	Existing	Area (Ha)		129		125	220	236	710
		Production (Q)		3470		3637	5503	6597	19205
		Households (No.)		245		230	190	215	880
	Potential	Area (Ha)	10	190		195	310	340	1046
		Production (Q)	452	5142		9575	14570	16660	46399
		New Households (No.)	80	645		351	265	325	1666
All fruit	Existing	Area (Ha)	866	927	99	895	1022	1156	4965
		Production (Q)	34679	35337	80	40385	42404	47172	200056
		Households (No.)	1209	4928	587	2887	7036	10314	26961
	Potential	Area (Ha)	1068	1150	170	1430	1838	1475	7131
		Production (Q)	84052	92393	183	129665	165842	112410	584545
		New Households (No.)	1667	6795	345	5671	10513	2922	27913

Source: Field Survey, 2007-08

## 5.2 Animal Husbandry

There are a few schemes in different blocks for the development of livestock and fisheries as given in Table 5.3. The livestock population shown in Table 5.4 is estimated at 8.63 lakhs in which sheep and goats collectively constitute around 58 per cent of livestock population. The sheep and goat population is mainly concentrated in Bharmaur block where Gaddi tribe predominates pursuing shepherding as main profession. Among milch animals, local cows predominate though there is constant increase in cross bred cows. In low hill regions, buffaloes are also reared and migratory Gujjar tribe is more predominant in this district.



**Table 5.3 Existing Schemes for Livestock and Fishery Development**

Scheme/ Blocks	No. of schemes	No. of village covered	Population covered (No.)	Area	Beneficiary families (No.)	Status		Total budget (Rs. Lakh)	Additional funds required (Rs. Lakh)
						Completed (No)	Incomplete (No)		
<b>Fisheries</b>									
Bharmaur	1	1	200	2.00	20	1	0	1.00	15.00
Bhatiyat	2	10	2500	15.00	27	0	2	1.00	2.00
Chamba	1	5	1800	0.20	5	1	0	0.20	1.00
Mehla	23	37	2800	30.00	32	23	0	40.00	60.00
Salooni	20	28	3100	24.00	20	10	10	6.00	10.00
Tissa	12	18	2200	21.00	18	12	0	3.00	10.00
<b>Total</b>	<b>59</b>	<b>99</b>	<b>12600</b>	<b>92.20</b>	<b>122</b>	<b>47</b>	<b>12</b>	<b>51.20</b>	<b>98.00</b>
<b>Livestock Improvement</b>									
Bharmaur	6	263	1315	21	989	2	4	50.50	50.00
Bhatiyat	2	40	8000	23	8000	0	2	200.00	50.00
Chamba	1	28	6100	21	90	0	1	100.00	100.00
Mehla	1	40	10000	46	510	0	1	100.00	100.00
Salooni	1	28	6100	21	90	0	1	100.00	100.00
Tissa	2	42	5500	42	80	0	2	10.00	112.50
<b>Total</b>	<b>13</b>	<b>441</b>	<b>37015</b>	<b>174</b>	<b>9759</b>	<b>2</b>	<b>11</b>	<b>560.50</b>	<b>512.50</b>

Source: Field Survey, 2007-08

**Table 5.4 Livestock Population (Number)**

Type of animals	Chamba	Mehla	Bhatiyat	Salooni	Tissa	Bharmaur	District
<b>Productive</b>							
Crossbred cows	6756	2772	6971	4914	3292	1044	25749
Local cows	9664	16448	17133	18096	13854	7903	83098
Buffaloes	4758	6972	5865	4830	7602		30027
Sheep	23464	29238	26734	14925	14156	218026	326544
Goats	10794	22438	15215	25251	17993	171141	262832
Young stock	3900	19950	6210	5750	5350	7800	48960
Bullocks	6473	8362	5993	13253	5237	6173	45491
Equines	3237	1722	1587	2714	1932	957	12149
<b>Unproductive*</b>	<b>4680</b>	<b>8448</b>	<b>2208</b>	<b>6050</b>	<b>3057</b>	<b>3857</b>	<b>28300</b>
<b>Total livestock</b>	<b>73726</b>	<b>116350</b>	<b>87916</b>	<b>95783</b>	<b>72473</b>	<b>416901</b>	<b>863150</b>
Poultry	10998	8148	14628	10534	13314	600	58222
Broilers	5811		17250		5880		28941

Note: \*Stray/ old/ diseased/ deformed/ infertile

Source: Field Survey, 2007-08

### **5.3 Fisheries**

There is no special effort to take up fishery enterprise in the district. However, there is scope to introduce cold-water fish culture at certain places where river Ravi flow is mild in the valley area. There is also scope for rearing trout that can be sold at premium price. To harness this potential, the major interventions have been depicted in Tables 5.5 and 5.6.

**Table 5.5 Cultured Fisheries: Existing Status, Potential and Diseases**

Particulars	Households (No.)	Fish production (Q)	Ponds (No.)	Ponds area (Ha)	Fish Species				Diseases	
					Common carp	Rohu	Catla-catla	Mrigal	Grass carp	Silver carp
<b>Bharmaur</b>										
Existing	0	40	20	0.16	√	√		√	√	√
Potential	0	100	50	0.04						
Gap	0	60	30	0.2	√	√				
<b>Bhatiyat</b>										
Existing	27	27	36	0.36	√	√				
Potential	25	25	25	0.25	√	√	√			
Gap	25	25	25	0.25	√	√	√			
<b>Chamba</b>										
Existing	0	18	19	0.19	√	√				
Potential	0	14	14	0.14	√	√				
Gap	0	14	14	0.14	√	√				
<b>Mehla</b>										
Existing	0	18	18	0.18	√	√				
Potential	0	22	0	0.22	√	√	√			
Gap	0	4	0	0.04	√	√	√			
<b>Salooni</b>										
Existing	20	0	0	150	√					
Potential	150	0	0	150						
Gap	130	0	0	150	√					
<b>Tissa</b>										
Existing	0	0	0	0						
Potential	0	0	0	0						
Gap										
<b>District</b>										
Existing	47	103	93	150.89	√	√	√	√	√	√
Potential	175	161	89	150.65	√	√	√	√	√	√
Gap	128	58	89	150.65	√	√	√	√	√	√

Field Survey, 2007-08

**Table 5.6 Constraints/Interventions in Cultured Fisheries: Response**

Constraint	Bharmaur	Bhatiyat	Chamba	Mehla	Salooni	Tissa
Quality/quantity of fingerlings	√	√		√		
Fish feed	√	√	√	√	√	
Quality and quantity of water supply	√	√	√	√		
Training	√	√	√	√	√	
Technical know how	√	√	√	√	√	
Pond structure	√					
Perishability	√					
Remunerative price	√		√	√		
Market	√	√	√	√	√	
Cast nets, medicines etc.	√	√	√	√		

Source: Field Survey, 2007-08

#### 5.4 Poultry

Poultry is not a major enterprise but farmers generally keep few birds for meeting domestic requirement. Total population of poultry in the district is 58,222 sparsely spread in all the blocks (Table 5.7). The population of broilers is estimated at 28,941 which are found mostly in warmer region of Bhatiyat block. Both improved and local breeds co-exist.

**Table 5.7 Poultry Production (Number)**

Type of animals	Chamba	Mehla	Bhatiyat	Salooni	Tissa	Bharmaur	District
Poultry	10998	8148	14628	10534	13314	600	58222
Broilers	5811		17250		5880		28941

Field Survey, 2007-08

#### 5.5 Mushroom

There is also scope for mushroom production. There are few small mushroom growers. However, mushroom farming can be developed as a potential enterprise provided technical, institutional and marketing support is provided to the growers. There are some local nutritious strains mainly *Guchhi* that need to be cultured and popularised through research and development endeavour.

#### 5.6 Medicinal Plants

District Chamba is known as the repository of medicinal and aromatic plants and plenty of these grow under natural conditions. There exists potential to domesticate and cultivate wide variety of medicinal species on commercial scale. The important medicinal species found in different parts of Chamba district are given in Table 5.8. The important species of economic importance are: *kalazeera*, *salampanja*, *karhu*, *patish*, *ratanjot*, *diascoria*, *dhoop* and many other species. There

is a dire need to conserve these high value herbs and to develop and standardise their cultivation techniques. Efforts also need to be directed towards *in situ* conservation as many of these species are facing extinction due to over exploitation. Recently, some efforts are being made to popularize cultivation of medicinal plants mainly safed musli and geranium.

**Table 5.8 Important Medicinal and Aromatic Species**

Common Name	Scientific Name
Kalazeera	<i>Bunium persicum</i>
Shingu	<i>Carum carvi</i>
Dhoop	<i>Juniperus macropoda</i>
Patrala	<i>Heracleum candican</i>
Salam panja	<i>Dactylorhiza hatagirea</i>
Atish	<i>Aconitum heterophyllum</i>
Karu	<i>Picrorhiza kurooa</i>
Ratanjot	<i>Arnebia euchroma</i>
Bankakri	<i>Podophyllum hexandrum</i>
Jangli lahsun	<i>Allium carolinianum</i>

Source: Field Survey, 2007-08

### 5.7 Bee Keeping

Bee keeping can be developed as a potential enterprise in this district as there is sufficient flora available. In certain locations, farmers are rearing exotic (*Apis mellifera*) as well as indigenous (*Apis indica*) bee colonies. Both stationary and migratory bee keeping practices are adopted. In Bharmaur, high quality honey is produced due to availability of medicinal flora *Chhichhari* (*Plectranthus*). Presently, bee keeping is not a specialised activity but a supplementary enterprise but with the emphasis on horticultural development, the bee keeping may gain importance to harness their complimentary benefits in pollination. With the increase in area under fruit, sufficient bee flora can be produced in flowering season. However, like sheep and goats, migratory bee keeping will be more feasible such that during winter bee colonies are shifted to other areas.

### 5.8 Agro-Eco-Tourism, Organic Farming and Protected Cultivation

The district harbours verdant valleys, camping sites, majestic mountains, passes, sky line glacier sand lakes, gushing rivers and heritage buildings and temples.

The entire district is full of natural scenery exhorting the tourists and visitors to explore and imbibe its hidden grandeur. In the past, there were no special efforts to develop tourism due to restriction for security reasons. But now, barring few border villages, the area has been opened

for outside tourists. Therefore, development of agro-eco-tourism may be looked as a major endeavour to provide more livelihood options to people.

Sustainable farming and environment protection are the key concerns in hills and organic farming is the best way to achieve these twin objectives. In most part of the district, farming is 'organic by tradition' as farmers are not using pesticides and chemicals. There is relatively less incidence of diseases and pests due to natural barriers. All these conditions favour organic agro-eco-tourism and organic farming.

The district stands third in the state in terms of the geographical area but at the same time has the limited availability of arable land. Consequently, there is predominance of marginal and small holdings. Therefore, land intensive farming practices like protected cultivation bear importance to increase land use and productivity. The protected cultivation can be promoted in all parts of the district. There is a need to develop the cluster of poly houses in different villages. State Agricultural/Horticultural Universities have already developed the technology which needs to be popularised among the farmers. In this plan, sufficient provisions have been made for developing these innovative schemes.

There are number of scenic resorts, historical monuments, old temples, pilgrim places, natural picnic spots, wild fauna and adventurous passes, etc. The worth mentioning are the scenic resorts like Dalhousie, Khajjiar, Chowgan; historical monuments like Chamba fort/museum, Chaurashi temples; adventures of Manimahesh Yatra and Saach pass. This natural grandeur and old wealth in the district can be used to develop agro-tourism as a potential source of income and employment.

### **5.9 Agricultural Marketing**

Marketing requires special emphasis in Chamba district in order to bring transformation in farming. The extent of marketed surplus of different commodities has been estimated and presented in Table 5.9. There is very limited marketed surplus in cereals, pulses and oilseeds as major proportion of these commodities is consumed. Similar pattern was observed in milk also. However, there is substantial surplus of fruit and vegetables in all the blocks. In case of vegetables, out of total production of 1,15,347 quintals, 52,074 quintals formed the marketed surplus. Similarly, in fruit, total production was estimated at 2,00,056 quintals out of which as high as 1,80,654 quintals was marketed. The marketed surplus could increase remarkably by reducing post harvest losses in vegetables and fruit. Major proportion of vegetables and fruit is marketed in distant markets. There is a dire need to establish primary market sub-yards in potential areas and integrate these with the principal market yard to provide local market outlets and remunerative prices to producers. There is not even a single regulated principal market in the district (Table 5.10). The market sub yard also needs to be developed in different blocks. The financial estimates for the development of markets have been given in Table 5.11

**Table 5.9 Production, Disposal and Post Harvest Losses of Agricultural Produce (Q)**

<b>Particulars</b>	<b>Chamba</b>	<b>Mehla</b>	<b>Bhatiyat</b>	<b>Salooni</b>	<b>Tissa</b>	<b>Bharmaur</b>	<b>District</b>
<b>Cereals</b>							
Total production	26325.00	12590.00	40316.40	24578.00	20548.80	21677.50	146035.70
Consumption	26275.00	12535.00	40261.45	24529.00	20495.60	21634.20	145730.25
Marketed surplus	17.35	12.65	16.54	13.19	17.02	9.28	86.03
Losses in storage	13.00	18.35	16.48	16.32	15.14	14.35	93.64
Losses in transportation	1.50	1.75	1.15	1.04	1.40	1.35	8.19
Post harvest losses	18.15	22.25	20.78	18.45	19.64	18.32	117.59
Name of markets where sold							
<i>Local</i>	100.00	100.00	100.00	100.00	100.00	100.00	100.00
<b>Pulses</b>							
Total production	180.70	206.85	277.72	429.64	304.29	1239.75	2638.95
Consumption	167.96	194.34	263.46	416.57	291.58	1222.45	2556.36
Marketed surplus	4.44	4.29	7.79	6.61	5.95	11.04	40.12
Losses in storage	4.36	3.98	4.07	3.45	3.75	3.25	22.86
Losses in transportation	0.48	0.54	0.15	0.45	0.45	0.76	2.83
Post harvest losses	3.46	3.70	2.25	2.56	2.56	2.25	16.78
Name of markets where sold							
<i>Local</i>	100.00	100.00	100.00	100.00	100.00	100.00	100.00
<b>Oilseeds</b>							0.00
Total production	18.00	5.67	43.81	0.00	7.64	0.00	75.12
Consumption	16.50	4.90	42.23		7.01		70.64
Marketed surplus	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Losses in storage	1.25	0.54	1.29		0.58		3.66
Losses in transportation							
Post harvest losses	0.25	0.23	0.29		0.05		0.82
<b>Vegetables</b>							
Total production	27375.00	13654.00	28237.50	17094.00	14709.00	14277.50	115347.00

Consumption	8546.00	6458.00	9548.00	7965.00	7456.00	8021.00	47994.00
Marketed surplus	15890.00	5017.00	15610.50	6650.00	4995.00	3911.50	52074.00
Losses in storage	425.00	256.00	685.00	598.00	489.00	459.00	2912.00
Losses in transportation	1056.00	958.00	1158.00	895.00	895.00	897.00	5859.00
Post harvest losses	1458.00	965.00	1236.00	986.00	874.00	989.00	6508.00
Name of markets where sold							
<i>Local</i>	50.00	50.00	50.00	50.00	50.00		46.24
<i>Distant within state</i>		50.00	50.00	50.00	50.00	50.00	42.00
<i>Distant outside State</i>	50.00					50.00	11.76
<b>Fruit</b>							
Total production	34678.59	35337.00	80.00	40384.72	42403.70	47172.15	200056.16
Consumption	4586.50	3256.12	5.68	3659.25	2564.39	4578.23	18650.17
Marketed surplus	29960.09	31938.88	22.19	36586.47	39705.31	42441.92	180654.86
Losses in storage	25.00	31.00	12.56	28.00	32.00	36.00	164.56
Losses in transportation	65.00	63.00	18.32	60.00	54.00	62.00	322.32
Post harvest losses	42.00	48.00	21.25	51.00	48.00	54.00	264.25
Name of markets where sold							
<b>Milk</b>							
Total production	38.25	36.60	38.55	32.70	33.90	20.43	200.43
Consumption	35.95	34.96	37.25	30.54	31.26	18.95	188.91
Marketed surplus	2.28	1.60	1.25	2.07	2.58	1.42	11.19
Losses in storage							
Losses in transportation	0.03	0.04	0.05	0.09	0.07	0.06	0.33
Post harvest losses							
Name of markets where sold							
<i>Local</i>	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Field Survey, 2007-08



**Table 5.10 Rural Markets in Chamba District**

Blocks	No. of schemes	No. of villages covered	Population covered	Area	Beneficiary families (No.)	Status		Total budget (Rs. Lakh)	Additional funds required (Rs. Lakh)
						Completed (No)	Incomplete (No)		
<b>Rural Markets</b>									
Bharmaur	0	0	0	0	0	0	0	0.00	0.00
Bhatiyat	0	0	0	0	0	0	0	0.00	0.00
Chamba	1	4	560	2	95		1	3.00	3.00
Mehla	0	0	0	0	0	0	0	0.00	0.00
Salooni	1	50	15000	9	3000		1	8.50	5.00
Tissa	0	0	0	0	0	0	0	0.00	0.00
<b>Total</b>	<b>2</b>	<b>54</b>	<b>15560</b>	<b>11</b>	<b>3095</b>	<b>0</b>	<b>2</b>	<b>11.50</b>	<b>8.00</b>

Source: Field Survey, 2007-08

### 5.10 Agricultural Infrastructure

The district has a strong network of agricultural institutions. The main agricultural development institutions prevalent in the district are; KVK (Horticulture), Dy. Dir (Agri) Research Sub Station (CSKHPKV), Salooni, Dy. Director (Animal Husbandry) and District Fisheries Officer. However, different institutions need to be strengthened and equipped with modern infrastructure. There is also need for more resource personnel for effective implementation of agricultural plans. The human resource requirement in different departments/institutions has been presented in Table 5.11.

**Table 5.11 Human Resources for Agricultural Development (No.)**

Position	Bharmaur				Bhatiyat				Chamba				Mehla			
	S	P	R	G	S	P	R	G	S	P	R	G	S	P	R	G
SMS (Agri)	0	0	2	2	1	0	2	1	1	1	1	0	1	1	2	1
ADOs	2	1	3	1	3	2	4	1	2	2	2	0	2	0	4	2
AEOs	4	4	8	4	13	2	24	11	9	3	15	6	10	2	20	10
SMS (Horti)	1	1	1	0	1	1	1	0	1	1	1	0	0	0	0	0
HDOs	2	1	2	0	2	1	3	1	1	1	1	0	1	1	2	1
HEOs	12	8	16	4	10	3	17	7	6	4	8	2	10	0	20	10
Sr. Veterinary officers	1	1	1	0	1	1	1	0	1	1	1	0	1	1	2	1
Veterinary doctors	9	7	14	5	6	6	6	0	8	7	9	1	2	2	4	2
Veterinary pharmacists	27	25	47	20	12	12	12	0	28	28	28	0	30	30	60	30
Extension specialists for				0				0				0				0
Bee keeping	2	1	3	1	0	0	1	1	1	1	1	0	0	0	0	0
Mushrooms	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0
Floriculture	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0	0
Fisheries	2	1	3	1	2	0	4	2	9	9	9	0	0	0	3	3
Sericulture	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
Soil conservation	0	0	0	0	0	0	0	0	4	2	6	2	0	0	0	0

**Table 5.11 contd...**

Position	Salooni				Tissa				District			
	S	P	R	G	S	P	R	G	S	P	R	G
SMS (Agri)	1	1	1	0	0	0	1	1	4	3	9	5
ADOs	2	0	4	2	2	1	4	2	13	6	21	8
AEOs	10	1	19	9	8	1	18	10	54	13	104	50
SMS (Horti)	0	0	0	0	0	0	1	1	3	3	4	1
HDOs	1	1	1	0	1	0	3	2	8	5	12	4
HEOs	1	1	1	0	6	1	16	10	45	17	78	33
Sr. Veterinary officers	0	0	0	0	1	0	5	4	5	4	10	5
Veterinary doctors	3	2	4	1	18	14	39	21	46	38	76	30
Veterinary pharmacists	36	35	37	1	0	0	0	0	133	130	184	51
Extension specialists for				0				0	0	0	0	0
Bee keeping	0	0	0	0	0	0	5	5	3	2	10	7
Mushrooms	0	0	0	0	0	0	5	5	0	0	7	7
Floriculture	0	0	0	0	0	0	5	5	0	0	7	7
Fisheries	0	0	0	0	0	0	5	5	13	10	24	11
Sericulture	0	0	0	0	0	0	0	0	0	0	1	1
Soil conservation	0	0		0	0	0	0	0	4	2	6	2

Note: S: Sanction; P: Present; R: Required; G: Gap

Source: Different offices of the Government of Himachal Pradesh in Chamba District

### 5.11 Rural Enterprises and Agro Processing

The existing livelihood options of different categories of farmers have been displayed in Table 5.12. It can be visualised that agriculture is the mainstay of majority of households followed by livestock and horticulture. There are few households engaged in rural handicrafts, rural artisans and shops. This clearly shows dearth of non-farm avenues of livelihood in this district

With the increase in education level, there are number of educated youth seeking employment outside agriculture. Most of the persons are educated up to matriculation and higher secondary levels. The educated manpower can be gainfully employed in different farm avocations and enterprises there by providing critical support services to improve farm productivity. The extent of employment in different activities has been displayed in table 5.12. The requirement of agro sale centres/agro clinics, markets and other infrastructure has been shown in Table 5.13. Development of these agro based enterprises would provide employment to educated youth.

**Table 5.12 Status of Rural Enterprises in Chamba District**

Particulars	Existing			Potential			
	No. of units	Person employed (No.)	Investment (Rs)	Production (Q)	No of units	Employment (No.)	Investment (Rs. Lakh)
<b>Atta chakki</b>							
Bharmaur	78	78	0.29	70	0	0	0
Bhatiyat	58	116	35	8700	5	10	2.5
Chamba	0	0	0	0	0	0	0
Mehla	29	29	116	0	32	32	128
Salooni	26	44	2.46	0	28	51	3.5
Tissa	378	378	50	8	1000	1000	4
<b>Total</b>	<b>569</b>	<b>645</b>	<b>203.75</b>	<b>8778</b>	<b>1065</b>	<b>1093</b>	<b>138</b>
<b>Oil expeller</b>							
Bharmaur	3	3	1.8	5.5	0	0	0
Bhatiyat	13	13	9	1600	4	4	1.8
Chamba	4	15	8.25	10	0	0	0
Mehla	0	0	0	0	0	0	0
Salooni	11	11	5	5.5	0	0	0
Tissa	52	52	13	4	80	80	0.8
<b>Total</b>	<b>83</b>	<b>94</b>	<b>37.05</b>	<b>1625</b>	<b>84</b>	<b>84</b>	<b>2.6</b>
<b>Bakery</b>							
Bharmaur	2	5	0.4	98	0	0	0
Bhatiyat	8	20	3	1000	2	6	1
Chamba	1	2	4	2	0	0	0
Mehla	2	6	2	0	4	12	4
Salooni	5	14	1.09	5	6	12	8
Tissa	0	0	0	0	6	40	3
<b>Total</b>	<b>18</b>	<b>47</b>	<b>10.49</b>	<b>1105</b>	<b>18</b>	<b>70</b>	<b>16</b>
<b>Rice sheller</b>							
Bharmaur	0	0	0	0	0	0	0
Bhatiyat	9	9	4	1100	6	6	3
Chamba	0	0	0	0	0	0	0
Mehla	0	0	0	0	0	0	0
Salooni	0	0	0	0	0	0	0
Tissa	0	0	0	0	0	0	0
<b>Total</b>	<b>9</b>	<b>9</b>	<b>4</b>	<b>1100</b>	<b>6</b>	<b>6</b>	<b>3</b>

<b>Maize sheller</b>							
Bharmaur	0	0	0	0	10	10	0.7
Bhatiyat	0	0	0	0	0	0	0
Chamba	0	0	0	0	0	0	0
Mehla	0	0	0	0	0	0	0
Salooni	0	0	0	0	0	0	0
Tissa	212	212	12	15	200	200	30
<b>Total</b>	212	212	12	15	210	210	30.7
<b>Vermi-compost</b>							
Bharmaur	4	0	0.5	150	0	0	0
Bhatiyat	15	0	2.25	15	100	100	15
Chamba	0	0	0	0	0	0	0
Mehla	0	0	0	0	0	0	0
Salooni	0	0	0	0	0	0	0
Tissa	0	0	0	0	5	50	1.5
<b>Total</b>	19	0	2.75	165	105	150	16.5
<b>Mushroom compost</b>							
Bharmaur	0	0	0	0	0	0	0
Bhatiyat	0	0	0	0	0	0	0
Chamba	0	0	0	0	0	0	0
Mehla	0	0	0	0	0	0	0
Salooni	0	0	0	0	0	0	0
Tissa	0	0	0	0	3	60	8
<b>Total</b>	0	0	0	0	3	60	8
<b>Rural craft</b>							
Bharmaur	105	200	15.75	105	0	0	0
Bhatiyat	25	75	1	0	0	0	0
Chamba	0	0	0	0	0	0	0
Mehla	0	0	0	0	0	0	0
Salooni	0	0	0	0	0	0	0
Tissa	0	0	0	0	100	1000	50
<b>Total</b>	130	275	16.75	105	100	1000	50
<b>Nursery raising</b>							
Bharmaur	9	9	2.9	0.6	0	0	0
Bhatiyat	8	12	1	0	0	0	0
Chamba	0	0	0	0	0	0	0
Mehla	0	0	0	0	0	0	0
Salooni	0	0	0	0	0	0	0
Tissa	25	100	10	1	25	100	5
<b>Total</b>	42	121	13.9	1.6	25	100	5

<b>Flower nursery</b>							
Bharmaur	0	0	0	0	1	1	0.2
Bhatiyat	0	0	0	0	0	0	0
Chamba	1	1	0.15	40	1	1	0.75
Mehla	0	0	0	0	0	0	0
Salooni	0	0	0	0	0	0	0
Tissa	0	0	0	0	0	0	0
<b>Total</b>	1	1	0.15	40	2	2	0.95
<b>Seed production</b>							
Bharmaur	0	0	0	0	5	5	0.2
Bhatiyat	0	0	0	0	0	0	0
Chamba	25	25	0.25	250	0	0	0
Mehla	0	0	0	0	0	0	0
Salooni	0	0	0	0	0	0	0
Tissa	0	0	0	0	10	500	10
<b>Total</b>	25	25	0.25	250	15	505	10.2
<b>Pottery</b>							
Bharmaur	0	0	0	0	0	0	0
Bhatiyat	0	0	0	0	0	0	0
Chamba	0	0	0	0	0	0	0
Mehla	0	0	0	0	0	0	0
Salooni	0	0	0	0	0	0	0
Tissa	0	0	0	0	2	50	0.5
<b>Total</b>	0	0	0	0	2	50	0.5
<b>Feed mill</b>							
Bharmaur	0	0	0	0	0	0	0
Bhatiyat	0	0	0	0	0	0	0
Chamba	0	0	0	0	0	0	0
Mehla	0	0	0	0	0	0	0
Salooni	0	0	0	0	0	0	0
Tissa	0	0	0	0	3	100	6
<b>Total</b>	0	0	0	0	3	100	6
<b>Fruit and vegetable processing</b>							
Bharmaur	0	0	0	0	2	5	2
Bhatiyat	1	15	0.5	0	1	4	1.5
Chamba	0.35	28	30.845	582	0	0	0
Mehla	0	0	0	0	0	0	0
Salooni	0	0	0	0	0	0	0
Tissa	0	0	0	0	1	100	20
<b>Total</b>	1.35	43	31.345	582	4	109	23.5
<b>Pickles/squashes</b>							
Bharmaur	0	0	0	0	1	3	2
Bhatiyat	0	0	0	0	0	0	0
Chamba	0.35	28	30.845	582	0	0	0
Mehla	0	0	0	0	0	0	0

Salooni	0	0	0	0	0	0	0
Tissa	0	0	0	0	1	20	10
<b>Total</b>	0.35	28	30.845	582	2	23	12
<b>Pulse processing</b>							
Bharmaur	0	0	0	0	0	0	0
Bhatiyat	0	0	0	0	0	0	0
Chamba	0	0	0	0	0	0	0
Mehla	0	0	0	0	0	0	0
Salooni	0	0	0	0	0	0	0
Tissa	0	0	0	0	1	50	5
<b>Total</b>	0	0	0	0	1	50	5
<b>Beekeeping equipments</b>							
Bharmaur	0	0	0	0	3	3	1.5
Bhatiyat	0	0	0	0	0	0	0
Chamba	20	20	1	200	20	1	2
Mehla	0	0	0	0	0	0	0
Salooni	0	0	0	0	0	0	0
Tissa	0	0	0	0	2	10	1
<b>Total</b>	20	20	1	200	25	14	4.5
<b>Honey processing</b>							
Bharmaur	0	0	0	0	0	0	0
Bhatiyat	0	0	0	0	0	0	0
Chamba	0	0	0	0	0	0	0
Mehla	0	0	0	0	0	0	0
Salooni	0	0	0	0	0	0	0
Tissa	0	0	0	0	1	10	1
<b>Total</b>	0	0	0	0	1	10	1
<b>Wool carding</b>							
Bharmaur	3100	0	0	0	0	0	0
Bhatiyat	11	11	1.25	2200	1	4	2.5
Chamba	0	0	0	0	0	0	0
Mehla	1	1	0.15	0	4	4	0.6
Salooni	7	14	3.25	6	10	10	10
Tissa	0	0	0	0	4	50	3
<b>Total</b>	3119	26	4.65	2206	19	68	16.1
<b>Cotton carding</b>							
Bharmaur	0	0	0	0	0	0	0
Bhatiyat	11	11	1.25	2200	1	4	2.5
Chamba	0	0	0	0	0	0	0
Mehla	0	0	0	0	0	0	0
Salooni	0	0	0	0	0	0	0
Tissa	0	0	0	0	0	0	0
<b>Total</b>	11	11	1.25	2200	1	4	2.5
<b>Shawl, woollen garments</b>							
Bharmaur	3100	0	0	0	0	0	0
Bhatiyat	8	40	4	30000	3	15	6
Chamba	3	10	2	500	5	10	2
Mehla	0	0	0	0	0	0	0

Salooni	17	23	5.52	0	0	0	0
Tissa	0	0	0	0	10	100	10
<b>Total</b>	3128	73	11.52	30500	18	125	18
<b>Silk reeling</b>							
Bharmaur	0	0	0	0	0	0	0
Bhatiyat	0	0	0	0	0	0	0
Chamba	0	0	0	0	0	0	0
Mehla	0	0	0	0	0	0	0
Salooni	0	0	0	0	0	0	0
Tissa	0	0	0	0	0	0	0
<b>Total</b>	0	0	0	0	0	0	0
<b>Composite units</b>							
Bharmaur	0	0	0	0	0	0	0
Bhatiyat	0	0	0	0	0	0	0
Chamba	28	52	27.9	25	0	0	0
Mehla	0	0	0	0	0	0	0
Salooni	0	0	0	0	0	0	0
Tissa	0	0	0	0	0	0	0
<b>Total</b>	28	52	27.9	25	0	0	0
<b>Over all total</b>	7387.7	1630	381.7	49455	1709	3833	370.05

Source: Field Survey, 2007-08

**Table 5.13 Agri-business Establishments (No.)**

Block	Status	Agro sale centres	PACS	Rural handicraft		Cooperatives		Farmers co-operatives	Others
				Public	Private	Public	Private		
Bharmaur	E	18	19	0	0	0	0	0	0
	R	11	10	4	0	0	0	2	0
	G	0	0	4	0	0	0	2	0
Bhatiyat	E	14	6	0	0	0	0	0	0
	R	69	13	0	0	0	0	0	0
	G	55	7	0	0	0	0	0	0
Chamba	E	1	26	0	0	1	0	0	0
	R	0	0	0	0	0	0	0	0
	G	0	0	0	0	0	0	0	0
Mehla	E	0	46	0	0	2	0	45	0
	R	3	10	2	2	0	0	0	0
	G	3	0	2	2	0	0	0	0
Salooni	E	1	16	24	24	0	0	1	0
	R	2	0	0	0	1	0	0	0
	G	1	0	0	0	1	0	0	0
Tissa	E	0	0	1	20	0	0	1	1
	R	1	1	2	0	1	0	3	0
	G	1	1	1	0	1	0	2	0
District	E	34	113	25	44	3	0	47	1
	R	86	34	8	2	2	0	5	0
	G	60	8	7	2	2	0	4	0

Note: E-Existing, R-Required, G-Gap

Source: Field Survey, 2007-08

## 5.12 Drudgery of Women

Unlike plains, the women folk play a major role in farming in hills and district Chamba is no exception. Farming, by and large, is female dominated avocation and in the absence of mechanization, most of the farm operations are carried out manually. The hill topography and geographical barriers add to more drudgery reducing the labour efficiency in farm operations. The extent of drudgery of women is clearly visualised through the time spent in accomplishing different activities as shown in Table 5.14. In addition to household chores, the female workers in the family perform most of the farm operations (barring ploughing) manually. The time spent in these farm operations varies as per the type of operation and cropping season. Some of the operations last for 20 to 30 days and the extent of drudgery is further compounded due to short working season when all the farm activities have got to be carried out simultaneously.

The livestock rearing is absolutely a female centered avocation in hilly regions. The extent of drudgery in livestock rearing is much more than farm operations as most of the livestock rearing activities are attended to as a part of daily routine (Table 5.15). Fetching fodder from grass lands, fetching water, feeding, milking, shed cleaning, dung disposal and even arranging natural servicing and animal treatment are carried out by female members. The lack of cultivated fodder,



*kucha* animal sheds and use of low efficiency tools make the tasks even more difficult. The women especially in higher hills lead really a tough life working hard from dawn to dusk. Therefore, there is a dire need to develop technologies to reduce the extent of drudgery.

The suitable interventions are to design improved tools, mechanical devices and impart trainings for improving work efficiency. The small devices like improved clod breaker, serrated sickles and milk churner, chaff-cutter as well as encouraging bio-gas plants, paved sheds, fodder cultivation and artificial insemination, etc., can reduce the drudgery of women to a great extent. There is also a need to impart more farm training to women folk rather than men. For this, the trained women extension workers need to be inducted in the extension network of different departments.

**Table 5.14 Extent of Drudgery of Women in Agricultural Operations**

Operations	Mode	Frequency	Extent of drudgery	Chamba	Mehla	Bhatiyat	Salooni	Tissa	Bharmaur
Ploughing operations	Bullocks	5-6 days	% Female	15.91	100	99.91	98.74	100	85.23
			Time spent/ day	5.25	5.25	5.79	3.6	6.67	5.92
	Power tiller	3-4 days	% Female	0	21.62	0	0	0	0
			Time spent/ day		2.56				
	Tractor	1-2days	% Female	0	0	0.09	38.94	0	0
			Time spent/ day			9	3		
Clod breaking	Manually	15-20 days	% Female	84.13	47.92	100	100	100	19.66
			Time spent/ day	4.25	4.2	4.86	2	5.67	8
Paddy transplanting	Manually	6-8days	% Female	10.48	0	91.48	0	0	0
			Time spent/ day	5		7.33			
Manuring & fertilization	Manually	10-15days	% Female	44.88	100	100	100	100	100
			Time spent/ day	3.92	1.5	3.92	6	5.5	3
Intercultural operations	Manually	35-40 days	% Female	89.49	100	80.75	100	100	100
			Time spent/ day	4.63	1.67	4.71	8	8	7
Threshing & winnowing	Manually	15-20days	% Female	83.18	38.07	2.09	13.05	27.59	85.96
			Time spent/ day	5	99	7.5	8	6	6
	Power Machinery	2-3 days	% Female	0	40.53	97.91	86.95	72.41	0
			Time spent/ day		7	5.25	5.4	4.5	
Halod	1		% Female	0	0	69.64		0	0
			Time spent/ day			1			
Halod	2		% Female	35.12	0	0	0	0	0
			Time spent/ day	3.5					

Source: Field Survey, 2007-08

**Table 5.15 Extent of Drudgery of Women in Livestock Rearing Operations (Per Cent Response)**

Operations	Mode	Frequency	Extent of drudgery	Chamba	Mehla	Bhatiyat	Salooni	Tissa	Bharmaur
Fodder resources	Cultivated	20-25 days	% female	8.44	25.19	40.74	0	0	0
			Time spent/ day	1.88	6	2.9			
	Ghasni	Daily	% female	89.8	57.88	59.26	87.44	76.32	100
			Time spent/ day	4.38	6	2.75	3	2.56	3.56
	Both	Daily	% female	82.33	23.5	0	12.56	100	0
			Time spent/ day	4	6		4	4	
Fodder cutting	Traditional tools	Daily	% female	68.64	51.64	100	100	100	94.33
			Time spent/ day	3.5	4	3.5	1.8	2	2.5
	Improved tools	Daily	% female	31.36	48.36	0	0	0	5.67
			Time spent/ day	3.63	3.75				3.45
Fodder transportation	On head/backload	Daily	% female	73.54	90.44	100	30.36	100	100
			Time spent/ day	1.44	2.5	2.45	50.75	8	2
	Tractor-trolley	Occasionally	% female	0	9.56	0	0	0	0
			Time spent/ day		2.5				
Fodder chaffing	Chaff cutter	Occasionally	% female	8.34	7.03	4.16	0	0	0
			Time spent/ day	1	0.75	1.25			
	Without chaff cutter	Daily	% female	79.46	68.95	95.84	100	100	100
			Time spent/ day	1	1	2.75	1	1	1
Feeding System	Inside manger	Daily	% female	3.18	8.86	28.96	20.47	0	11.12
			Time spent/ day	1	0.5	2.5	1		1
	On floor	Daily	% female	93.31	91.14	71.04	79.53	100	88.88
			Time spent/ day	0.75	0.5	2.5	1	1	0.23
Feeding practices	Stall feeding	Daily	% female	37.4	55.39	59.82	43.25	65.89	48.95
			Time spent/ day	0.75	0.65	0.5	0.75	0.25	0.65
	Grazing	Daily	% female	61.01	44.61	40.18	58.3	35.62	52.65
			Time spent/ day	4.75	4.5	4.5	5	4.56	5.62

	Both	Daily	% female	36.71	25.62	41.23	100	100	100
			Time spent/ day	6	4	3	3.2	3.6	4
Animal waste disposal	Bio-gas plant	Daily	% female	0	0.11	0	0	0	0
			Time spent/ day		1				
	Head/back-load to field	Daily	% female	91.2	100	20.48	35.26	100	84.23
	FYM	1.5-20 days	Time spent/ day	0.75	1.25	1	2.5	1.5	2
			% female	6.69	78.27	79.52	100	100	100
			Time spent/ day	0.5	0.5	0.75	1.8	1	1
Cleaning of animals & sheds	Manually	Once a week	% female	94.73	76.1	100	100	100	100
			Time spent/ day	1	2	1.5	1	1	1
Milking operation	Hand milking	Daily	% female	97.89	100	100	100	100	100
			Time spent/ day	0.5	0.4	0.75	0.88	0.75	0.28
Selling of milk	Within village	Daily	% female	21.18	56.71	79.58	98.74	100	100
			Time spent/ day	0.5	3	2	1	1.5	2
	Distant market	Daily	% female	0	43.29	20.42	1.26	0	0
			Time spent/ day		2	2.5	2		
Churning of milk	Manually	Daily	% female	69.09	53.08	60.89	81.47	97.71	96.21
			Time spent/ day	0.75	0.73	0.85	1.13	1	0.2
	Using machine	Daily	% female	2.11	46.92	39.11	18.53	2.29	3.79
			Time spent/ day	0.5	0.25	0.1	1	0.5	0.75
Breeding methods	Natural service		% female	55.24	49.41	42.75	58.74	86.96	46.97
			Time spent/ day	2	2.5	3	4	3	3.5
	A.I.		% female	23.67	50.59	57.25	41.26	13.04	53.03
			Time spent/ day	2	1.5	1	2	1.5	1
Animal house type	Single story		% female	92.6	19.8	100	93.72	100	0
	Double story		% female	7.4	80.2	0	6.28	0	100
Animal shed	<i>Kachha</i>		% female	77.02	74.75	96.95	98.74	100	100
	<i>Pucca</i>		% female	22.98	25.25	4.05	1.26	0	0

Light and ventilation	Sufficient			67.17	26.48	27.34	25.34	100	18.54
	Insufficient			32.83	37.85	72.66	74.66	0	81.46
Animal shed roof	Slated			92.63	77.17	91	92.56	93.23	85.21
	Asbestos sheets			4.22	1.97	3.25	7.44	6.77	14.79
	RCC lenthil			3.15	20.86	5.75	0	0	0
Animal shed floor	Kachha			87.34	76.85	97.12	100	100	100
	Pucca			12.66	23.15	2.88	0	0	0

Source: Field Survey, 2007-08

### 5.13 Input Use and Gaps

The problems and constraints in horticultural development displayed in Table 5.16 clearly necessitate the need to strengthen supply of critical inputs and extension services relating to fruit cultivation. Most of the farmers are not aware of specialised practices like scientific layouts, training, pruning, proper mix of pollinisers, manuring/fertilisation and disease/pest control, etc. The severity of the input supply constraints was more in hilly regions like Bharmaur. There is a lack of adequate production and marketing support thwarting the realisation of potential of these crops. In case of livestock, there was huge gap in the feed/fodder and management practices. There is shortage of green and dry fodder especially for milch animals. (Table 5.17) The fodder scarcity was more during winter. The quantity of concentrates and minerals fed to animals is meagre leading to low yield. The respondents and veterinary experts also pointed out various disorders, diseases and endo/ecto parasites reducing vigour and yield potential of animals.

**Table 5.16 Problems and Constraints in Horticultural Development (Per Cent of Panchayats)**

Fruit plants	Problems	Chamba	Mehla	Bhatiyat	Salooni	Tissa	Bharmaur
Apple	Lack of irrigation	25	14				60
	Hail strom			25			
	Insect problem			25	20		
	Disease				40		
	Less pollinator				60		
	Poor management				60	100	20
	Animal menace						40
Citrus	No market is available		14	25			
	Canker problem			75			
	Monkey problem			50			
	Die back			25			
	Leaf minor			25			
	Irrigation problem				20		0
Mango	No market is available			25			
	Mango hopper			75			
	Psylla			75			
	Monkey problem			25			
	Malformation						
Litchi	No market is available			25			
	Red rust			50			
	Fruit cracking			50			
	Monkey problem			50			
	Fruit fly			50			
Apricot	Monkey menace			25			
Pear	Monkey menace			25			
Dry fruit	Disease problem		14				
Olive	Lack of proper irrigation	25	0				

Source: Field Survey, 2007-08

**Table 5.17 Live Stock Feeding Practices (Kg/Day/Animal)**

Type of animal	Feed/Fodder	Chamba	Mehla	Bhatiyat	Salooni	Tissa	Bharmaur	District
<b>Productive</b>								
Crossbred cows	Green fodder	10.61	23.23	17.38	17.16	14.65	20.00	2.86
	Dry fodder	8.94	13.20	8.13	25.91	3.96	12.00	12.02
	Concentrate (g)	612.73	1669.64	1182.40	366.16	2849.58	2500.00	1530.09
	Minerals (g)	15.32	8.07	33.88	3.66	0.00	50.00	18.49
Local cow	Green fodder	6.80	7.09	10.66	15.68	8.50	11.25	10.00
	Dry fodder	4.73	5.08	6.67	24.22	2.56	8.00	8.54
	Concentrate (g)	0.00	294.51	197.45	0.16	916.67	1000.00	401.47
	Minerals (g)	0.00	0.61	15.19	0.00	0.00	50.00	10.97
Buffaloes	Green fodder	11.79	20.08	14.75	17.09	15.37		16.05
	Dry fodder	11.87	19.28	13.29	24.19	4.07		13.87
	Concentrate (g)	0.56	129.54	219.99	0.18	2552.24		719.32
	Minerals (g)	11.19	1.28	17.41	0.00	0.00		5.47
Goats	Green fodder	0.00	0.00	1.72	1.75	4.81	0.00	1.38
	Dry fodder	0.03	0.00	0.88	1.75	0.00	0.00	0.44
	Concentrate (g)	0.00	0.00	30.08	0.00	0.00	0.00	5.01
	Minerals (g)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sheep	Green fodder	0.00	0.00	0.80	1.73	3.48	0.00	1.00
	Dry fodder	0.00	0.00	0.51	1.73	0.00	0.00	0.37
	Concentrate (g)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Minerals (g)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Young stock	Green fodder	0.00	10.00	8.35	7.05	6.00	4.00	
	Dry fodder	0.00	5.00	6.75	7.05	7.00	6.00	
	Concentrate (g)	0.00	0.00	39.89	0.00	0.00	0.00	
	Minerals (g)	0.00	0.00	0.00	0.00	0.00	0.00	
Bullocks	Green fodder	0.58	9.79	15.62	7.63	0.00	0.00	5.60
	Dry fodder	0.27	10.18	12.42	9.27	0.00	0.00	5.36
	Concentrate (g)	0.00	0.00	49.83	0.00	0.00	0.00	8.31
	Minerals (g)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Equines	Green fodder	1.18	16.36	7.35	17.46	0.00	4.36	7.79
	Dry fodder	0.84	10.79	5.53	20.58	0.00	6.55	7.38
	Concentrate (g)	0.12	228.92	1625.63	0.00	0.00	1636.36	581.84
	Minerals (g)	0.00	0.00	0.00	0.00	0.00	27.27	4.55

Field Survey, 2007-08

## 5.14 Yield Gap Analysis

There exists glaring differences in average and potential yields obtained by progressive farmers in the district. The yield gap in apple, shown in Table 5.18, is quite high showing that production of fruit can be increased 2 times from the existing level of production.

There is also yawning gap between actual and potential yield in different livestock species (Table 5.19). In cross bred cows, the yield was remarkably higher than local cow. There is also huge gap in the actual and potential yield of animals on average and at the progressive farmers' level. Therefore, there exists scope for improving livestock production with suitable interventions and livestock improvement programmes.

**Table 5.18 Yield Gaps in Fruit Crops (Q/ha)**

Fruit	Apple			Walnut		
	A	P	G	A	P	G
Chamba	45	95	50	24	45	21
Mehla	41	94	53	27	48	21
Bhatiyat						
Salooni	48	98	50	29	49	20
Tissa	46	99	53	25	47	22
Bharmaur	47	90	53	28	49	21

Field Survey, 2007-08

**Table 5.19 Yield Gaps in Livestock Products (Litres/Animal/Day)**

Livestock	Chamba			Mehla			Bhatiyat			Salooni		
	A	P	G	A	P	G	A	P	G	A	P	G
Crossbred Cow (Milk)	5.50	10.50	5.00	5.10	10.70	5.60	6.00	10.00	4.00	4.50	10.30	5.80
Local Cow (Milk)	2.25	3.50	1.25	2.50	3.70	1.20	2.10	3.60	1.50	2.00	3.20	1.20
Buffalo (Milk)	4.50	9.00	4.50	4.20	9.10	4.90	4.40	9.30	4.90	3.90	8.90	5.00
Goat (Milk)	0.50	1.00	0.50	0.40	0.80	0.40	0.45	0.90	0.45	0.50	0.90	0.40
Sheep (Wool (Kg/year)	1.25	2.00	0.75	1.00	1.70	0.70	1.40	1.80	0.40	1.00	1.50	0.50

**Table 5.19 contd....**

Livestock	Tissa			Bharmaur			District		
	A	P	G	A	P	G	A	P	G
Crossbred cows(Milk)	5.00	10.40	5.40	4.10	10.20	6.10	5.21	10.34	5.13
Local cow(Milk)	2.40	3.80	1.40	2.20	3.60	1.40	2.22	3.53	1.31
Buffaloes(Milk)	3.50	8.90	5.40				4.06	9.04	4.98
Goats(Milk)	0.40	0.90	0.50	0.51	0.91	0.40	0.49	0.90	0.41
Sheep(Wool (Kg/year)	1.15	2.00	0.85	1.30	2.00	0.70	1.26	1.93	0.68

Field Survey, 2007-08



### **5.15 Reasons for Gap in Yield**

The reasons for gaps in productivity of fruit as mentioned in Table 5.16 revealed lack of technical know-how especially in apple plantation. As such, research and extension need special consideration and priority.

In livestock, low yielding local breeds, fodder shortage and poor feeding/management practices were major reasons for low yields. The incidence of livestock diseases as shown in Table 5.20 also reduces livestock productivity. The major diseases of cattle are foot and mouth disease (FMD), tympany, diarrhoea and calf scour. Various internal (endo) and external (ecto) parasites are infecting the livestock, especially cattle. The disease incidence is slightly lower in sheep and goats. In equines, respiratory, colic diseases and certain endo parasites are reported

**Table 5.20 Incidence of Livestock Diseases and Mortality (Per Cent)**

Type of animal/Disease	Bharmaur		Bhatiyat		Chamba		Mehla		Salooni		Tissa		District
	Infected	Mortality	Infected	Mortality	Infected	Mortality	Infected	Mortality	Infected	Mortality	Infected	Mortality	
<b>Cattle and Buffaloes</b>													
a. FMD	2	0	0	0	0	0	0	0	0	0	15	2	2.83333
b. Hemorrhagic septicaemia	0	0	0	0	0	0	0	0	0	0	5	0.5	0.83333
c. Tympny	5	0	10	0.5	10	5	35	5	2	1	11	1	12.1667
d. Pneumonia	6	0.3	15	1	30	50	20	5	1	0	25	2	16.1667
e. Diarrhoea/dysentery	4	0	10	0.5	10	20	60	5	40	0	35	2	26.5
f. Calf scour	0.02	0	15	1	5	1	30	2	0	0	5	1	9.17
g. Endoparasites	21	0	40	4	50	7.5	80	5	50	0	45	0	47.6667
h. Ectoparasites	22	0	70	3	60	2.5	80	5	90	0	45	0	61.1667
i. Repeat breeding	4	0	25	0	30	0	60	0	20	0	25	0	27.3333
j. Mastitis/rabies	0	0	0	100	35	65	0	0	0	0	7.5	0	7.08333
<b>Sheep &amp; Goats</b>													
a. PPR/CCPP	0	0	40	30	65	50	60	50	0	0	11	1	29.3333
b. Mange	2	0	25	5	0	0	70	0	50	0	35	0	30.3333
c. Lice and ticks	15	0	70	5	35	0	85	0	50	0	45	0	50
d. Endoparasites	30	0	75	10	75	50	95	30	0	0	25	0	50
e. Diarrhoea/dysentery	20	0.6	20	2	65	50	60	20	50	0	25	5	40
<b>Poultry</b>													
a. Coccidiosis	0	0	20	80	0	0	95	60	0	0	7.5	0	20.4167
b. Ranikhet disease	0	0	0	0	0	0	5	100	0	0	0	0	0.83333
c. Fowl pox	0	0	0	0	0	0	0	0	0	0	2	0	0.33333
d. Merek's disease	0	0	0	0	0	0	0	0	0	0	0	0	0
e. Endoparasites (liver fluke etc)	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Equines</b>													
a. Respiratory distress	2	0	25	5	60	25	40	5	5	1	11	0	23.8333

b. Colic	0	0	40	5	12.5	40	45	10	10	5	0	0	17.9167
c. Internal parasites	12	0	80	4	40	7.5	95	1	50	0	7.5	0	47.4167
d. Glanders	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Rabbits</b>													
a. Pneumonia	0	0	0	0	0	0	0	0	0	0	0	0	0
b. Diarrhoea	0	0	0	0	0	0	0	0	0	0	0	0	0
c. Ear cancer	0	0	0	0	0	0	0	0	0	0	0	0	0
d. Mange	0	0	0	0	0	0	0	0	0	0	0	0	0

Field Survey, 2007-08

### 5.16 Interventions needed for the District and Financial Estimates

The interventions needed for horticultural development in the district are given in Table 5.21. These interventions are relating to supply of healthy planting material, dissemination of technical know how, timely supply of critical inputs and strengthening marketing system.

The interventions needed for livestock improvements are promoting cultivation of fodder, planting of fodder trees and nutritive forage grasses in pasture lands, supply of concentrates/minerals by govt agencies, improving AI and other veterinary services, etc. The creation of fodder banks, preparation of feed blocks and silage are the other innovative interventions to solve fodder shortage. The funds required for creating required infrastructure for livestock marketing and human resource for agricultural development have been given in Tables 5.25 and 5.26. The detailed budget allocation under different components of agriculture has been given in next chapter.

**Table 5.21 R & D Interventions Needed for Horticultural Development (Per Cent of Panchayats)**

<b>Crop/ Intervention</b>	<b>Chamba</b>	<b>Mehla</b>	<b>Bhatiyat</b>	<b>Salooni</b>	<b>Tissa</b>	<b>Bharmaur</b>
<b>Apple</b>						
Irrigation schemes	25	0	0	80	5	0
Training and exposure visit	0	0	0	20	0	0
Dept. of Horticulture to intervene	0	14	25	0	0	60
Improvement of varieties	0	0	0	0	0	0
Animal parks	0	0	0	0	0	0
<b>Citrus</b>						
Department of horticulture to intervene	0	0	25	0	0	0
Irrigation	25	0	50	0	0	0
<b>Mango</b>						
Department of horticulture to intervene	0	0	75	0	0	0
<b>Litchi</b>						
Department of horticulture to intervene	0	0	25	0	0	0
<b>Apricot</b>						
Forest department to intervene	0	0	25	0	0	0
Dry fruit						
Forest department to intervene	0	0	25	0	0	0
Technical guidance	0	14	0	0	0	0

Field Survey, 2007-08

**Table 5.22 Financial Estimates for Marketing Infrastructure of Livestock Products (Rs. Lakh)**

Particular	Bharmaur		Bhatiyat		Chamba		Mehla		Salooni		Tissa	
	No.	Funds	No.	Funds	No.	Funds	No.	Funds	No.	Funds	No.	Funds
Cold Storage	1	50	1	50	1	55	1	60	1	55	1	60
Chilling plants	1	60			1	60	0	0	1	60	1	60
Refrigerated vans	1	10	1	10	1	10	1	10	1	10	1	10
Packaging machines	1	20	1	20	1	20	1	20	1	20	1	20
Baling machine												
Wool sorting machine	2	5	2	5	2	5	2	5	2	5	2	5
Cheese making machine					1	5						
Milk powder machine					1	20						
Others												
<b>Total</b>	<b>6</b>	<b>145</b>	<b>5</b>	<b>85</b>	<b>8</b>	<b>175</b>	<b>5</b>	<b>95</b>	<b>6</b>	<b>150</b>	<b>6</b>	<b>155</b>

Field Survey, 2007-08

**Table 5.23 Financial Estimates for Human Resource Development (Rs. Lakh)**

Position	Bharmaur		Bhatiyat		Chamba		Mehla		Salooni		Tissa		District	
	G	Funds	G	Funds	G	Funds	G	Funds	G	Funds	G	Funds	G	Funds
SMS (Agri)	1	18	1	18	0	0	1	18	0	0	1	18	4	72
ADOs	1	15	1	15	0	0	2	30	2	30	2	30	8	120
AEOs	4	36	11	99	6	54	10	90	9	81	10	90	50	450
SMS (Horti)	0	0	0	0	0	0	0	0	0	0	1	18	1	18
HDOs	2	30	1	15	0	0	1	15	0	0	2	30	6	90
HEOs	4	36	7	63	2	18	10	90	0	0	10	90	33	297
Sr. Veterinary Officers	0	0	0	0	0	0	1	27	0	0	4	108	5	135
Veterinary doctors	5	42	0	0	1	8.4	2	16.8	1	8.4	21	176.4	30	252
Veterinary pharmacists	20	144	0	0	0	0	30	216	1	7.2	0	0	51	367.2
Extension specialist for:														
Bee keeping	1	18	1	18	0	0	0	0	0	0	5	90	7	126
Mushrooms	1	18	1	18	0	0	0	0	0	0	5	90	7	126
Floriculture	1	18	1	18	0	0	0	0	0	0	5	90	7	126
Fisheries	1	15	2	30	0	0	3	45	0	0	5	75	11	165
Protected cultivation	0	0	0	0	2	30	0	0	0	0	0		2	30
<b>Total</b>														<b>2374.2</b>

Field Survey, 2007-08

### **5.17 Researchable Issues**

The analysis of data on different parameters throws up the following researchable issues in horticultural crops, animal husbandry and allied sectors.

#### **Horticultural Crops**

- Identification of niche areas and remapping of different fruit growing belts.
- Diversification of fruit and their varieties with under utilized fruit.
- Rejuvenation of old and senile apple orchards
- Development of technology for frost management.
- Generation of data base of pollinator diversity in different horticultural crops.
- Awareness of pollinator conservation and use of honey bees in crop pollination for increased crop productivity.
- Identification of potential bee-keeping belts in different blocks.
- Safe waiting periods of pesticides on horticultural crops.
- Development of management strategies for apple scab and premature leaf fall including their curative control strategies.
- Management of diseases of ornamental crops like gladiolus, carnation and liliun etc.
- Evaluating the efficacy of newly developed fungicides, monitoring of resistant strains and breeding for disease resistance against apple scab and premature leaf fall.
- Survey and surveillance of economic and marketing aspects in horticultural crops.
- Quality nursery production of fruit crops.
- Integrated pest/ disease management
- To evolve improved frost protection technology for subtropical areas.
- Crop diversification under frost prone agro-eco system through low chilling temperate fruit.
- Integrated nutrient management.
- To develop technology for improving water use efficiency and fertigation in different fruit crops.
- Constraint identification in different horticulture crops.
- Strengthening farmers training facilities and transfer of technology.
- Management of irregular bearing in pomegranate.

- Refinement of spray schedules in apple.
- Assessment of soil health and amelioration of nutrient deficiencies.
- Establishment of *ex-situ* germplasm bank sub temperate fruit crops.
- Impact assessment and policy evaluation in horticultural sector.
- Study of supply chain management and emerging marketing systems.
- Standardization of agro forest models for different agro-ecological situation.

### **Animal Husbandry**

- Identification of indigenous livestock health practices and documentation of the prevailing indigenous technical knowledge (ITK)
- Identification and nutritional evaluation of the high nutrition fodder grasses having adaptation to pasture in migratory animals and development of feed blocks, silage practices and strategic mineral supplements to improve nutrition of animals
- Surveillance, monitoring and control of the diseases of animals and birds including wild fauna.
- Development of herbal nutraceuticals for health and production of farm animals and toxicological studies on the poisonous plants and characterization of their toxic principles and anti nutritional factors.
- Preparation and testing of multiserotype vaccine against H.S. Serosurveillance of some important infectious diseases in Livestock.
- Investigations on the epidemiology and serodiagnosis of *Mycobacterium bovis* infection in bovines in Himachal Pradesh. Molecular diagnosis and genetic diversity analysis of important pathogens responsible for major animal diseases and zoonoses
- Evaluation of medicinal plants/herbs utilized in soft and hard tissue healing in animals.
- Standardization and further application of endoscopic and laproscopic techniques in clinical cases of abdominal disorders in small and large animals.
- Evaluation of various prosthetics and biomaterials in the management of abdominal trauma/fracture/muscular skeletal disorders in animals.
- Studies on socio-economic status of Gaddis and Gujjars and processing and marketing aspects of livestock products

### **Other Allied Areas**

- Varietal development in medicinal plants.

- Standardisation of cultivation techniques for medicinal and aromatic plants
- Development of suitable agro forestry models
- Studies on diseases and pests in important tree species particularly willow, poplars and junipers
- Research on suitable engineering designs for water harvesting and protected cultivation
- Research on development of hill specific suitable models/designs of mechanical tools and equipments for improving efficiency in various farm operations
- Studies on honey bees and rearing practices to popularise garden bee colonies
- Socio demographic and nutritional studies of households
- Scope and potential for household tourism and non farm enterprises
- Studies on climate change, hydrology and glacial regimes
- Impact assessment of different programmes/schemes and policy implications



## Chapter VI

### DISTRICT PLAN

#### 6.1 DAP and Sectoral Outlays

Based upon the potential of agriculture, horticulture, livestock and allied activities in Chamba district, the comprehensive budget outlay and yearly allocation under various schemes/interventions have been given in Table 6.1. The plan envisages budget allocation among VIII major components of agricultural sector comprising crop improvements, infrastructure, natural resource conservation/management, niche based potential enterprises, development of horticulture, livestock improvement, human resource development and finally research and extension needs. Each component has been further divided into different sub components/interventions to achieve desirable growth in agriculture, The total plan outlay for the district has been estimated at Rs 69,973 lakhs. The yearly allocation came out to be about Rs 10,495.95 lakhs in the first year, Rs 13,994.60 lakhs in the second, third and fourth years of implementation and remaining Rs 17,493.25 lakhs in the fifth and final year of execution of this plan.

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

Sr. No.	Schemes	Total Plan Outlay	Yearly Allocation				
			I	II	III	IV	V
<b>I</b>	<b>Interventions to Promote Sustainability of Crop Production System</b>	<b>2620</b>	<b>393</b>	<b>524</b>	<b>524</b>	<b>524</b>	<b>655</b>
1	Improvement of productivity of cereals, pulses, oilseeds, vegetables and spices crops through promotion of HYV seeds including hybrids	250	37.5	50	50	50	62.5
2	Improvement of soil health through vermi-composting, bio-fertilizers, micro nutrients, soil testing etc.	200	30	40	40	40	50
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	500	75	100	100	100	125
	(i) Sprinkler	450	67.5	90	90	90	112.5
	(ii) Drip	50	7.5	10	10	10	12.5
5	Agricultural mechanization through popularization of improved tools and hill specific machinery like power tillers, tractors, crop planters/ harvesters,	150	22.5	30	30	30	37.5

	sprayers, etc. clod breakers and gender friendly post harvesting equipments etc. (to remove women drudgery)						
6	Protected (poly house) cultivation to minimize risk factors and enhance quality and productivity	1200	180	240	240	240	300
7	Strengthening and improvement of quality control infrastructure (seed, pesticide, fertilizer testing laboratories)	150	22.5	30	30	30	37.5
8	Strengthening of seed production farms and promotion of infrastructure to improve seed production and replacement	20	3	4	4	4	5
<b>II</b>	<b>Need Based Infrastructure Development</b>	<b>9107</b>	<b>1366.05</b>	<b>1821.4</b>	<b>1821.4</b>	<b>1821.4</b>	<b>2276.75</b>
1	Irrigation	2400	360	480	480	480	600
2	Improvement of on-farm water delivery and efficiency of existing irrigation systems	2769	415.35	553.8	553.8	553.8	692.25
3	Rural markets	138	20.7	27.6	27.6	27.6	34.5
4	Rural roads for connectivity	3800	570	760	760	760	950
<b>III</b>	<b>Natural Resource Conservation and Management</b>	<b>30722</b>	<b>4608.3</b>	<b>6144.4</b>	<b>6144.4</b>	<b>6144.4</b>	<b>7680.5</b>
1.	Soil conservation of arable and non-arable land through engineering measures	2251	337.65	450.2	450.2	450.2	562.75
2.	Water harvesting check dams, ponds, tanks, etc	16748	2512.2	3349.6	3349.6	3349.6	4187
3.	Land improvement	11723	1758.45	2344.6	2344.6	2344.6	2930.75
<b>IV</b>	<b>Niche Based Enterprises for Rural Entrepreneurs</b>	<b>968</b>	<b>145.2</b>	<b>193.6</b>	<b>193.6</b>	<b>193.6</b>	<b>242</b>
	(i) Organic farming	822	123.3	164.4	164.4	164.4	205.5
	(ii) Agro-tourism	84	12.6	16.8	16.8	16.8	21
	(iii) Medicinal and aromatic plants	62	9.3	12.4	12.4	12.4	15.5
<b>V</b>	<b>Fruit Production</b>	<b>2413</b>	<b>361.95</b>	<b>482.6</b>	<b>482.6</b>	<b>482.6</b>	<b>603.25</b>
<b>VI</b>	<b>Livestock, Poultry &amp; Fisheries</b>	<b>20720</b>	<b>3108</b>	<b>4144</b>	<b>4337.6</b>	<b>4337.6</b>	<b>5180</b>
1	Livestock Improvement	20458	3068.7	4091.6	4091.6	4091.6	5114.5
2	Fisheries	262	39.3	52.4	52.4	52.4	65.5
<b>VII</b>	<b>Human Resource/ Development</b>	<b>2445</b>	<b>366.75</b>	<b>489</b>	<b>489</b>	<b>489</b>	<b>611.25</b>
1	Additional man power requirement	2374	356.1	474.8	474.8	474.8	593.5
2	Capacity building of Extension Personnel	71	10.65	14.2	14.2	14.2	17.75
<b>VIII</b>	<b>Research &amp; Extension</b>	<b>978</b>	<b>146.7</b>	<b>195.6</b>	<b>195.6</b>	<b>195.6</b>	<b>244.5</b>
<b>IX</b>	<b>All Sectors &amp; Schemes</b>	<b>69973</b>	<b>10495.95</b>	<b>13994.6</b>	<b>13994.6</b>	<b>13994.6</b>	<b>17493.25</b>

## 6.2 New Schemes for Agricultural Development

Under district agricultural plan, various new schemes for agricultural development in Chamba are portrayed in Table 6.2. New approach to watershed development and soil conservation would include thrust on water/snow harvesting, construction of check dams and other civil engineering works so as to make more productive use of land resource. The fruit plantation and livestock improvement schemes would cover maximum number of beneficiaries to diversify income and livelihood opportunities. The entire district has a potential for horticulture development and is a rich repository of naturally growing medicinal and aromatic herbs which can be taken up to diversify farming. Substantial provision has been made to improve rural connectivity as many of the remote villages are still isolated from the mainstream of economic development. The marketing infrastructure also needs to be strengthened in order to improve marketing efficiency in commercial crops for the benefit of farmers.

Keeping in view the specificities and agro climatic diversity of the district, protected cultivation and organic farming should be given due attention to increase the profitability of farming and cropping intensity. The entire district has a treasure of scenic adventures, mountain passes, heritage property and rich culture attracting large number of tourists. Therefore, household tourism can play a significant role in enhancing non-farm income as the other non farm avenues are scanty.

Based upon opinion survey and assessment made by officials of agriculture and irrigation department in the district, number of new irrigation schemes can be taken up to increase the irrigated area (Table 6.3). Three new lift irrigation schemes can be developed with a command area of 71 hectares covering. About 83 new irrigation kuhls are proposed that would require Rs 2247 lakhs creating irrigation potential of 1,797 hectares. In this way, additional command area of 1,805 hectares would be created in the district. The total budget estimates for different schemes are about Rs 2400 lakhs. The exploitation of available irrigation potential shall lead to an increase in the production of crops especially vegetables.

**Table 6.2 New Schemes for Agriculture and Rural Development**

Block	No. of schemes	Villages (No.)	Beneficiary families (No.)	Potential area (Ha)	Funds required (Rs. Lakh)
<b>Watershed development including check dams, ponds, tanks, etc</b>					
Bharmaur	6	6	65	700	1750
Bhatiyat	165	0	165	900	2450
Chamba	20	20	100	800	2000
Mehla	0	0	0	1200	3000
Salooni	130	130	1300	1500	3798
Tissa	16	317	10000	1500	3750
<b>Total</b>	<b>337</b>	<b>473</b>	<b>11630</b>	<b>6600</b>	<b>16748</b>

<b>Soil/land conservation schemes</b>					
Bharmaur	20	20	134	10	350
Bhatiyat	0	0	0	0	0
Chamba	56	56	392	160	1258
Mehla	0	0	0	0	0
Salooni	25	18	218	28	243
Tissa	0	0	0	0	400
<b>Total</b>	101	94	744	198	<b>2251</b>
<b>Fruit production schemes</b>					
Bharmaur	5	263	4002	15	350
Bhatiyat	1	0	0	0	113
Chamba	2	21	250	250	400
Mehla	0	0	0	0	0
Salooni	5	200	1000	5	550
Tissa	1	0	0	0	1000
<b>Total</b>	14	484	5252	270	<b>2413</b>
<b>Fisheries (pond constructions)</b>					
Bharmaur	26	26	26	2.6	23
Bhatiyat	8	8	8	0.8	15
Chamba	14	11	14	0.14	18
Mehla	8	8	8	0.08	16
Salooni	150	30	150	0	90
Tissa	1	0	0	0	100
<b>Total</b>	207	83	206	3.62	<b>262</b>
<b>Livestock improvement schemes</b>					
Bharmaur	7	263	5240	0	142
Bhatiyat	5	100	1000	0	100
Chamba	5	70	100	0	250
Mehla	6	430	9000	0	19500
Salooni	5	46	5000	0	350
Tissa	1	0	0	0	116
<b>Total</b>	29	909	20340	0	<b>20458</b>
<b>Rural roads (Kms)</b>					
Bharmaur	50	10	65	0	500
Bhatiyat	0	0	0	0	0
Chamba	20	20	5000	15	300
Mehla	0	0	0	0	0
Salooni	46	400	2000	0.01	2000
Tissa	1	0	0	0	400
<b>Total</b>	117	430	7065	15.01	<b>3200</b>

<b>Bridges</b>					
Bharmaur	3	10	65	0	300
Bhatiyat	0	0	0	0	0
Chamba	0	0	0	0	0
Mehla	0	0	0	0	0
Salooni	2	100	1000	0	200
Tissa	1	0	0	0	100
<b>Total</b>	6	110	1065	0	600
<b>Rural markets</b>					
Bharmaur	2	102	3140	0	33
Bhatiyat	0	0	0	0	0
Chamba	4	4	500	40	15
Mehla	0	0	0	0	0
Salooni	4	320	3200	250	40
Tissa	1	0	0	0	50
<b>Total</b>	11	426	6840	290	<b>138</b>
<b>Protected cultivation</b>					
Bharmaur	1	50	200	212	200
Bhatiyat	1	48	220	223	210
Chamba	1	52	180	214	185
Mehla	1	47	170	221	170
Salooni	1	53	210	215	215
Tissa	1	55	220	218	220
<b>Total</b>	6	305	1200	1303	<b>1200</b>
<b>Organic farming</b>					
Bharmaur	4	50	250	300	138.2
Bhatiyat	4	48	240	300	148.4
Chamba	4	52	260	300	128.6
Mehla	4	47	235	300	138.5
Salooni	4	53	265	300	148
Tissa	4	55	275	300	120
<b>Total</b>	24	305	1525	1800	821.7
<b>Agro-tourism</b>					
Bharmaur	4	50	200	0	12
Bhatiyat	5	48	220	0	16
Chamba	3	52	180	0	10
Mehla	2	47	170	0	18
Salooni	3	53	210	0	16
Tissa	4	55	220	0	12
<b>Total</b>	21	305	1200	0	84

<b>Medicinal plants</b>					
Bharmaur	0	0	0	0	61.16
Bhatiyat	35	8	125	107	0
Chamba	0	0	0	0	0
Mehla	0	0	0	0	0
Salooni	0	0	0	0	0
Tissa	0	0	0	0	61.16
<b>Total</b>	35	8	125	107	61.16

**Table 6.3 New Irrigation Schemes**

<b>Particulars</b>	<b>Bharmaur</b>	<b>Bhatiyat</b>	<b>Chamba</b>	<b>Melha</b>	<b>Salooni</b>	<b>Tissa</b>	<b>District</b>
<b>Lift irrigation</b>							
Number	0	2	0	1	0	0	3
Amount required (Rs. Lakh)	0	43.9	0	115	0	0	158.9
Villages to be covered	0	1	0	2	0	0	1
Beneficiaries (No.)	0	0	0	80	0	0	80
Command area (Ha)	0	21.56	0	50	0	0	71.26
<b>Kuhl</b>							
Number	10	17	23	9	12	22	83
Amount required (Rs. Lakh)	400	240	340	375	428	424	2207
Villages to be covered	20	23	18	15	20	34	130
Beneficiaries (No.)	400	300	430	300	350	750	2530
Command area (Ha)	320	200	280	300	350	347	1797
<b>FIS</b>							
Number	1	0	38	0	0	0	39
Amount required (Rs. Lakh)	29	0	5.1	0	0	0	34.1
Villages to be covered	1	0	38	0	0	0	39
Beneficiaries (No.)	52	0	38	0	0	0	90
Command area (Ha)	32	0	4.6	0	0	0	36.6
<b>Total</b>							<b>2400</b>

### 6.3 Input Requirement

The data for working out the projections in the demand for fertilizers have been estimated by obtaining the data from the office of the Deputy Director, Agriculture, District Chamba for the different years. The supply of critical inputs is the utmost necessity to achieve the anticipated growth in agriculture and allied sectors. The critical inputs are seeds/planting material of major crops and fertilizers. The demand for these two critical inputs has been estimated.

Balanced use of fertilizers needs to be promoted along with increased use of organic manures and bio fertilizers. The projected fertilizers requirement in the district by 2012-13 would be around 2,412 tonnes of urea, 186 tonnes of IFFCO (12:32:16). In case of increased irrigation and more diversification, the requirement of urea would be 2,657 tonnes and that of IFFCO 205 tonnes (Table 6.4).

**Table 6.4 Fertilizer Demand, Actual Supply and Projections for 2012-13 (M.T)**

Year	CAN	UREA	SSP	MOP	12:32:16	15:15:15
2003-04	216.55	1970.85	68.85	33.85	184.20	3.55
2004-05	120.65	1949.85	81.35	36.05	211.20	3.35
2005-06	18.60	2018.10	98.65	48.80	223.25	0.00
2006-07	43.20	2146.00	86.05	26.95	278.61	0.00
2007-08	14.15	2175.90	53.80	34.90	185.00	0.00
Growth rate (% p. a)	-18.69	2.08	-4.37	0.62	0.09	
Projection for 2012-13	5.02	2411.80	43.02	33.83	185.79	
Projection making allowance for crop diversification @2%	4.44	2657.50	38.71	39.71	205.11	
Projection making allowance for irrigation @2%	3.91	2922.85	34.75	43.74	226.01	

Source: (i) Data on Demand and Supply of fertilisers from the Office of Deputy Director Agriculture, Chamba

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

#### 6.4 Projected Outcomes and Growth Rates

With the implementation of the plan, there will be appreciable growth in agriculture, horticulture and livestock production. The expected growth in different sectors has been contemplated. Agricultural development plans and interventions proposed would lead to overall development of farm sector through resource augmentation (arable land and irrigation) as also by technological interventions and strengthening of multiple backward and forward linkages through creation of social overheads. With the implementation of plan, there will be increase in arable land, irrigated area and support lands to the extent shown in Table 6.5, which, in turn, would provide growth impetus to agriculture as projected in Tables 6.6 and 6.7.

With the execution of plan, horticulture sector may get a big boost in the district. After realising full potential, apple production in the district would increase from existing 19,811 tonnes to about 42,417 tonnes showing around 23 per cent growth in production (Table 6.8). The total fruit production would increase from 26,343 tonnes to 53,178 tonnes with annual growth rate of about 20 per cent

The impressive output growth can also be achieved in livestock production as shown in Table 6.9. If full potential output is realised, there will be impressive annual growth of around 18 per cent in milk production, 11 per cent in wool and 9 per cent in meat production in the district.

The sectoral growth in different components based upon existing and potential production has been displayed in Table 6.10. Agriculture sector would grow with annual rate of about 10 per cent. The highest growth (21 per cent) can be achieved in horticulture especially in apple production which has tremendous potential. Animal husbandry sector would achieve a growth of 17 per cent per annum. Thus, with the implementation of District Agricultural Plan, there shall

be increase in the gross value output of all the primary sectors. The gross value of all the primary sectors will increase from existing level of Rs 34,489 lakhs to Rs 60,226 lakhs registering an annual growth of about 15 per cent over the plan period. Some quantitative outcomes are as follow:

- Irrigation potential shall be created which will provide irrigation to an area of 8,506 hectares. In this way, available water potential shall be exploited and thereby additional 8,506 hectares of land (Table 6.5) shall be brought under protective and assured irrigation. With the implementation of plan 21.90 per cent of the arable land will have assured irrigation facilities compared to existing 15.18 per cent.
- A huge chunk of land amounting to 11,651 hectares infested with soil erosion, stream bank erosion, etc shall be treated by adopting soil conservation measures.
- Support land (private grasslands) of 3,15,690 hectares (2,81,682 ha productive support land and 34,008 potential support land) shall be treated against invasive weeds and shrubs (Table 6.5). This shall improve the fodder production to the approximate level of 31,569 metric tonnes.
- Foodgrain production shall increase from 1,08,823 metric tonnes to 1,32,948 metric tonnes after the implementation of the plan recording a growth rate of 4.43 per cent per annum in scenario I. Even in scenario II when 20 per cent of irrigated land is shifted to high value cash crops production, the growth rate in foodgrain production shall be fairly high at 3.61 per cent per annum (Table 6.6)
- Production of vegetables would increase from 22,078 metric tonnes to 26,873 metric tonnes in scenario I registering a growth rate of 4.34 per cent per annum when the proportion of area under these crops remains same and to 54,694 metric tonnes recording a growth rate of 29.55 per cent per annum in scenario II when 20 per cent of the irrigated area is brought under these crops (Table 6.6). This will generate a marketable surplus of 49,225 metric tonnes which in monetary terms amounts to Rs 49.22 crores. The disposal of this surplus shall generate huge employment opportunities for rural unemployed youth.
- There is potential to increase the production of all the field crops as the existing yield levels are much below the potential achieved by progressive farmers in different blocks. In this way, the production of maize, paddy and wheat can be increased at the annual rate of about 5 per cent, 22 per cent and 13 per cent, respectively. The production of pulses and oilseeds also has tremendous growth potential keeping in view the existing low yield of crops. There will be more impressive growth in vegetable crops. The production of pea and potato would increase by about 7 per cent and 11 per cent per annum (Table 6.7) while other vegetable crops would get big boost with the improvement in irrigation and marketing infrastructure



- Chamba district has a great potential for horticulture development. The fruit production in the district may increase from the existing level of 26,343 tonnes to 51,176 tonnes with annual growth of 20.37 per cent. The most impressive growth can be achieved in apple production that may increase at the rate of around 23 per cent p.a. from existing 19,811 tonnes to 42,417 tonnes. Similarly, stone fruit and walnut may increase by 13 to 14 per cent annually (Table 6.8).
- The projected fertilizer requirement in the district by 2012-13 would be around 2412 tonnes of urea, 186 tonnes of IFFCO (12:32:16). In case of increased irrigation and more diversification, the requirement of Urea would be 2657 tonnes and that of IFFCO 205 tonnes (Table 6.4). However, based upon survey data on fertilizer gap, total requirement of Urea, IFFCO and SSP for the entire district has been estimated at 2,934 tonnes, 1,597 tonnes and 1546 tonnes, respectively.
- With the improvement in livestock breeds, fodder availability and rearing practices, there will be increase in livestock production in the district. The milk, meat and wool production would increase at the annual rate of 17.95 per cent, 8.77 per cent and 10.76 per cent, respectively
- The strengthening of marketing and R&D institutions would anchor the agricultural development process through need based and location specific interventions.
- With the implementation of District Agricultural Plan, there shall be increase in the gross value output of all the primary sectors in the district. The value output of agriculture, horticulture and animal husbandry will grow with annual rate of 10 per cent, 20 per cent and 17 per cent, respectively. The gross value of all the primary sectors will increase from existing level of Rs 34,489 lakhs to Rs 60,226 lakhs registering the annual growth of about 15 per cent over the plan period (Table 6.10).

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

Blocks	Cultivated land	Potential cultivable land	Productive support land	Potential support land	Existing irrigated area	Potential irrigated land	Irrigation potential through water harvesting
Bharmaur	4103	1635	136000	1362	222	352	700
Bhatiyat	9060	920	6055	24219	1917	222	900
Chamba	6874	395	8427	8427	3306	285	800
Mehla	6976	1070	25063	0	120	350	1200
Salooni	6002	2383	34212	0	97	350	1500
Tissa	5822	1205	71925	0	234	347	1500
District	38837	7608	281682	34008	5896	1906	6600

**Table 6.6 Projected Output Growth and Diversification of Agriculture in District Chamba**

Crops	Existing			Potential Production (MT)		Growth rate (% p.a.)	
	Area (Ha)	Production (MT)	Yield (Q/ha)	Scenario I	Scenario II	Scenario I	Scenario II
Maize	28261	71191	25.19	84537	83016	3.75	3.32
Paddy	2774	4214	15.19	6362	6272	10.20	9.77
Wheat	16974	26087	15.37	31593	31036	4.22	3.79
Barley	3105	4150	13.37	4764	4675	2.96	2.53
Foodgrains	55807	108823	19.50	132948	128482	4.43	3.61
Pulses	3217	2255	7.01	2589	2541	2.96	2.53
Vegetables	1920	22078	115.00	26873	54694	4.34	29.55

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

**Table 6.7 Projected Output Growth in Field Crops in Chamba District (Quintals)**

Crops	Existing production	Potential production	Growth rate (% p.a.)
Maize	518622	658993	5.41
Paddy	24486	51397	21.98
Wheat	268675	448918	13.42
Barley	16374	28224	14.47
Millets	5077	14404	36.74
Rajmash	9091	18912	21.60
Mash	6426	11862	16.92
Sarson	1285	3366	32.38
Toria	804	1919	27.72
Potato	237952	363518	10.55
Peas	174954	238778	7.30
Tomato	15717	37259	27.41
Cabbage	7482	20222	34.05
Cauliflower	2296	5357	26.67
Beans	9915	18872	18.07
Capsicum	1390	2755	19.66
Bhindi	730	1327	16.36
Brinjal	714	1960	34.92
Cucurbits	1502	2113	8.13
Onion	4259	5814	7.30
Ginger	389	583	10.00
Garlic	16663	28429	14.12

Note: Estimated on the basis of actual and potential yields  
Source: Field Survey, 2007-08

**Table 6.8 Projected Growth in Horticulture (Quintals)**

Fruit	Existing	Potential	Growth rate (% p.a.)
Apple	198114	424169	9.50
Stone fruits	44498	72552	5.25
Walnut	20817	35061	5.70
All fruit	263429	531782	8.49

Note: Estimated on the basis of actual and potential yields

Source: Field Survey, 2007-08

**Table 6.9 Projected Growth in Livestock Production in Chamba District (Quintals)**

Livestock Products	Existing	Potential	Growth rate (% p.a.)
Milk			
Crossbred cows	244754	478455	19.10
Local cow	278507	443045	11.82
Buffaloes	219498	488622	24.52
Goats	33873	63691	17.61
Total milk	776633	1473813	17.95
Wool	4106	6315	10.76
Meat	18481.28	26587	8.77
Eggs (Lakh No.)	139	163	3.50

Note : Estimated on the basis of actual and potential yields of animals

Source : Field Survey, 2007-08

**Table 6.10 Existing and Potential Gross Value of Output and Expected Sectoral Growth Rates (Rs. Lakh)**

Sectors	Existing	Potential	Growth rate (% p.a.)
Agriculture	11516.03	17349.89	10.13
Horticulture	2223.74	4457.34	8.37
Animal Husbandry	20749.18	38419.29	17.03
All Sectors	34488.95	60226.52	14.92

Source: Consultant's own calculations

### 6.5 Growth Drivers and Expected Outcomes

The district harbours unique agro-climatic conditions that are favourable to grow niche based high value and high quality cash crops. The district is rich in natural wealth and has huge hydel potential. There are number of hydel projects being executed in the district. Obviously, the staff employed in these projects has created demand for local products especially milk, fruit and vegetables. The joining of hinterlands and remote places with motorable roads, upcoming local markets and niche based farming are the important growth drivers for agricultural development in this district.

Irrigation potential shall be created which will provide irrigation to an additional area of 903 hectares (including watershed irrigation schemes).

## 6.6 Innovative Schemes

There are number of new initiatives envisaged in district agricultural plan with the resolve and efforts to achieve sustainable and holistic development of all the components of farming system. All possible options have been explored. Some of the innovative schemes included in the draft plan are:

- Creation of water harvesting structures
- Provision of irrigation through development of major and minor kuhls
- Natural resource (soil, land water) conservation and resource use efficiencies
- Protection of crops against biotic and abiotic stresses
- Promotion and development of horticulture
- Livestock development through breed improvement, training, management and veterinary services
- Organic farming and promoting protected cultivation
- Development of adequate rural infrastructure particularly markets, roads and bridges
- Reducing drudgery and coping with labour shortage through mechanisation
- Promoting rural handicrafts and enterprises for providing income and employment opportunities in lean (winter) season

## 6.7 Prioritisation of Schemes

The in-depth survey of sample Panchayats in different blocks enables us to prioritise different location specific schemes of agriculture and rural development. The prioritisation was done on the basis of PRA conducted at Panchayat level. The development priorities under different components of agriculture have been shown through Table 6.11. In agriculture, tackling monkey menace and developing irrigation facilities need to be given top priority in all the blocks. The other priorities are: training to farmers, supply of seeds of improved/disease resistant varieties and timely supply of inputs. Credit and market facilities are other priorities and felt needs of farmers.

In horticulture, supply of quality planting material, training and marketing get top priorities in that order. In livestock sector, improved breed of dairy cattle, awareness camps organisation, monitoring of mineral deficiency, pasture development and improving veterinary services are the major priority areas. The renovation of veterinary institutions and creation of necessary facilities should be given due attention to provide adequate veterinary services to farmers.

**Table 6.11 Prioritizations of Different Schemes (Ranks)**

Sector	Scheme	Bharmaur	Bhatiyat	Chamba	Melha	Salooni	Tissa
<b>Agriculture</b>	Monkey menace has to be tackled through creating monkey parks, sterilization programme etc.	1	2	1	2	2	1
	Bringing more area under irrigation through various schemes.	2	1	2	1	1	2
	Regular training to the farmers on polyhouse technology, bee keeping, mushroom, dairy and floriculture etc.		3			4	3
	Availability to the farmers of improved seeds and latest technology.		4	3			
	Proper marketing system	3		4		3	
	Credit facility			5			
	Demand for different seeds			6			
	Prioritization of vegetable production and medicinal plants					5	
	Tackling the problems of stray animals						
	Construction of the farmers hostel and training hall						
<b>Horticulture</b>	Vacant post of the staff should be filled up	1	1	1	1	1	1
	Availability of improved plant materials and other input materials	2	2	2		2	2
	Farmer should be trained inclusive of exposure visit	3	3	3		3	3
	Training hall should be constructed	4	4				
	Marketing agency is needed		5	4			
	Monkey menace has to be tackled through creating monkey parks, sterilization programme etc.			5			
	Introduction of floriculture and other fruit crops			6			
	Soil conservation			7			
	Irrigation schemes and rainwater harvesting						
	Suitable for stone fruit						
<b>Animal husbandry</b>	Improved breed of dairy cattle	2	1	2	1	1	1
	Awareness camps organisation	1	2	1	2	3	2
	Mineral deficiency should regularly be monitored	3	3	4	3	2	
	Pasture development		4	3	4		

	Proper medical programmes		5	5	5	
	Laboratory strengthening at block level		6			
	<i>Gosadan</i> at distt. level/ block level		7			
	Establishment of milk cooperative societies					
	Ensured availability of feed					
	Lantana and ageratum management in pastures					

Source : Field Survey, 2007-08

**Appendix Table 1 Block-Wise Demographic and Institutional Features of Chamba District**

Sr. No.	Particulars	Blocks						
		Bharmaur	Bhatiyat	Chamba	Mehla	Salooni	Tissa	District
1.	<b>Gram panchayats (No.)</b>	29	69	39	42	46	42	267
2.	<b>Villages (No.)</b>	263	361	122	129	306	317	1498
3.	<b>Households (No.)</b>	8566	2040	12189	13555	12766	14441	63557
4.	<b>Total population (No.)</b>							
	Male	19259	51034	31983	38288	36159	38745	215468
	Female	17987	51048	32673	36128	34662	33090	205588
	Schedule caste	4922	15420	18046	13420	17935	15519	85262
	Schedule tribe	32324	29913	13605	17785	4175	4909	102711
	Rural	37246	87867	1022	74416	70821	0	271372
	Urban	0	14215	20327	0	0	0	34542
	Sex ratio	934	1000	1022	944	959	854	954
5.	<b>Literacy rate (%)</b>							
	Male	74.00	68.61	78.00	72.00	71.00	69.00	71.56
	Female	39.00	47.26	51.00	41.00	41.00	28.00	41.88
	Scheduled caste	68	0	0	13738	0	28.6	922.3067
	Scheduled tribe	67	0	0	18034	0	0	1206.733
6.	<b>Household economic status (No.)</b>							
	Antodaya households	0	5446	4582	5308	5547	5825	26708
	BPL households	2658	8221	6917	8244	8514	8791	43345
	APL1 households	5879	3918	5272	0	0	0	15069
	APL2 households	0	8321	0	0	0	0	8321
7.	<b>Village amenities (No.)</b>							
	Connected with pucca roads	35	366.81	58	0	100	81	640.81
	Connected with kuchha roads	96	0	22	0	153	40	311
	Connected with no roads	132	0	42	0	12513	196	12883
	Drinking water supply	263	0.7	0	129	100	206	698.7
	Villages electrified	263	361	1	129	225	290	1269
	Tel connection to panchayats	1617	69	39	42	46	25	1838
	Post office	24	41	26	30	15	34	170
	Fair price shops							
	<i>Co-op depots</i>	19	28	69	2	41	27	186
	<i>Private dealers</i>	0	0	33	0	5	10	48
8.	<b>Educational and health institutions (No.)</b>							
	Primary schools	124	261	154	180	169	150	1038
	Middle schools	16	70	39	39	43	30	237
	High schools	13	17	27	22	24	7	110

	Technical institutions							
	<i>Polytech/Engg</i>	0	1	1	0	0	0	2
	<i>ITI</i>	1	1	1	0	0	1	4
	<i>Nursing Training institute</i>	0	0	0	0	0	0	0
	<i>College of Education</i>	1	1	1	0	0	1	4
	PHC	2	12	7	47	7	3	78
	Dispensaries	0	0	0	0	28	20	48
	Sub-health centres	19	41	32	0	22	30	144
	Community HCs	1	2	1	0	2	1	7
	Hospitals	1	2	1	0	0	0	4
	Medical college cum hospitals	0	0	0	0	0	0	0
	Veterinary hospitals	8	6	5	3	3	2	27
	Veterinary dispensaries	27	33	28	27	36	16	167
	Gosadan	0	0	0	0	0	0	0
	Other health institutions	1	5	0	0	0	0	6
	Anganwaris/balwaris	72	331	0	0	192	195	790
<b>9.</b>	<b>Village/community organizations (No.)</b>							
	Mahila mandals	67	144	84	71	21	140	527
	Self help groups	120	127	224	151	354	192	1168
	Youth clubs	47	50	0	74	100	44	315
	NGOs	0	2	4	0	3	1	10
	Farmers co-operatives	0	0	0	0	1	0	1
<b>10</b>	<b>Banking institutions (No.)</b>							
	Commercial banks	2	11	4	1	4	3	25
	RRBs	4	6	9	3	4	0	26
	Central co-operative banks	2	9	0	1	0	0	12
	Co-operative credit societies	19	0	0	1	0	2	22



**Appendix Table 2 Estimated Area Under Different Crops (Ha)**

<b>Crops</b>	<b>Chamba</b>	<b>Mehla</b>	<b>Bhatiyat</b>	<b>Salooni</b>	<b>Tissa</b>	<b>Bharmaur</b>	<b>District</b>
Cereal							
Maize	4370.48	5804.40	5886.13	5552.38	3922.57	1018.14	26554.10
Paddy	123.35	126.00	2282.95	0.00	0.00		2532.30
Wheat	4090.87	4107.60	6283.04	2584.06	3129.52	1397.65	21592.75
Barley	384.62	210.00	671.46	228.41	71.57		1566.05
Millets		294.00		50.00	62.00	352.00	758.00
Pulses							0.00
Mash	124.52	75.60	122.95		116.44	890.59	1330.10
Rajmash	143.87	193.20			109.56	781.84	1228.47
Oilseeds							0.00
Sarson	191.66	399.00	94.90		86.71		772.27
Toria		84.00	453.61				537.61
Vegetables							0.00
Potato	617.31	302.40	312.75	419.36	62.21	188.79	1902.83
Peas	493.68	201.60	139.07	140.12	1277.52		2251.99
Tomato	62.81		17.91	34.11	67.99		182.82
Cabbage		50.40	8.36		22.02		80.78
Cauliflower			8.36		22.30		30.65
Beans	67.99		18.50	58.86	22.02		167.37
Capsicum	23.96						23.96
Bhindi	13.27						13.27
Brinjal	11.33						11.33
Cucurbits	9.39						9.39
Onion	33.99			16.72			50.71
Spices			0.00				0.00
Ginger	4.86		0.00				4.86
Garlic	32.05	33.60	125.34	36.12			227.11
Total Cropped Area	10800.01	11881.80	16425.31	9120.14	8972.43	4629.01	61828.69





