



Department of Agriculture
Himachal Pradesh

DISTRICT AGRICULTURE PLAN

KULLU, HIMACHAL PRADESH

Volume - VI



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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 Kullu was prepared by Dr. (Mrs.) Brij Bala, Scientist Regional Research Station, Bajaura. In addition, a large number of scientists and administrative staff of the university were involved in the first ever such state wide field survey for weeks. I wish to place on record my appreciation of the wonderful work done by each one of the above named persons and those I could not mention by name.

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



DR TEJ PARTAP
Vice Chancellor

Palampur, March 18, 2009

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EXECUTIVE SUMMARY

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

Sr. No.	Schemes	Total Plan Outlay	Yearly Allocation				
			I	II	III	IV	V
I	Interventions to Promote Sustainability of Crop Production System	2160	324	432	432	432	540
1	Improvement of productivity of cereals, pulses, oilseeds, vegetables and spice crops through promotion of HYV seeds including hybrids	260	39	52	52	52	65
2	Improvement of soil health through vermicomposting, bio-fertilizers, micro nutrients, soil testing, etc.	180	27	36	36	36	45
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	1100	165	220	220	220	275
	(i) Sprinkler	900	135	180	180	180	225
	(ii) Drip	200	30	40	40	40	50
5	Agricultural mechanization through popularization of improved tools and hill specific machinery like power tillers, tractors, crop planters/ harvesters, sprayers, clod breakers and gender friendly post	150	22.5	30	30	30	37.5

	harvesting equipments etc. to remove women drudgery						
6	Protected (poly house) cultivation to minimize risk factors and enhance quality and productivity	300	45	60	60	60	75
7	Strengthening and improvement of quality control infrastructure (seed, pesticides, fertilizer testing laboratories)	5	0.75	1	1	1	1.25
8	Strengthening of seed production farms and promotion of infrastructure to improve seed production and replacement	15	2.25	3	3	3	3.75
II	Need Based Infrastructure Development	1051	157.65	210.2	210.2	210.2	262.75
1	Improvement of on-farm water delivery and efficiency of existing irrigation systems	97	14.55	19.4	19.4	19.4	24.25
2	Rural markets	954	143.1	190.8	190.8	190.8	238.5
III	Natural Resource Conservation and Management	4125	618.75	825	825	825	1031.25
1.	Soil conservation of arable and non-arable land through engineering measures	25	3.75	5	5	5	6.25
2.	Water harvesting check dams, ponds, tanks, etc.	3500	525	700	700	700	875
3.	Land improvement	600	90	120	120	120	150
IV	Niche Based Enterprises for Rural Entrepreneurs	122	18.3	24.4	24.4	24.4	30.5
	(i) Organic farming	122	18.3	24.4	24.4	24.4	30.5
V	Fruit Production	1377	206.55	275.4	275.4	275.4	344.25
VI	Livestock, Poultry & Fisheries	2352	352.8	470.4	470.4	470.4	588

1	Livestock improvement	1720	258	344	344	344	430
2	Fisheries	632	94.8	126.4	126.4	126.4	158
VII	Human Resources	741	111.15	148.2	141.6	141.6	185.25
1	Additional man power requirement	719	107.85	143.8	137.4	137.4	179.75
2	Capacity building of extension personnel	22	3.3	4.4	4.2	4.2	5.5
VIII	Research & Extension	268	40.2	53.6	53.6	53.6	67
IX	All Sectors & Schemes	12196	1829.4	2439.2	2439.2	2439.2	3049

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 Allocations (Rs. Lakh)

Sr. No.	Schemes	Total Plan Outlay	Yearly Allocation				
			I	II	III	IV	V
I	Interventions to Promote Sustainability of Crop Production System	2160	324	432	432	432	540
1	Improvement of productivity of cereals, pulses, oilseeds, vegetables and spice crops through promotion of HYV seeds including hybrids	260	39	52	52	52	65
2	Improvement of soil health through vermicomposting, bio-fertilizers, micro nutrients, soil testing, etc.	180	27	36	36	36	45
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	1100	165	220	220	220	275
	(i) Sprinkler	900	135	180	180	180	225
	(ii) Drip	200	30	40	40	40	50
5	Agricultural mechanization through popularization of improved tools and hill specific machinery like power tillers, tractors, crop planters/ harvesters, sprayers, clod breakers and gender friendly post harvesting equipments	150	22.5	30	30	30	37.5

	etc. to remove women drudgery						
6	Protected (poly house) cultivation to minimize risk factors and enhance quality and productivity	300	45	60	60	60	75
7	Strengthening and improvement of quality control infrastructure (seed, pesticides, fertilizer testing laboratories)	5	0.75	1	1	1	1.25
8	Strengthening of seed production farms and promotion of infrastructure to improve seed production and replacement	15	2.25	3	3	3	3.75
II	Need Based Infrastructure Development	26693	4003.95	5338.6	5338.6	5338.6	6673.25
1	Irrigation	1491	223.65	298.2	298.2	298.2	372.75
2	Improvement of on-farm water delivery and efficiency of existing irrigation systems	97	14.55	19.4	19.4	19.4	24.25
3	Rural markets	1908	286.2	381.6	381.6	381.6	477
4	Rural roads for connectivity	23197	3479.55	4639.4	4639.4	4639.4	5799.25
III	Natural Resource Conservation and Management	7625	1143.75	1525	1525	1525	1906.25
1.	Soil conservation of arable and non-arable land through engineering measures	25	3.75	5	5	5	6.25
2.	Water harvesting check dams, ponds, tanks, etc.	7000	1050	1400	1400	1400	1750
3.	Land improvement	600	90	120	120	120	150
IV	Niche Based Enterprises for Rural Entrepreneurs	122	18.3	24.4	24.4	24.4	30.5
	(i) Organic farming	122	18.3	24.4	24.4	24.4	30.5
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VI	Livestock, Poultry & Fisheries	2352	352.8	470.4	470.4	470.4	588
1	Livestock improvement	1720	258	344	344	344	430
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VII	Human Resources	741	111.15	148.2	141.6	141.6	185.25
1	Additional man power requirement	719	107.85	143.8	137.4	137.4	179.75
2	Capacity building of extension personnel	22	3.3	4.4	4.2	4.2	5.5
VIII	Research & Extension	268	40.2	53.6	53.6	53.6	67
IX	All Sectors & Schemes	41338	6200.7	8267.6	8267.6	8267.6	10334.5

PROPOSED INTERVENTIONS AND EXPECTED OUTCOMES

IA Projected Output Growth of Agriculture

Crop	Area (Ha)	Output (Mt)			Growth (%p.a.)	
		Existing	Scenario I	Scenario II	Scenario I	Scenario II
Maize	16497	46192	53006	50028	2.95	1.66
Paddy	952	1153	1774	1700	10.78	9.49
Wheat	21001	47252	3403	3212	2.93	1.64
Barley	2496	2247	54716	51670	3.16	1.87
Pulses	3500	2968	2577	2432	293	1.64
All foodgrains	44446	99812	112888	109042	2.62	1.85
Vegetables	4126	89944	152207	195131	13.84	23.89

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

IB Projected Output Growth in Production of Agricultural Crops

Particular	Existing			Potential			Growth rate (% p.a.)
	Area (Ha)	Production (Mt)	Yield (Q/ha)	Area (Ha)	Production (Mt)	Yield (Q/ha)	
Maize	16036.7	33068	20.62	16036.7	55807.72	34.80	13.75
Paddy	1629.0	4738.8	29.09	1629.0	5163.93	31.70	1.79
Wheat	21806.6	47320	21.70	21806.5	73597.28	33.75	11.10
Barley	1565.6	2851	18.21	1565.6	3914	25.00	7.46
Pulses	5043.2	4388.36	8.70	5043.2	7540.68	14.95	14.37
Vegetables & spices	9165.89	84096	91.75	9165.89	145660	158.9	14.64

IC Projected Value of Output and Growth of Agricultural Crops

Particular	Existing			Potential			Growth rate (% p.a.)
	Area (Ha)	Production (Mt)	Value of output (Rs. Lakh)	Area (Ha)	Production (Mt)	Value of output (Rs. Lakh)	
Maize	16036.7	33068	2645.41	16036.7	55807.72	4464.61	13.75
Paddy	1629.0	4738.8	568.65	1629.0	5163.93	619.67	1.79
Wheat	21806.6	47320	6151.64	21806.6	73597.28	9567.64	11.10
Barley	1565.6	2851	256.58	1565.6	3914	352.26	7.46
Mash	1224.86	945.59	520.07	1224.86	1451.46	798.30	10.69
Rajmash	3214.1	2928	1229.77	3214.1	5110.42	2146.37	14.90
Other pulses	604.2	515.38	206.15	604.2	978.80	391.52	17.98
Mustard	402.88	317.87	38.14	402.88	437.13	52.46	7.51
Other oilseeds	793.62	283.32	50.99	793.62	654.74	117.85	26.22
Potato	1283.52	11595	1159.53	1283.52	16031.16	1603.11	7.65
Peas	1293.5	4742	948.39	1293.5	9701.25	1940.25	20.92
Tomato	776.96	17777	2133.22	776.96	30674.38	3680.92	14.51
Cabbage	986.13	16365	818.24	986.13	28104.70	1405.23	14.35
Cauliflower	946.16	8419.9	1515.57	946.16	15602.18	2808.39	17.06
French bean	289.5	1756.1	316.09	289.5	3358.2	604.47	18.24
Capsicum	175.3	1086.9	239.10	175.3	2086.07	458.93	18.38
Bhindi	134.2	465.81	60.55	134.2	858.88	111.65	16.88
Brinjal	370.52	2377.3	213.95	370.52	4890.86	440.17	21.14
Cucurbits	106.14	995.81	89.62	106.14	1995.43	179.58	20.07
Onion	185.8	1077.6	118.54	185.8	1672.2	183.94	11.03
Radish	366.8	2978.4	178.70	366.8	4467.62	268.05	10
Garlic	1680.76	13565	2713.08	1680.76	24942.48	4988.49	16.77
Coriander	88.1	255.49	153.29	88.1	355.92	213.55	7.86
Chillies	127.6	638	574.2	127.6	918.72	826.84	8.79
Total	56088.55	177064	22899.47	56088.55	292775.53	38224.25	13.38

IIA Projected Output Growth in Fruit Production

Particular	Existing			Potential			Growth rate (% p.a.)
	Area (Ha)	Production (Mt)	Yield (Q/ha)	Area (Ha)	Production (Mt)	Yield (Q/ha)	
Apple	19542.2	258651.20	132.36	19877.20	496930	250	7.68
Stone fruits	2407.74	37912.08	157.46	2866.74	62587.61	218.32	5.43
Other fruits	1796.88	17342.70	96.52	2871.88	40991.70	142.73	11.36

IIB Projected Value of Output and Growth in Fruit Production

Particular	Existing			Potential			Growth rate (% p.a.)
	Area (Ha)	Production (Mt)	Value of output (Rs. Lakh)	Area (Ha)	Production (Mt)	Value of output (Rs. Lakh)	
Apple	19542.2	258651.20	38797.68	19542.2	488555	73283.25	17.78
Stone fruits	2407.74	37912.08	4549.45	2407.74	52565.8	6307.9	7.73
Other fruits	1796.88	17342.70	3121.69	1796.88	25646.9	4616.44	9.58
Total	23746.82	313905.98	46469	23746.82	566767.7	84207.59	16.24

IIIA Projected Output Growth in Livestock Products and Live Animals for Sale

Particular	Existing			Potential			Growth rate (% p.a.)
	No.	Production (Mt/yr)	Milk Yield (L/day)	No.	Production (Mt/yr)	Milk Yield (L/day)	
Milk (Crossbred cow)	69214	52639.4	6.08	69214	95169.2	11	16.17
Milk (Indigenous cow)	85436	6705.7	1.57	85436	17514.4	4.1	32.23
Wool (sheep)	200912	319	1.59 (kg/yr)	200912	514	2.56 (kg/yr)	12.22
Sheep & goat for meat	70099	-	-	75394	-	-	1.51

IIIB Projected Value of Output and Growth in Livestock Products and Live Animals for Sale

Particular	Existing			Potential			Growth rate (% p.a.)
	No.	Production (Mt/yr)	Value of output (Rs. Lakh)	No.	Production (Mt/yr)	Value of output (Rs. Lakh)	
Milk (Crossbred cow)	69214	52639.4	7369.52	69214	95169.2	13323.7	16.16
Milk (Indigenous cow)	85436	6705.7	938.80	85436	17514.4	2452.02	32.23
Wool (sheep)	200912	319	319	200912	514	514	12.22
Sheep & goat for meat	70099	-	525.74	75394	-	565.45	1.51
Total			9153.06			16855.17	16.83

IV Projected Value of Output and Growth of Agriculture and Allied Sectors

Sectors	Current value of output (Rs. Lakh)	Projected value of output (Rs. Lakh)	Growth rate (% per annum)
Agriculture	22899.47	38224.25	13.38
Horticulture	46469.00	84207.59	16.24
Animal husbandry	9153.06	16855.17	16.83
All sectors	78521.53	139287	15.48

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 suitable for hill farming and equipments & implements to reduce labour and to provide relief to 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 cattle, sheep and goat with improved ones.
- Promoting health care system of cattle, 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 fruits.
- Provision of quality plant material to promote fruit production and harness available potential.
- Construction of adequate number of CAS (Control Atmosphere Storage) at appropriate places.
- To install anti-hail guns and nets at vulnerable points.
- Creation of monkey sanctuaries, planting wild fruit species in the forests and taking measures like sterilization to check the monkey menace.

Research and Extension Support

- Refinement and validation of technologies for different agro-ecological situations
- *Ex-situ* and *in situ* conservation of minor millets
- 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.

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

Block	Cultivated land	Potential cultivable land	Productive support land	Potential support land	Existing irrigated area	Potential irrigated land	Irrigation potential through water harvesting
Kullu	12971	1043	72	120	369	320	400
Banjar	6015	1140	93	42	1171	250	500
Naggar	6471	695	45	50	993	380	650
Ani	5278	1255	20	80	124	93	600
Nirmand	5770	138	23	10	931	80	650
District	36505	4271	253	302	3588	1123	2800

VI Projected Fertiliser Demand by 2012-13 (Mt)

Fertilisers	Scenario-I	Scenario-II	Scenario-III
Urea	3855	4251	5153
12:32:16	3712	4089	4949
15:15:15	2594	2839	3395
MOP	1500	1657	2016

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

(ii) Scenario-II projects on the basis of growth rate of demand plus 2 per cent increase in demand arising from ongoing process of crop diversification in the district.

(iii) Scenario-III projects on the basis of growth rate of demand, 2 per cent growth in demand arising due to crop diversification and additional 2 per cent increase in demand if the target of proposed area under irrigation is fulfilled.

Interventions

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

VII Potential Enterprises for Gainful Employment

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

VIII Human Resource Requirement (No.)

Block	Crop Production	Horticulture	Animal Husbandry	Others	Total
Kullu	7	3	0	1	11
Banjar	8	4	1	0	13
Naggar	8	5	1	4	18
Ani	3	5	0	0	8
Nirmand	3	5	0	0	8
District	29	22	2	10	63

Interventions

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

IX Some Quantitative Outcomes

- Food grain production shall increase from 99,812 metric tons to 1,12,888 metric tons after the implementation of the plan recording a growth rate of 2.62 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 food grains production shall be 1.85 per cent per annum.
- Production of vegetables would increase from 89,944 metric tons to 1,52,207 metric tons in scenario I registering a growth rate of 13.84 per cent per annum when the proportion of area under these crops remains same and to 1,95,131 metric tons recording a growth rate of 23.89 per cent per annum in scenario II when 20 per cent of the irrigated area is brought under these crops. This will generate a marketable surplus of 1,75,619 metric tons which in monetary terms amounts to Rs. 175.62 crores.
- The apple production in the district will increase at the rate of 7.68% per annum. Stone fruits like apricot, plum, peach etc are the other important fruits of the area. The production of these fruits shall increase at the rate of 5.43% per annum. Similarly, the production of other fruits viz., pomegranate, kiwi, pear, (mango and

citrus in Nirmand block) is expected to rise from 17,342 metric tonnes to 40,991 metric tonnes thus giving a growth rate of 11.36% per annum.

- The milk production from crossbred cows will increase at the rate of 16.17% per annum as a result of the implementation of the plan. The milk production from indigenous cows as well is expected to rise from 6,705.7 metric tonnes to 17,514.4 metric tonnes thus enabling it to grow at the rate of 32.23% per annum.
- Sheep are maintained for both meat and wool purpose. The wool production is expected to increase by 12.22% per annum. The number of sheep and goat live animals sold for meat purpose will increase by 1.51% per annum.
- Irrigation potential shall be created which will provide irrigation to an area of 3,923 hectares.
- Available water potential shall be exploited and thereby 3,923 hectares of land shall be brought under protective and assured irrigation.
- With the implementation of plan 20.58 per cent of the arable land will have assured irrigation facilities compared to existing 9.83 per cent.
- Land amounting to 10,951 hectares infested with soil erosion, stream bank erosion, etc; shall be treated by adopting soil conservation measures.
- Support land (private grasslands) of 555 hectares will be treated against invasive weeds and shrubs. This will improve the fodder production to the approximate level of 55.5 metric tons.
- The projected sectoral growth rates are 13.38 per cent for agriculture, 16.24 per cent for horticulture and 16.83 per cent for animal husbandry. The overall agricultural growth rate is projected at 15.48 per cent per annum during the plan.

X Researchable Issues

Agriculture

- Characterization and classification of soils.
- Delineation of the acid soil regions (ASR).
- Issues in solid waste management for organic farming in major cash crops.
- 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, soil and water management practices.

- Enhancement of soil health through organic farming in vegetable/cereal based cropping systems.
- Development of high yielding varieties of various crops having wider adaptability and resistance to various biotic and abiotic stresses, through exploitation of land races, agronomic basis and alien species using conventional as well as non-conventional breeding approaches. The focus will be on the development of improved varieties of various niche based crops e.g. red rice, special purpose corn e.g. baby corn, sweet corn, pop corn, rajmash and mash.
- Utilization of diverse gene pool of maize to generate diversified improved genotypes.
- Breeding of barley varieties for value added products like malting & brewing.
- Development of disease resistant varieties of mash and rajmash having high yield and suitability for intercropping.
- Development of varieties of mustard with high yield, resistance to white rust and *Alternaria* blight and suitable as sole as well as mixed with wheat.
- Development/identification of bacterial wilt resistant hybrids/varieties of *solanaceous* vegetables.
- Identification of the most economic crops/ cropping systems and their suitable niches in Kullu and Mandi districts.
- Development, standardization and promotion of protected precision farming of high value vegetable crops.
- Standardization of agro-technology for organic vegetable production.
- Standardization of production technology for rainfed cultivation of potential vegetable crops.
- Formulation of biointensive IPM strategies for the management of *Helicoverpa armigera* (tomato and gram), fruit flies (cucurbits and tomatoes), white grubs (potato, maize, peas, ginger, cabbage etc.) cut worms (cereals and vegetables), diamondback moth and cabbage caterpillar (cole crops), shoot and fruit borer (brinjal and okra), leaf miner and pod borer (peas), mites (pulses and vegetables), plant parasitic nematodes (cereals and vegetables).
- Insect pest and nematode management under protected cultivation situations.

- Management of insecticide resistance in field populations of *Helicoverpa armigera*, *Spodoptera litura*, *Plutella xylostella*, *Leucinodes orbonalis*, *Trialeurodes vaporariorum*.
- Collection and utilization of local strains of entomopathogenic organisms for insect pest management under organic farming situations.
- Identification and utilization of native botanicals for eco-friendly pest management.
- Pesticide residue analysis in vegetables and determination of MRL's for consumer safety. Germplasm screening for resistance against major insect pests (cereals, pulses, oilseeds and vegetables).
- Survey and surveillance for identification of new invasion of insect pests.
- Safe management alternatives for the stored grain pests.
- Identification and management of insect-pests of medicinal, aromatic and ornamental plants.
- Survey and surveillance of major diseases and development of disease forecasting modules. Identification of resistant sources and study of genetics of resistance. Marker assisted selection of resistant genes using molecular markers and their use in gene pyramiding for resistance in commercial varieties.
- Development of integrated disease management modules suitable for organic and protected agriculture conditions.
- Development of waste lands and marshy lands/ravenous lands.
- Development of high fodder yielding varieties with high nutritive value and good regeneration capacity e.g. setaria and napier bajra hybrids, and oats among annuals.
- Mechanization of hill Agriculture.
- Validation of ITKs
- Analysing trends and patterns of demand, prices and markets of emerging crops and enterprises in the context of ongoing process of globalisation.
- Understanding economic implications of climate change towards cropping systems, cropping patterns and livelihood of the farmers.

- Assessing impact of the ongoing process of commercialisation of agriculture on natural resource base (soil, water and environment) and its implications towards livelihood of the farmers.
- Studies on impact assessment and policy implications of various developmental programmes/schemes.

Horticulture

- Development of techniques for use of organic manures or bio-fertilizers and micronutrients in fruit crops.
- Developing techniques for crop regulation in pomegranate.
- Standardization of technology for off-season cut flower production of chrysanthemum.
- Development of eco friendly methods for integrated management of important insect-pests in apple, pomegranate and other fruit crops.
- Varietal diversification in apple, pear, cherry, plums, kiwi, persimmon and walnut through introduction and testing of improved genotypes.
- Popularisation of spur type apple cultivars in low-lying areas.
- Evaluation of cherry rootstocks for wider adaptability.
- Identification and multiplication of clonal rootstocks for higher yields in pears.
- Flower regulation as per market demands.
- Development of resource (soil and water) conservation practices in horticulture.
- Development of technology for improving water use efficiency, fertigation in different fruit crops.
- Evolving improved frost protection technology.

Animal Husbandry

- Documentation of the prevailing ethno-veterinary practices among rural livestock farmers; their scientific validation and subsequent mass dissemination.
- Analytical study of the contribution of women to animal husbandry operations.
- Analysis of the constraints in the adoption of improved dairy husbandry practices /technology by livestock farmers in the district, perceptions of stake-holders.

- Development of a sustainable dairy husbandry package for livestock farmers in the face of ‘livestock revolution 2020’
- Scope study for the development of an integrated livestock (cattle, fish and poultry) production model (ILPM) for hill farmers in Kullu district.
- Identification and nutritional evaluation of the high nutrition fodder grasses in high altitude areas of Kullu district.
- A technical study into the genesis of stray cattle menace and its sustainable remedy.
- Identification of honey potential areas for two spp. i. e. *Apis cerana* and *Apis mellifera*.
- Refinement in the technology for control of wasps predating on honey bees.
- Selection in *Apis cerana* and *Apis mellifera* for some biological and economic traits.

XI Sum Up

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

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

The current crisis in agricultural sector has once again brought up the importance of preparing district agricultural plans taking into account myriad 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 the 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 coverage of commodities under MSP scheme. Likewise, neglect of agricultural research and extension, technology fatigue manifested in stagnation/deceleration in growth of yields of important crops like wheat, practically no increase in area under irrigation despite launching Accelerated Irrigation Benefit Programme (AIBP) in 1996-97. Between 1995-96 and 2003-04 both central and state governments have spent nearly Rs. 35,000 crores but the net irrigated area has remained static at around 53-55 million hectares, the poor growth in surface irrigation has obliged farmers to depend heavily on ground water exploitation thereby depleting ground water resources and increasing cost of production and fall in the rate of growth of employment opportunities. While the overall employment growth declined from 1.74 per cent between 1983-84 and 1993-94 to 1.08 per cent between 1993-94 and 2003-04, in agriculture it decreased from 1.41 per cent to 0.63 per cent. The net result has been dwindling income of the farmers culminating in increasing number of farmers' suicides.

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

expenditure on agriculture by the state governments is higher than the base period, which is defined as the moving average of the expenditure of the preceding three years. Second, the preparation of district and state agricultural plans is mandatory. The areas like integrated development of food crops including coarse cereals, minor millets and pulses, agricultural 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-fertilisers are given priority. The District Agricultural Plan (DAP) should determine that each district's final resource envelops its production plan and the associated input plan. It has also been emphasised to integrate these district level agricultural plans with the state plans.

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

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 Hulme¹, 2000, pp. 79-98. The present section is, therefore, devoted to explain methodological framework adopted to prepare district agricultural plans.

1.2.1 Sampling Plan

The state has been divided into 77 developmental blocks. Though all the developmental blocks in the state were taken, sampling approach was adopted to select the panchayats. The sample panchayats were selected in such a way so that variations in micro climatic niches, farming systems and cropping patterns in a particular block are captured. To meet this requirement, it was decided to select 10 per cent of the total panchayats from each of the block with a minimum of four panchayats in those districts, where number of panchayats was more than 200. In other districts, where number of panchayats was less than 200, 15 per cent of the panchayats were selected again with a minimum condition of selecting four panchayats in a block. Wherever 10 per cent or 15 per cent of the total panchayats from a block was not an integer (5.5 say) in those cases the next higher integer (say 6) was taken. There are five blocks in the district and following this methodology, the number of panchayats selected in district Kullu was 23. The details of the sample panchayats selected from each block are provided in Table 1 .1.

Map 1.1 District Map Showing Location of the Selected Panchayats



Table 1.1 Sample Panchayats

Sr. No.	Blocks	Total panchayats (No.)	Selected Panchayats (No. and names)
1	Kullu	70	7 (Bhaliyani, Tegubehr, Ratocha, Kasol, Dyar, Garsa, Talara)
2	Banjar	36	4 (Mohini, Chehani, Nohanda, Larji)
3	Naggar	40	4 (Benchi, chansari, Karzan, Jana)
4	Ani	32	4 (Behna, Chowai, Dingidhar, Khanag)
5	Nirmand	26	4 (Gadej, Twar, Sarahan, Nither)
6	Total	204	23

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 panchayat 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 percentages, simple and weighted averages and standard deviations of different parameters were computed. The averages then were multiplied with the total number of panchayats in a particular block to arrive at the estimates for the whole block. In some cases, depending upon the nature of parameters, one standard deviation was added to the average

to arrive at estimates at the block level. The problems, suggestions and interventions suggested by the grass root level functionaries were coded. Based upon these codes, frequency tables were generated and different problems and interventions were prioritised and five most important problems and interventions were considered for preparing plan estimates. The interventions required to solve different problems and to exploit the available potential in different areas, were divided into three categories namely, research, extension and development. The funds for these interventions were then worked out in consultation with the stakeholders. The financial requirements for other parameters like irrigation, watershed schemes, infrastructure, markets, and so on were prepared in consultation with the district level officials of the line departments like agriculture, horticulture, animal husbandry and irrigation. The state level plans were prepared on the basis of different district agricultural plans.

1.2.4 Limitations

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

Note

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

Chapter II

GENERAL DESCRIPTION OF THE DISTRICT

2.1 Background

2.1.1 Location

The name Kullu traces its origin from the word 'Kullut' which was described on the coins of first and second centuries. District Kullu, the valley of village Gods, nestles in the Pir Panjal range of the Western Himalayas. It is located between 30⁰-51'-00" North latitude and 77⁰-06'-04" East longitude.

2.1.2 Boundaries

The north-east boundary of the district touches the border district of Lahaul & Spiti. On the east and south-east, it is bounded by Kinnaur and Shimla districts; on the south-west by Mandi and on the west by Kangra. The geographical condition of the district is mountainous cruised by rivers and valleys. The mountains in the region are comprised of high ranges with sharp crests and steep terrains. The region is characterized by semi-tropical forest vegetation. The hillsides are covered with dense pine woods and higher up stand deciduous arboretum, rhododendron and evergreen oak, fir and spruce. The Beas and Satluj are the principal rivers of the district and the entire drainage of the district is received by these two rivers. The Beas runs down from the snowy heights of Beas Kund near Rohtang pass and passes southwards through Manali and Kullu towns till it reaches Larji. It joins its main tributaries, the Parvati at Bhuntar, the Sainj (a fairly large river flowing to the west from 'Supa Kuni' high peak on Spiti boundary) and the Tirthan below Larji. Other tributaries of Beas in the district are Solang nalla, Manalsu, Sujoin, Sarvari and Phozal nullah. Satluj is the other major river on the southern boundary of the district touching Ani and Nirmand blocks. Kurpan stream in the Outer Seraj, flows in the south-east direction from Sriksand peak down to a fertile valley and joins the Satluj below Nirmand. Ani Khad having its origin from Jalori peak, flows through a narrow valley and drains into Satluj near Behna village.

2.2 Physiographic Features

2.2.1 Area

The total geographical area of the district is 5503 sq. km. which is comprised of mountain peaks as high as Deo-Tibba (6123 mts) and as low as Jalori pass (3000 mts), the valleys of the Beas, the Parvati, the Sainj, the Tirthan and the vales of Ani and Kurpan. The total population of the district is 3,81,571 as per the 2001 census, which accounts for 6.25 per cent of the state's population. The altitude of the district ranges from 500 m to 5000 m above the mean sea level, but the habitation is only up to 3500 m. The district comprises of physiographic areas viz., Ujhi, Lug, Rupi, Kharahal and Seraj areas. The Seraj area is further divided into inner and outer Seraj. The inner Seraj includes Banjar block and Outer Seraj includes Ani & Nirmand blocks.

Initially, Kullu was a Tehsil of Kangra district which was made a separate district in 1963 and later on was integrated with Himachal Pradesh in November 1966. Presently, Kullu district is comprised of four tehsils, namely, Kullu, Manali, Banjar and Nirmand and two subtehsils at Ani and Sainj. There are five development blocks in the district, namely, Kullu, Naggar, Banjar, Ani and Nirmand. There are 204 panchayats and 172 revenue villages. Kullu, Manali, Bhuntar and Banjar are major towns. Kullu and Manali are major tourist places. Manikaran and Vashisht are famous for hot water springs.

Table 2.1 District at a Glance

Sr. No.	Particular	Figures/Description
1.	Total Population (2001 census)	3,81,571
	Male population	1,98,016
	Female population	1,83,555
	Rural population	3,51,478
	Urban population	30,093
	SC population	1,07,897
	ST population	11,351
	Sex ratio	927
	Density of population	69
2	Total Literates	2,39,649
	Male literacy	84.85 %
	Female literacy	61.24 %
	Total literacy	73.36 %
3	Geographical Area (sq.km.)	5,503
	Inhabited Census Villages	172 172
	Longitude	77 ⁰ -06' -04" E
	Latitude	30 ⁰ -51'-00" N
4	Number of electrified villages	172
5	Villages with water availability	172
6	Road length	1333
7	Post offices	157
8	Banks	73
9	Police stations/posts	14
10	Major rivers	Beas, Satluj
11	People & Culture	
	Major religions	Hindus, Sikhs
	Languages	Pahari (Kullavi), Hindi
	Culture	Traditional and Pahari
	Traditions	Religious
	Art forms	Kullu shawls, Pattus, Caps, Border
12	Administrative Setup	
	No. of sub-divisions	4
	No. of tehsils	4
	No. of sub-tehsils	2
	Development blocks	5
	Panchayats	204
	Nagar parshads	4
	Number of constituencies	3
13	Total workers	2,16,513
	Cultivators	1,64,646
	Agricultural labourers	5,590
	Domestic industry workers	2,733
	Other workers	43,544

14	Total Cropped Area	64,973 hectare
15	Net Sown Area	36,224 hectare
16	Net Irrigated Area	2,828 hectare
17	Allopathic Institutions Hospitals Community health centers Primary health centers Health sub-centers	2 5 17 100
18	Ayurvedic Institutions Hospitals Ayurvedic health centers Homeopathic health centers	1 66 1
19	Educational Institutions	
	Primary schools Middle schools High schools Senior secondary schools Colleges	730 115 48 39 4
20	Veterinary Institutions	
	Hospitals Dispensaries Mobil veterinary clinic Poultry farm	15 85 1 1
21	Livestock (2003)	3,86,491
22	Cooperative societies	551
23	Fair price shops	416

Source: Population Census, India.

2.2.2 Agro-Climatic Conditions

The district is characterized with cold dry weather. The maximum temperature varies from 15.8⁰ C in January to 32.8⁰ C in June, whereas the minimum temperature ranges from 21.1⁰ C in July to as low as 0.7⁰ C (Twenty three years' average from 1985-2007). The summers are mild and winters are harsh due to snowfall on mountain ranges. The upper regions experience snow and sleet fall while rains are confined to the lower heights. The rainfall is well distributed from January to September and other three months receive comparatively less rainfall. Maximum rainfall is received during the month of July. The less rainfall during the months of October to December adversely affects the sowing of rabi crops. Sometimes in the months of April and May, hailstorms are received which cause damage to crops, especially fruits. Heavy rains during the maturity period of rabi crops also sometimes cause damage to the crops. The sunshine hours during the months of December, January and

February are very less (4.9-5.4) which further intensify the severity of cold. The natural calamities viz., flashfloods, cloudbursts and droughts are common and frequent features in the district and have caused heavy losses to the farmers during the past years. (Table 2.2)

2.2.3 Agro-Ecological Situations and Soils

Kullu District falls under two agro climatic zones viz., mid hill sub humid zone and high hill wet temperate zone as identified under NARP. Further, on the basis of altitude, topography, thermal regime, soil type, hydrological features, precipitation and land use, four agro ecological situations (AESs), three falling under mid hill sub humid zone and one under high hill wet temperate zone, have been identified. These four situations are spread in all the five blocks of the district. The main features of these AESs are discussed hereunder (Table 2.3).

Table 2.2 Normal Monthly Meteorological Parameters at Bajaura (1985-2007)

Month	Temperature (°c)		Relative humidity (%)		Bright sunshine (Hrs/day)	Total evaporation (Mm)	Total rainfall (Mm)*	No. of rainy days*
	Max	Min	M	E				
January	15.8	1.0	92	40	4.9	41.7	81.9	7.0
February	17.5	3.3	89	44	5.4	52.4	91.2	8.5
March	21.2	6.1	87	41	6.5	91.0	125.3	10.3
April	26.5	9.1	87	37	7.7	121.0	71.9	8.1
May	30.9	12.9	83	35	8.0	151.7	74.0	9.3
June	32.8	17.4	80	40	7.6	168.9	61.1	8.4
July	31.1	21.1	87	58	6.1	151.5	141.3	13.7
August	30.4	20.7	90	60	5.9	135.6	122.0	12.8
September	29.7	17.1	89	52	7.3	123.0	64.5	7.9
October	27.2	8.9	88	34	8.0	104.9	27.1	2.8
November	23.1	3.5	91	33	6.8	59.2	24.5	2.2
December	17.6	0.7	92	39	5.1	38.0	34.5	3.4
Mean/Total	25.3	10.2	88	43	6.6	1238.9	919.3	94.4

Note: Rain fall data pertain to the period from 1973-2007.

AES I: Valley Areas

This AES includes the valley areas having elevation ranging from 651-1300 m in all the five development blocks. The average annual rainfall is about 1000 mm. Soils are entisol and inceptisol with gentle slopping topography. The net cultivated area under this AES is about

12.7 thousand hectares (35.05%) with partial irrigation facilities. Main sources of irrigation are flow and lift irrigation schemes. Vegetable, cereal and fruit based cropping systems are predominant in this AES. The net cultivated area is spread over approximately 54.3, 11.8, 11.8, 11.8 and 10.3 per cent in Kullu, Naggar, Banjar, Nirmand, and Ani blocks, respectively.

AES II: Mid Hill Mild Temperate Areas

Area of this AES also spreads throughout the five blocks of the district. The elevation of this AES ranges between 651 and 1300 m having annual rainfall of about 1540 mm. The soils are entisol, inceptisol and mollisol. The topography is hilly terrain. The net cultivated area is about 16.02 thousand hectares (44.23%) with meagre irrigation facilities. Cereal, pulse, fruit and vegetable based cropping systems are predominantly in practice in this AES. The net cultivated area in this AES is spread over approximately 19.2, 16.7, 20.6, 18.5 and 24.7 per cent in Kullu, Naggar, Banjar, Nirmand, and Ani blocks, respectively.

AES III: High Hill Temperate Areas

Area of this AES too spreads in all the five blocks of the district with elevation ranging from 1300 to 1800 m amsl. Average rainfall is about 1078 mm and soil types are alfisol and inceptisol. Topography is hilly terrain having net cultivated area of approximately 6.0 thousand hectares (16.58%) with inadequate irrigation facilities. Fruits, off-season vegetables, pulses and traditional mountain crops are predominant. The net cultivated area under this AES is spread over approximately 41.3, 25.0, 51.1, 13.3 and 5.3 per cent in Kullu, Naggar, Banjar, Nirmand, and Ani blocks, respectively.

AES IV: High Hill Wet Temperate Areas

This AES also extends in all the five blocks with elevation about 1800 m with medium shallow soil. Topography is hilly terrain with net cultivated area of approximately 1.5

Table 2.3 Agro-Ecological Situations in District Kullu.

Name of AES	Elevation (M)	Rainfall (Mm)	Soil type	Topography	Approximate net cultivated area (000, Ha)	Per cent area	Cropping system
AES I Valley areas	651-1300	1000	Entisol & inceptisol	Gentle sloping	12.7	33.05	Vegetable, cereal and fruit based
AES II Mid hill mild temperate areas	651-1300	1540	Entisol, inceptisol & mollisol	Hilly terrain	16.4	44.23	Vegetable, cereal, fruit & pulse based
AES III High hill temperate areas	1300-1800	1078	Alfisol & inceptisol	Hilly terrain	6.0	16.58	Fruits, off-season vegetables pulses & traditional mountain crops.
AES IV High hill wet temperate areas	>1800	-	Medium shallow	Mountainous with heavy snow	1.5	4.14	Mountain traditional crops, pulses, cereals & fruits.

Source: SREP for District Kullu

thousand hectares (4.41%). Heavy snowfall with one crop season is characteristic feature in some of the areas in this AES. The peasants grow mountain traditional crops, pulses, cereals, fruits and vegetables. The net cultivated area under this AES is spread over approximately 33.3, 21.0, 12.3, and 13.3 per cent in Kullu, Naggar, Banjar, Nirmand, and Ani blocks, respectively.

2.2.4 Forests

According to the forest department the total area under forests in the district is 4,95,169 hectares. The entire area is divided into six forest circles, namely, Kullu, Parvati, Banjar, Ani, Wild Animals and National Park, each having 19.5, 31, 5.29, 10.8, 9.69 and 23.72 per cent of the total forest area, respectively. Again, the forest area has been classified under three categories i.e. reserved forests, protected forests and unclassified forests. Reserve forests occupy 3.24 per cent of the area whereas protected forests occupy 64.8 per cent of the total area. Large scale felling of trees, forest fire, theft, and overgrazing are the major factors resulting in destruction and degradation of forests. Total value of medicinal herbs, resins and other forest products during 2002-03 amounted to Rs. 61 lakh. (Table 2.4)

Table 2.4 Area Under Forests (Ha)

Forest circle	Reserve forest	Protected forest	Unclassified forest	Total
Kullu	325	39,046	57,232	96,603
Parvati	4,557	1,36,928	12,269	1,53,754
Banjar	1,016	10,693	14,500	26,209
Ani	2,076	23,211	28,216	53,503
Wild animals	3,249	22,266	11,473	47,988
National park	4,829	88,771	23,512	1,17,112
Total	16,052	3,20,915	1,58,202	4,95,169

Source: 1 Forest Circle Officers of all Circles.

2 Director, Great Himalayan National Park, Shamshi

2.2.5 Flora and Fauna

The district is known for luscious quality of apples, apricots, cherries, plums, peaches and pears. In higher reaches where the life is harsh and difficult, the people have been mostly subsisting upon coarse grains and wild products like buckwheat and barley. Kodra, sariara, maize and dried beans have been the staple food of these people. Among the various forest trees, district is rich in alpine vegetation. The commonest trees present are pine, oak rhododendron, deodar, mohru, kharsu and wild walnut. The wild life species found sparsely include common Indian rat, wild cat, Himalayan black bear, brown bear, barking deer, musk deer, goral, jackal, langoor, monkey, leopard and panther.

2.2.6 Fishery

Pisciculture has better scope in Kullu district. It has perennial rivers, the Beas, Solang, Manalsu, Chhaki, Parvati, Sujoin, Fozal, Garsa, Kurpan etc. The important variety of fish found in the district is Trout and Himalayan Barbel. Trout fish farms have been established at Patlikuhl, Babeli and Nagni to give a boost to this enterprise. The total fish production in the district during 2006-07 was 243 metric tonnes, the value of which turned out to be Rs. 135 lakh (Table 2.5).

Table 2.5 Fish Production

Particular	2003-04	2004-05	2005-06	2006-07
Licensed fishermen (No.)	273	281	288	285
Fish production (Mt)	195.6	205	225	243
Value of fish catch (Rs. Lakh)	117.34	123	135	145
Fish production by Indo-Norwegian Project, Patlikuhl (Mt)	7.00	12.00	12.34	14-62

Source: Statistical Abstract of District Kullu, 2007

2.3 Demographic Features

2.3.1 Distribution of Population

According to population census 2001, the total population of the district was 3, 81,571 comprising of 1, 98,016 males and 1, 83,555 females. The decennial growth rate was about 27 per cent during 1991 however; it has shown a decline over the period. The population density is 69 and sex ratio is 928. Literacy percentage has increased significantly over the period but is still below the state average (Table 2.6).

Table 2.6 Demographic Features of District Kullu, 1991 and 2001

Particular	Population (No.)						Literacy %		
	Year	Persons	% to state	Dec. growth	Density/ Sq km	Sex ratio	Male	Female	Total
Kullu	1991	302432	5.85	26.68	55	920	69.64	38.53	54.82
	2001	381571	6.25	25.60	69	928	84.85	61.24	73.36
HP	1991	5170877	100.00	20.79	93		75.36	52.13	63.86
	2001	6077248	100.00	17.39	109	970	86.02	68.08	77.13

Source: Census of HP, 1991 & 2001.

Table 2.7 Block-Wise Population and Number of Villages (2001)

Block	Population (No.)			Inhabited villages	Area (Sq. km.)
	Persons	Males	Females		
Kullu	1,14,240	59,542	54,698	50	148.85
Banjar	87,080	45,056	42,024	37	102.00
Naggar	51,765	26,228	25,537	42	90.14
Ani	50,476	25,722	24,754	17	78.42
Nirmand	47,917	24,583	23,334	26	77.45
All blocks	3,51,478	1,81,131	1,70,347	172	496.86
District	3,81,571	1,98,016	1,83,555		5,503.00

Note: District includes the information of three villages of Kullu block.

Source: Statistical Abstract of District Kullu, 2007.

The block-wise distribution of population shows that Kullu block accommodated the maximum population followed by Banjar and Naggar blocks. The total number of inhabited villages was also highest in Kullu followed by Naggar and Banjar (Table 2.7).

2.3.2 Sex Ratio

It can be observed that the population of the district continuously increased over the decades from 1901 to 2001 except for the period from 1911 and 1921. But, it is really sad to say that the sex ratio i. e. the number of females per 1000 of males declined from 1000 during 1901 to 927 in 2001, which is below the state average of 970 females. It has continuously declined except during 1951 and 1961 census years. The figures obtained for 2001 were also encouraging as the sex ratio increased from 920 to 927 (Table 2.8).

Table 2.8 Decadal Variation of Population

Year	Population (No.)	Decadal variation	Sex ratio (F/1000M)	Population density (No./km ²)	Scheduled caste popn. (%)	Scheduled tribe popn. (%)
1901	1,19,585	..	..	..	..	..
1911	1,24,803	(+) 4.36	1,000	..	..	..
1921	1,22,027	(-) 2.22	1,015	..	..	..
1931	1,31,425	(+) 7.70	1,006	..	..	..
1941	1,37,202	(+) 4.40	930	..	..	..
1951	1,45,688	(+) 6.19	941	..	..	..
1961	1,52,925	(+) 4.97	945	28	26.08	..
1971	1,92,371	(+) 5.79	920	35	25.14	..
1981	2,38,734	(+)24.10	918	43	28.41	3.10
1991	3,02,432	(+)26.68	920	55	28.93	3.61
2001	3,81,571	(+)26.17	927	69	28.28	2.97

Source: Population census, HP.

The sex ratio worked out for the population above six years of age is 922 while the same for population below six years' of age touches the figure of 959, which shows a ray of hope. We can expect that the declining sex ratio will improve in the coming years (Table 2.9).

Table 2.9 Block-Wise and Sex-wise Population (2001)

Block	Population above 6 years' age			Child population in the age group 0-6 years		
	Male	Female	Total	Male	Female	Total
Kullu	50,705	46,405	97,110	8,837	8,293	17,130
Banjar	39,267	36,374	75,641	5,789	5,650	11,439
Naggar	22,025	21,386	43,411	4,203	4,151	8,354
Ani	22,508	21,663	44,171	3,214	3,091	6,305
Nirmand	21,374	20,110	41,484	3,209	3,224	6,433
All blocks	155,879	1,45,938	3,01,817	25,252	24,409	49,661
District	1,71,061	1,57,690	3,28,751	26,955	25,865	52,820
Sex ratio			922			959

Note: i) District includes the information of three villages of Kullu block.

ii) Density of population cannot be worked out because the area of blocks according to Surveyor General is not available.

Source: Statistical Abstract of District Kullu, 2007.

2.3.3 Density of Population

In terms of total population the district is ranked at ninth place in the state and in case of population density its rank is tenth; district Kinnaur and Lahaul & Spiti are more thinly populated than Kullu. The density of population has also shown a continuous increase over the period. It has increased from 28 per km² in 1961 to 69 in 2001 registering more than two times increase.

2.3.4 Literacy Level

The total population above six years of age was 3,28,751 i.e. about 86 per cent of the total population. Like total population, it was also the maximum in Kullu block followed by Banjar (Table 2.10).

The overall literacy rate obtained for the district in 2001 was 72.9 percent. The literacy level of male population was quite high (84%) as compared to the female population (61%). Banjar block appeared to be the leading block in terms of total literacy rate followed by Kullu and Naggar (Table 2.11).

Table 2.10 Block-Wise Literate Population, 2001 (No.)

Block	Total population	Population above 6 years' age	Literate Population		
			Male	Female	Total
Kullu	1,14,240	97,110	42,768	27,569	70,337
Banjar	87,080	75,641	32,995	22,572	55,567
Naggar	51,765	43,411	18,289	12,319	30,608
Ani	50,476	44,171	18,406	12,383	30,789
Nirmand	47,917	41,484	17,260	11,390	28,650
All blocks	3,51,478	3,01,817	1,29,718	86,233	2,15,951
District	3,81,571	3,28,751	1,43,655	95,994	2,39,649

Note: District includes the information of three villages of Kullu block.

Source: Statistical Abstract of District Kullu, 2007.

Table 2.11 Block-Wise Literacy Rate (2001)

Block	Percentage of literates		
	Males	Females	Total
Kullu	84.35	59.41	72.43
Banjar	84.03	62.06	73.46
Naggar	83.04	57.60	70.51
Ani	81.78	57.16	69.70
Nirmand	80.75	56.64	69.06
All blocks	83.22	59.09	71.55
District	83.98	60.88	72.90

Note: District includes the information of three villages of Kullu block.

Source: Block Development Indicators, District Kullu, 2007.

2.3.5 Occupational Distribution

It can be observed that nearly 44 per cent of the total population in the district is classified as main workers. Among blocks, Nirmand has the highest proportion followed by Naggar. Agricultural workers account for 32.5 per cent of the total population and 74 per cent of the main workers.

Table 2.12 Proportion of Main Workers in Total Population (2001)

Block	Total population (No.)	Main workers (No.)	% of main workers to total population
Kullu	1,14,240	50,096	43.85
Banjar	87,080	38,132	43.79
Naggar	51,765	23,229	44.87
Ani	50,476	22,524	44.62
Nirmand	47,917	21,681	45.25
All blocks	3,51,478	1,55,662	44.29
District	3,81,571	1,66,715	43.69

Note: District includes the information of three villages of Kullu block.

Source: Block Development Indicators, District Kullu, 2007

Table 2.13 Proportion of Agricultural Workers to Total Population (2001)

Block	Total population (No.)	Agricultural workers (No.)	% of agril. workers to total population
Kullu	1,14,240	37,630	32.94
Banjar	87,080	28,119	32.29
Naggar	51,765	20,573	39.74
Ani	50,476	19,649	38.93
Nirmand	47,917	17,825	37.20
All blocks	3,51,478	1,23,796	35.22
District	3,81,571	1,23,967	32.49

Source: Block Development Indicators, District Kullu, 2007.

District includes the information of three villages of Kullu block.

The proportion of agricultural workers in total population is 32.9, 32.3, 39.7, 38.9 and 37.2 per cent in Kullu, Banjar, Naggar, Ani and Nirmand blocks, respectively. The percentage of agricultural workers to the total workers is highest in Naggar followed by Ani block. Nearly 11 per cent of the total population in the district has been classified as non-agricultural workers (Tables 2.12-2.15).

Table 2.14 Proportion of Agricultural Workers to Main Workers (2001)

Block	Main workers (No.)	Agricultural workers (No.)	% of agril. workers to total workers
Kullu	50,096	37,630	75.12
Banjar	38,132	28,119	73.74
Naggar	23,229	20,573	88.57
Ani	22,524	19,649	87.24
Nirmand	21,681	17,825	82.21
All blocks	1,55,662	1,23,796	79.53
District	1,66,715	1,23,967	74.36

Note: District includes the information of three villages of Kullu block.

Source: Block Development Indicators, District Kullu, 2007.

Table 2.15 Proportion of Non-Agricultural Workers to Total Population (2001)

Block	Total population (No.)	Non-agricultural workers (No.)	% of non-agril. workers to total population
Kullu	1,14,240	12,466	10.91
Banjar	87,080	10,013	11.5
Naggar	51,765	2,656	5.13
Ani	50,476	2,875	5.7
Nirmand	47,917	3,856	8.05
All blocks	3,51,478	31,866	9.07
District	3,81,571	42,748	11.2

Note: District includes the information of three villages of Kullu block.

Source: Block Development Indicators, District Kullu, 2007.

2.4 Agricultural Status

The economy of the district is basically agrarian. It largely depends on agriculture, fruit farming, and animal husbandry. Edaphic conditions in the district vary considerably. The average rainfall also varies in the valley as well as on the high altitude. The texture of the soil is generally sandy loam to clay loam. The salubrious agro-climatic conditions provide a range of potentialities for growing cash crops like off-season vegetables, seed potatoes, pulses, and temperate fruits apart from cereals, millets and oilseeds. The low lying fertile valleys where irrigation facilities are available, cultivation of off-season vegetables has emerged as an attractive source of income for the farming community.

2.4.1 Land Holding Pattern

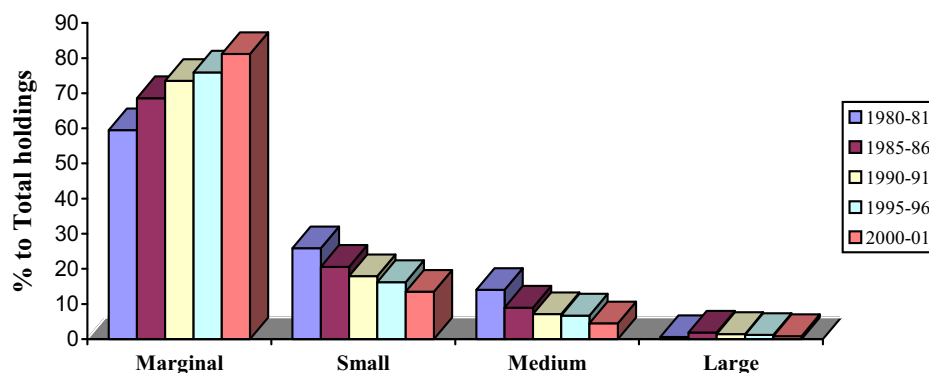
More than 81 per cent of the total holdings in district Kullu are marginal, 13.5 per cent are small, 4.5 per cent are medium and only 0.85 per cent are large (2005-06). The proportion of marginal holdings has continuously increased whereas that of small and medium has decreased over the period from 1980-81 to 2005-06, which witnesses the fact that the small, medium and large holdings are continuously being fragmented to give rise to marginal holdings.

**Table 2.16 Pattern of Changes in Land Holdings in District Kullu and HP
1980-81 to 2005-06 (Per Cent)**

Particular	Marginal <1Ha		Small 1-2 Ha		Medium 2-4Ha		Large >4 Ha		Total	
	No.	Area	No.	Area	No.	Area	No.	Area	No.	Area
Kullu										
1980-81	59.50	22.18	25.85	30.42	14.04	31.59	0.60	15.81	36672	43768
1985-86	68.59	32.12	20.58	30.17	8.96	25.93	1.87	11.78	46368	42552
1990-91	73.51	34.62	17.90	30.86	7.14	23.70	1.46	10.82	56837	46286
1995-96	75.88	38.48	16.24	29.38	6.70	23.49	1.18	8.66	57061	44233
2000-01	80.36	45.21	13.94	28.78	4.87	19.18	0.82	6.83	62625	42399
HP										
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) shown in last column of the table.

Pattren of Change in Land Holdings, District Kullu (No.)



Increased use of agricultural land for non-agricultural purposes like buildings, paths, roads etc., is also responsible for increasing the proportion of marginal holdings. The average size of holdings has also declined over the period. It was 1.19 hectares in 1980-81 and has remained only 0.68 hectares in 2000-01 (Table 2.16 and Table 2.17).

Table 2.17 Changes in Average Size of Holdings in District Kullu vis-a-vis HP 1980-81 to 2005-06

Particular	Year	Marginal (<1 Ha)	Small (1-2 Ha)	Medium (2-4 Ha)	Large (> Ha)	Overall (Ha)
Kullu	1980-81	0.44	1.40	2.68	31.45	1.19
	1985-86	0.43	1.35	2.66	5.78	0.92
	1990-91	0.38	1.40	2.70	6.04	0.81
	1995-96	0.39	1.40	2.72	5.67	0.78
	2000-01	0.38	1.40	2.67	5.61	0.68
HP	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	1.07

Note: Medium includes semi-medium holdings also.

Source: District Statistical Abstracts, District Statistical Office, Kullu, HP.

2.4.2 Land Utilization Pattern

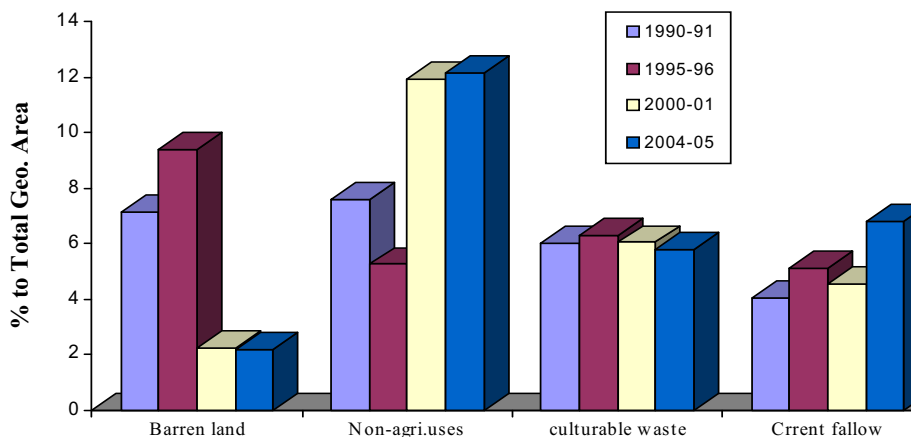
The proportion of land put to non-agricultural purposes has increased over the time, which is a matter of concern for increasing pressure on agricultural land. But, on the other hand, the proportion of barren land has decreased from 7.15 in 1990-91 to 2.20 in 2004-05, which shows that the endeavours to reclaim the barren land have proved to be successful over the period. The percentage of net sown area has remained almost constant over the period varying between 72 and 74 per cent. At the same time, an increase in the proportion of current fallow land reflects the increasing disinterest of farmers towards agriculture, which may be because of rapidly increasing costs of agricultural production, risk of market fluctuations, lack of irrigation facilities, etc. The non-cultivating owners also contribute to this factor. At state level the proportion of both the barren land and land put to non-agricultural uses has increased over the period (Table 2.18).

Table 2.18 Changes in the Land Utilization Pattern in District Kullu and HP, 1990-91 to 2004-05 (Per Cent)

Particular	Forest land	Barren land	Non-agri. uses	Culturable waste	Pasture	Misc trees/groves	Current fallow	Other fallow	Net sown area
Kullu									
1990-91	0.00	7.15	7.58	6.03	1.33	0.61	4.06	0.63	72.61
1995-96	0.00	9.41	5.25	6.31	0.00	0.55	5.10	0.00	73.38
2000-01	0.00	2.25	11.92	6.04	0.00	0.71	4.53	0.34	74.20
2001-02	0.00	2.25	11.97	5.94	0.00	0.71	4.78	0.34	74.00
2002-03	0.00	2.25	12.13	5.64	0.00	0.71	6.04	0.00	73.23
2003-04	0.00	2.25	12.08	5.63	0.00	0.71	6.83	0.00	72.50
2004-05	0.00	2.20	12.17	5.79	0.00	0.80	6.78	0.00	72.26
HP									
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

Source: District Statistical Abstracts, District Statistical Office, Kullu. HP.

Land Utilization Pattern in District Kullu



2.4.3 Cropping Pattern

As the cereal crops viz., maize, wheat, barley and pulses are generally the domain of unirrigated land, hence, no significant shift in the proportion of acreage under these crops has taken place over the period. However in case of paddy, 80 per cent of which is grown under irrigated conditions, a significant proportion of the area has been shifted to vegetables. A sharp decline in the area under food grains signifies the extent of commercialisation of agriculture in the district in recent years. The total cropped area as well as the area under food grains registered a declining trend at state level too (Table 2.19).

2.4.3.1. Irrigated Area under Major Crops

Only 0.18 per cent of the total area under maize is irrigated whereas, more than 81 per cent of paddy is grown under irrigated conditions. The proportion of irrigated area under paddy increased over the period from 1990-91 to 1995-96 but, declined over the period from 2000-01 to 2004-05, which is attributed to the shifting/ occupation of the irrigated area by cash crops. The per cent irrigated area to the net sown area has also shown a decline over the period whereas it has shown an increase at state level (Table 2.20).

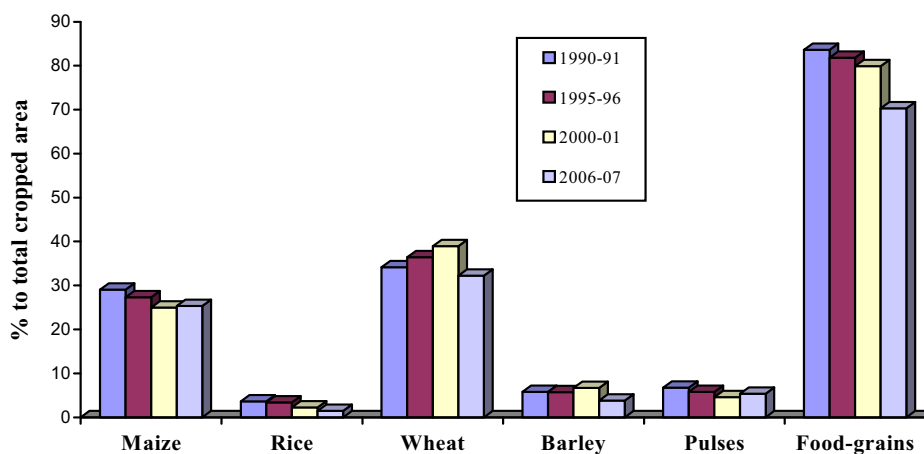
**Table 2.19 Changes in Cropping Pattern of District Kullu and HP,
1990-91 to 2006-07 (Per Cent)**

Particular	Maize	Rice	Wheat	Barley	Pulses	Food- grains	Cropped area ('000' Ha)
Kullu							
1990-91	29.08	3.64	34.16	5.78	6.76	83.59	60.65
1995-96	27.29	3.37	36.44	5.73	5.80	81.81	57.88
2000-01	24.95	2.26	38.95	6.67	4.58	79.88	66.82
2001-02	27.26	2.63	34.73	5.66	5.43	78.09	61.41
2002-03	27.85	2.84	33.59	5.73	5.17	77.32	60.56
2003-04	26.71	2.39	36.85	5.47	5.06	77.01	65.19
2004-05	25.37	2.38	39.07	5.52	5.40	79.27	64.97
2006-07	25.31	1.46	32.22	3.83	5.37	70.29	65.18
HP							
1990-91	32.44	8.63	38.26	2.98	3.69	88.59	983.60
1995-96	32.58	8.74	38.04	2.84	3.80	87.43	949.89
2000-01	31.46	8.65	38.27	2.71	3.28	85.98	947.54
2002-03	30.80	8.80	38.03	2.50	3.19	85.67	945.21

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

Source: District Statistical Abstracts, District Statistical Office, Kullu, HP. and Department of Agriculture, Kullu.

Changes in Cropping Pattern of District Kullu



**Table 2.20 Irrigated Area under Major Crops in District Kullu and HP,
1990-91 to 2004-05 (Per Cent)**

Particular	Year	Maize	Paddy	Wheat	% Irrigated area to net sown area
Kullu	1990-91	0.08	77.46	0.06	-
	1995-96	0.02	82.07	2.10	12.00
	2000-01	0.20	83.41	2.70	6.75
	2001-02	0.22	82.01	2.79	7.52
	2002-03	0.18	75.79	2.89	8.11
	2003-04	0.21	80.42	2.71	7.92
	2004-05	0.18	81.11	2.50	7.95
HP	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	22.63
	2002-03	9.43	60.39	20.33	18.80

Source: District Statistical Abstracts, District Statistical Office, Kullu, HP.

2.4.4 Crop Yields

The yields of maize, wheat and paddy showed fluctuating trends over the period. Though, the area under high yielding varieties of maize increased from 77 per cent to 91 per cent and that of paddy increased from 61 to 98 per cent over the period, yet, the unscientific cultivation and poor management of these crops is responsible for less than expected yields. As a sequel of increasing commercialization, the cereals and pulses are being cultivated under marginal, degraded and resource poor conditions and majority of the resources are being allocated to cash crops. The yields of cereals and total food grains have shown declining trends at state level too (Table 2.21 and Table 2.22).

**Table 2.21 Changes in Yields of Major Food grain Crops in District Kullu and HP,
1990-91 to 2006-07 (Q/ha)**

Particular	Year	Maize	Rice	Wheat	Barley	Pulses	Food grains
Kullu	1990-91	23.09	11.76	22.33	16.89	1.71	19.19
	1995-96	23.94	15.94	18.54	15.24	4.99	18.40
	2000-01	31.92	15.18	16.06	13.05	2.64	19.52
	2002-03	29.64	16.15	15.23	13.20	1.62	11.78
	2003-04	28.37	13.13	16.29	12.01	3.61	11.98
	2006-07	28.00	12.12	22.50	9.00	8.48	13.96
HP	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

Source: District Statistical Abstracts, District Statistical Office, Kullu, HP and Department of Agriculture, Kullu.

Yields of Major Food Grain Crops in District Kullu

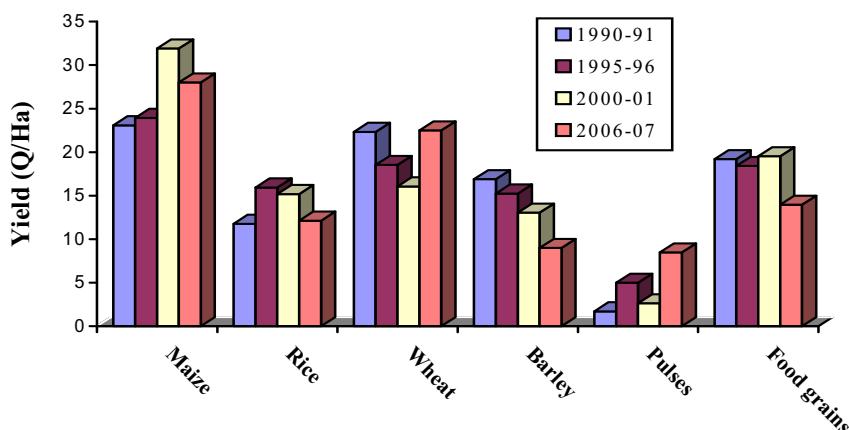


Table 2.22 Area under High Yielding Varieties of Major Crops in District Kullu and HP (Per Cent)

Particular	Year	Maize	Paddy	Wheat
Kullu	1980-81	7.64	NA	29.56
	1999-00	76.98	60.84	66.00
	2003-04	80.41	80.23	79.10
	2004-05	86.40	84.70	81.45
	2006-07	90.90	98.00	97.62
HP	1980-81	14.83	NA	33.85
	1999-00	61.63	41.61	61.05

Source: Annual Seasons and Crop Reports HP and Department of Agriculture, Kullu.

Note: NA = Area not available for 1980-81.

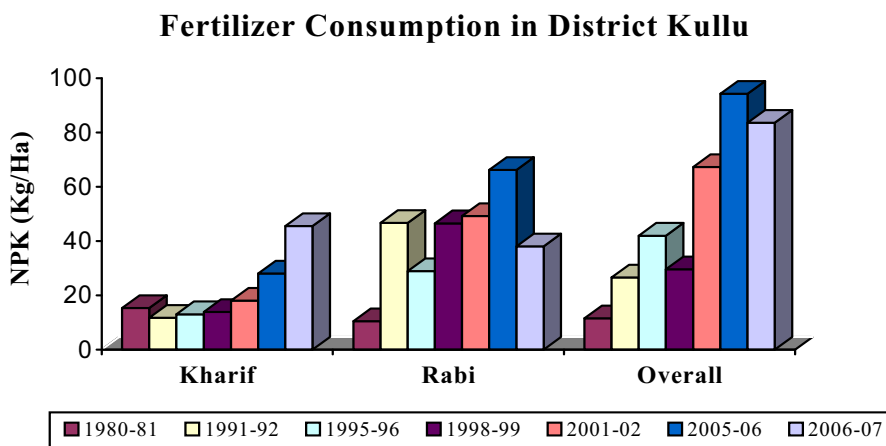
2.4.4.1 Fertilizer Consumption

The total fertilizer consumption has definitely increased over the period, which may be attributed to the increased area under cash crops. It was about 12 kg /ha in 1980-81 and has reached 84 kg/ha in 2006-07. The fertilizer use per hectare in both the seasons has shown a zigzag trend over the period (Table 2.23).

Table 2.23 Fertilizer Consumption in District Kullu and HP, 1995-96 to 2006-07

Particular	NPK (Mt)			NPK (Kg/ha of net sown area)		
	Kharif	Rabi	Total	Kharif	Rabi	Overall
Kullu						
1980-81	428	253	603	15.33	10.45	11.57
1991-92	433	1273	1706	11.76	46.72	26.63
1995-96	477	1058	1534	13.06	28.95	41.99
1998-99	455	1415	1870	13.91	46.55	29.63
2001-02	671	1824	2495	18.09	49.18	67.27
2005-06	1016	2399	3415	28.05	66.23	94.27
2006-07	1650	1378	3028	45.55	38.04	83.59
HP						
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: District Statistical Abstracts, District Statistical Office, Kullu, HP and Department of Agriculture, Kullu.



2.4.5 Vegetable Production

The edaphic conditions of district Kullu are highly salubrious for season and off-season vegetable production. The area under vegetable crops has increased manifold during the past

one decade. Tomato, cabbage, pea, cauliflower and garlic are the major vegetables being grown in the district (Table 2.24 and Table 2.25).

Table 2.24 Area and Production of Important Vegetable Crops in Kullu District

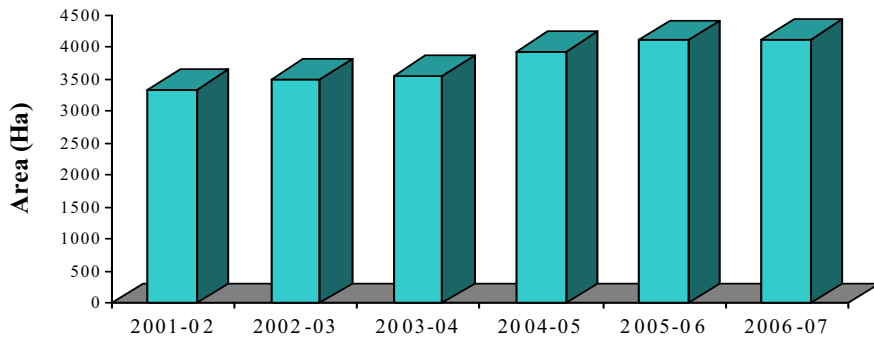
S. No	Crop	2001-02		2002-03		2003-04	
		A (Ha)	P (Mt)	A (Ha)	P (Mt)	A (Ha)	P (Mt)
1	Tomato	650	21100	600	15875	700	13300
2	Cabbage	420	10920	385	8470	450	7200
3	Peas (Green)	400	3900	415	4150	425	3187
4	Cauliflower	350	6400	375	6750	400	6400
5	Root crop (Radish, Turnip & Carrot)	75	1275	50	750	60	900
6	Capsicum & chillies	150	1360	125	1000	135	877
7	Brinjal	25	440	10	100	25	190
8	Onion & garlic	610	10635	1260	8850	1015	5650
9	Beans	150	1440	90	720	95	570
10	Cucurbits	180	4370	90	2250	105	2625
11	Bhindi	40	325	80	680	100	800
12	Other vegetable	280	3080	20	240	40	360
	Total	3330	65245	3500	49835	3550	42059

Table 2.25 Area and Production of important Vegetable Crops in Kullu District

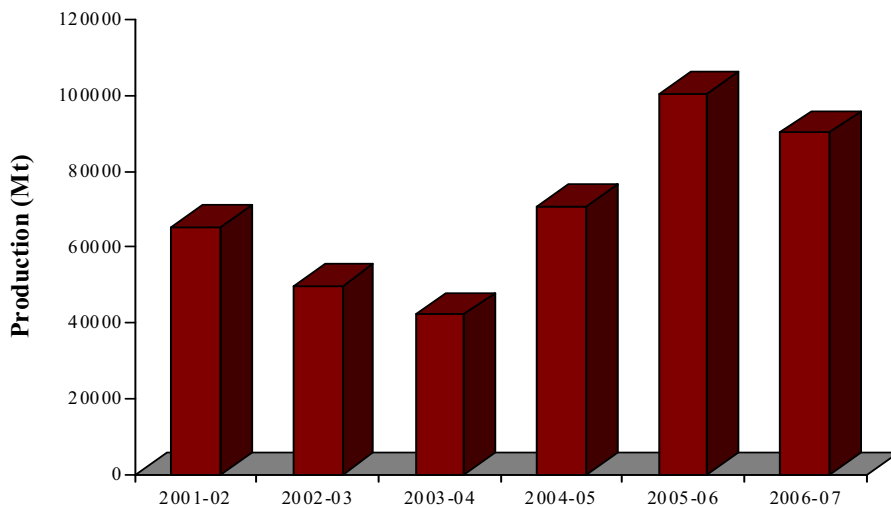
S. No	Crop	2004-05		2005-06		2006-07	
		A (Ha)	P (Mt)	A (Ha)	P (Mt)	A (Ha)	P (Mt)
1	Tomato	785	27475	695	28850	680	27200
2	Cabbage	450	9000	820	24600	835	20875
3	Peas (Green)	600	6000	760	9780	790	9430
4	Cauliflower	500	12500	570	17100	550	13750
5	Root Crop (Radish, Turnip & Carrot)	80	1440	130	2600	135	2700
6	Capsicum & Chillies	140	980	60	600	65	650
7	Brinjal	40	360	40	900	45	900
8	Onion & Garlic	965	7885	755	11380	740	9600
9	Beans	105	945	110	770	100	650
10	Cucurbits	110	2750	90	3150	95	3325
11	Bhindi	115	1150	40	360	45	360
12	Other Vegetable	40	360	30	450	45	675
	Total	3930	70845	4100	100540	4125	90115

Note: A- Area; P-Production

Area of Important Vegetable Crops in Kullu District



Prtoduction of Important Vegetable Crops on Kullu District



2.4.6 Fruit Production

Apple is the major fruit crop of district occupying about 85 per cent of the total area under fruits and contributing more than 87 per cent to total fruit production. Area under apple as well as that under total fruits has continuously increased over time. Other fruits include plum, peach, pear and apricot (Table 2.26).

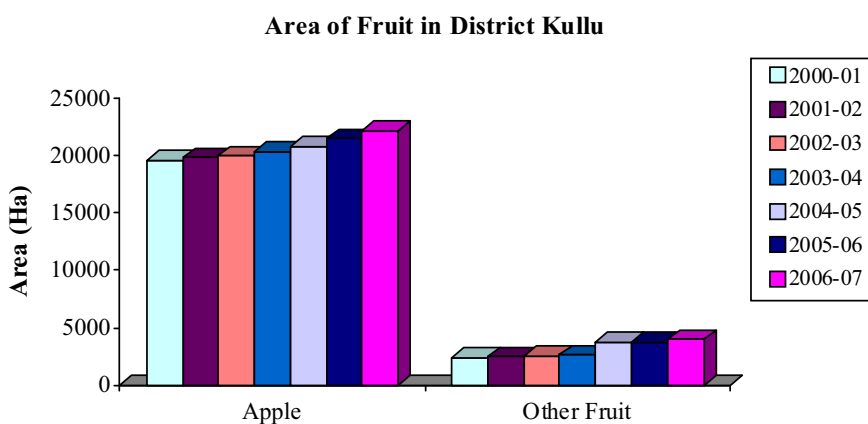
Table 2.26 Area and Production of Fruits in District Kullu, 1990-91 to 2006-07

Year	Apple		Stone & other sub temperate fruits		Total	
	Area (Ha)	Production (Mt)	Area (Ha)	Production (Mt)	Area (Ha)	Production (Mt)
1990-91	1363	NA	4315	NA	17946	75656
1995-96	17640	NA	2717	NA	20057	60482
2000-01	19612	63154	2399	5946	22011	69100
2001-02	19863	38842	2529	13532	22392	52374
2002-03	20032	59611	2577	28045	22603	87656
2003-04	20384	110883	2682	12659	23066	123542
2004-05	20819	167992	3760	10840	24579	178832
2005-06	21459	134671	3793	16578	25252	151249
2006-07	22176	68913	3953	9634	26129	78547

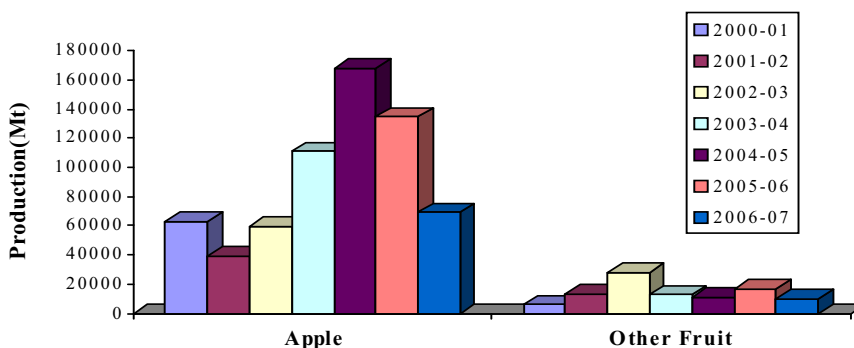
Note: NA: Not Available.

Source: i) Deputy Director, Horticulture, Kullu.

ii) District Horticulture Officer, Kullu.



Production of Fruit in District Kullu



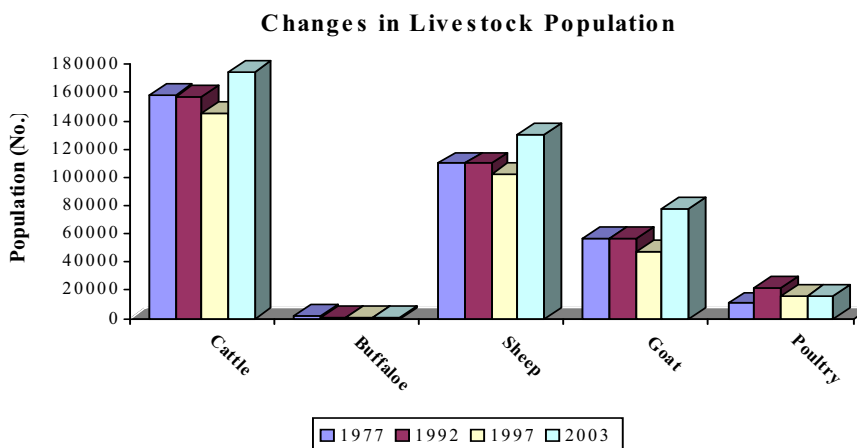
2.4.7 Livestock and Poultry

Livestock is another rewarding source of income. Every household invariably used to keep a few cows or buffaloes, sheep, goats, pigs and ponies. The bovine density was almost constant during the three census periods i.e. 1977, 1992 and 1997 but has shown an increase from 0.6 to 0.7 during 2003. Similarly, the number of bovines per hectare decreased during first three census periods but increased to 8.98 during the last census period, which is an indicator of the increased pressure on agricultural land. The number of poultry birds has decreased during 1997 and 2003 as compared to 1992 census (Table 2.27).

Table 2.27 Changes in Livestock Population, 1977-2003 Census (No.)

Particular	Cattle	Buffaloe	Sheep	Goat	Total livestock	Poultry	Bovine density (No/ha)	
							Geog. area	Operational holding
Kullu								
1977	157961	1615	109877	56658	327491	10693	0.60	7.41
1992	157448	670	109835	56384	328302	21315	0.60	7.21
1997	145343	413	102617	47213	297804	15831	0.59	6.73
2003	174928	313	129842	78096	386491	15692	0.70	8.98
HP								
1977	2106229	560006	1055005	1035337	4795226	329561	0.86	4.75
1992	2151616	700923	1074345	1115591	5116933	664039	0.92	5.04

Source: Livestock Census 1977,1992, 1997 and 2003.



2.5 General Infrastructure

2.5.1 Medical Institutions

The medical facilities in the district have improved over the period. The number of allopathic hospitals has increased from 4 in 1995 to 7 in 2007 whereas ayurvedic dispensaries have increased from 32 to 66 over the period. The primary health centers and sub centers have also grown over the period but these facilities require further improvement and boost so that every village has its own medical facility with sufficient staff and medicines (Table 2.28).

Table 2.28 Number of Different Medical Institutions in Kullu District

Year	Hospitals/ community health centers		Dispensaries		Primary health centers	Health sub-centers
	Allopathic	Ayurvedic	Allopathic	Ayurvedic		
1995	4	1	5	32	11	97
2000	7	1	5	64	12	99
2001	7	1	5	64	12	99
2002	7	1	5	64	12	99
2003	7	1	5	66	12	99
2004	7	1	5	66	17	99
2005	7	1	5	66	17	99
2006	7	1	5	66	17	99
2007	7	1	5	66	17	100

Source: Chief Medical Officer & District Ayurvedic Officer, Kullu.

2.5.2. Educational Institutions

The number of primary schools has increased from 425 in 1995 to 730 in 2006-07, the impact of which has been reflected by the increasing literacy rate in the district. The number of middle and high/senior secondary schools has also increased over the period. In order to provide higher educational facilities, the number of colleges has increased to 4 during 2006-07. The teacher-student ratio at primary level has decreased over the period and is 1:13 at present but at middle level the ratio is 1:65 which needs to be reduced by increasing the number of teachers (Table 2.29 and Table 2.30).

Table 2.29 Number of Recognized Schools and Colleges in Kullu District

Year	Primary schools	Middle schools	High / senior secondary schools	Colleges
1995-96	425	47	54	2
1999-00	694	86	74	2
2000-01	699	86	74	2
2001-02	699	86	74	2
2002-03	728	92	75	2
2003-04	727	92	75	2
2004-05	727	107	80	2
2005-06	727	107	82	2
2006-07	730	115	87	4

Source: 1. Deputy Director, Primary Education, Kullu
2. Deputy Director Secondary Education, Kullu
3. Principal, Govt. College, Kullu & Banjar

Table 2.30 Teacher Student Ratio at Different Levels

Year	Primary level (Class 1 to 5)	Middle level (Class 6 to 8)	High / senior secondary level (Class 9 To 12)	College level
1995-96	1:27	1:80	1:18	1:70
2000-01	1:29	1:52	1:17	1:62
2001-02	1:31	1:48	1:21	1:69
2002-03	1:24	1:52	1:22	1:72
2003-04	1:23	1:60	1:22	1:73
2004-05	1:21	1:63	1:20	1:85
2005-06	1:20	1:21	1:21	1:75
2006-07	1:13	1:65	1:23	1:69

Source: 1. Deputy Director, Primary Education, Kullu
2. Deputy Director Secondary Education, Kullu
3. Principal, Govt. College, Kullu & Banjar

2.5.3 Veterinary facilities

There are 15 veterinary hospitals and 85 dispensaries in the district. One mobile veterinary dispensary is also operational in district Kullu that caters to the problems of dairy farmers at their doorsteps (Table 2.31).

Table 2.31 Veterinary Facilities in Kullu District (No.)

Year	Hospitals/dispensaries				Veterinary officers/ workers		
	Vet. hospitals	Vet. dispensaries	Poultry farms	Mobile dispensaries	Veterinary officers	Animal health assistants	Vet. pharmacists
1995-96	5	54	2	-	14	-	58
2000-01	15	81	1	1	16	-	102
2001-02	15	81	1	1	13	-	82
2002-03	15	81	-	1	14	20	82
2003-04	15	81	-	1	17	22	78
2004-05	15	81	1	1	14	22	71
2005-06	15	81	1	1	18	25	66
2006-07	15	85	1	1	15	19	106

Source: Assistant Director, Animal Health & Breeding, Kullu.

2.5.4 Electrification

District Kullu is fully electrified. The number of total consumers has increased over time but surprisingly the proportion of domestic and commercial users has remained almost constant over the period (Table 2.32).

Table 2.32 Number of Electrified Villages and Consumers in District Kullu

Year	% Electrified villages to total inhabited villages	Consumers			Total
		Domestic (%)	Commercial (%)	Others (%)	
1995	100	86.00	11.64	2.36	63,085
2001	100	87.00	11.20	1.80	81,724
2002	100	87.00	11.34	1.66	84,113
2004	100	87.00	11.40	1.60	95,082
2005	100	86.00	11.41	2.59	99,533
2006	100	86.00	11.84	2.16	1,09,133
2007	100	86.63	11.87	1.50	1,18,890

Source: Executive Engineer, Electricity Circle, Kullu, Manali & Ani.

2.5.5 Fair Price Shops

There are 416 fair price shops in the district at present. Of these, 45 per cent are cooperative, 53 per cent are personal and only 2 per cent are owned by panchayats or nigrams. The number of these shops has continuously increased over time which has helped the farming community in a long way, as agricultural inputs viz. seeds, fertilizers etc are also distributed by some of the cooperatives (Table 2.33).

Table 2.33 Number of Fair Price Shops in District Kullu

Year	No of fair price shops of different kinds				
	Cooperative	Personal	Panchayat	Nigam	Total
1995-96	175	86	18	3	282
2000-01	196	135	16	2	349
2001-02	190	142	12	2	346
2002-03	187	159	9	2	357
2003-04	186	171	8	2	367
2004-05	189	189	8	2	388
2005-06	187	212	8	2	409
2006-07	187	219	8	2	416

Source: 1. District Food & Supply Controller, Kullu

2.5.6 Industry

Carpentry, iron smithy, limestone industry and gur/ sugar industries are the major industries in which the people of Kullu are engaged. The number of registered industries has increased from 158 in 1999 to 171 in 2005 whereas the registered workers have increased from 521 to 1283. This is an indication of the increased involvement of people in non-farm enterprises. Shawl and handloom industry has assumed the status of a leading industry in the valley. Besides shawls, Kullu caps and borders with beautiful designs are produced for use in sarees and other dresses.

2.5.7 Banks

The number of banks has increased over the period and is 73 at present. Credit reserve ratio has also increased from 33 per cent in 2000-01 to 52.35 per cent in 2006-07, which is an indicator of the improved economic condition of the people of district (Table 2.34).

Table 2.34 Number of Banks, Deposits and Credits by Banks

Year	No. of banks	Deposits (Rs. Lakh)	Credit (Rs. Lakh)	C.R. ratio
2000-01	69	43,685	14,566	33.00
2001-02	69	51,009	17,139	33.00
2002-03	70	59,680	20,903	35.00
2003-04	70	64,453	23,838	37.00
2004-05	72	73,661	31,195	42.00
2005-06	73	82,809	39,421	47.60
2006-07	73	94,959	49,717	52.35

Source: Chief Bank Officer, Kullu.

2.5.8 Roads and Transport

The total road length in district Kullu is 1,333 kilometres which was 1,117 kilometres in 1995 -96. The length of double lane roads has remained constant from 2000-01 onwards whereas that of single lane has increased from 843 kilometres to 1,033 kilometres over the period. The jeepable and less than jeepable roads have been upgraded, thereby making the transport facilities better in the district. As the district is very well known for its fruit production and has recently earned a name in off-season vegetable production too, the connectivity of every village is a key factor to control the transportation costs as well as to explore the potential of these cash crops to the fullest (Table 2.35).

Table 2.35 Road Length in District Kullu (Kilometres)

Year	Double lane	Single lane	Jeepable	Less than jeepable	Total length
1995-96	109	710	24	274	1117
2000-01	128	843	24	270	1,265
2001-02	128	870	15	258	1,271
2002-03	128	902	10	254	1,294
2003-04	128	933	10	239	1,310
2004-05	128	971	3	205	1,307
2005-06	128	1,033	2	170	1,333

Source: Public Works Department, H P

2.5.9 Cooperatives

The number of primary cooperative societies has grown over the period from 387 in 1995-96 to 546 in 2006-07. The societies for handlooms and handicrafts constitute the highest proportion (35%) followed by agricultural coop. societies. Some milk producers' cooperatives are also functional in the district, which help the dairy farmers to market the surplus milk at remunerative prices.

Table 2.36 Cooperative Societies in District Kullu (No.)

S. No.	Particular	1995-96	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07
A	Number of primary coop. societies								
1	Agricultural coop.	124	127	131	124	126	131	131	131
2	Non-agricultural coop.	15	15	23	23	20	32	32	20
3	Milk producers' coop.	12	24	25	23	29	47	47	51
4	Handlooms & handicrafts	116	161	165	172	172	183	188	190
5	Consumer coop.	18	30	28	27	27	33	33	33
6	Industrial coop.	24	21	22	20	19	17	17	15
7	Others	78	95	83	78	80	72	85	106
	Sub-Total	387	473	477	467	473	515	533	546
B	Number of secondary coop. societies								
1	Tehsil marketing societies	1	1	1	1	1	1	1	1
2	Other marketing societies	3	3	5	3	-	3	3	3
3	Others	1	1	-	1	-	-	-	-
	Sub Total	5	5	6	5	1	4	4	4
C	Apex coop. societies								
1	Handloom apex	1	1	1	1	1	1	1	1
2	Others								
	Sub total	1	1	1	1	1	1	1	1
	Grand total A+B+C	393	479	484	473	475	520	538	551

Source: Registrar, Cooperative Societies, Kullu.

Among the secondary cooperative societies, one tehsil level and three other marketing societies are operational and the number is constant since 2002. As handloom industry is one of the major components of the economy of district Kullu, one apex level handloom cooperative is working successfully in the district (Table 2.36).

2.5.10 Police Station and Police Posts

There are 5 police stations in the district. The number of police posts is 9 at present, which was 5 in 1995, and 7 in 2001 (Table 2.37).

Table 2.37 Number of Police Stations and Police Posts

Police stations		Police posts/ help rooms	
1.	Kullu Sadar	1.	Manikaran
2.	Manali	2.	Bhuntar
3.	Banjar	3.	Patlikuhal
4.	Nirmand	4.	Bron
5.	Ani	5.	Sainj
		6.	Akhara Bazar Kullu
		7.	Police Help Room Dalash
		8.	Luhari
		9.	Jari

Source: S.P, Kullu, H.P.

Chapter III

SWOT ANALYSIS OF THE DISTRICT

3.1 SWOT Analysis for Improving Agricultural and Allied Sectors

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 panchayat level data for improving agricultural and allied sectors has been given in the present chapter.

3.1.1 Strengths

The strongest point in the district's agriculture is that 72.26 per cent of the total geographical area is available for cultivation as against only 12 per cent in the state. This is further buttressed by the wide array of climate varying from mid hill sub humid zone to high hills temperate wet zone. The range of elevations from 500 m to 5000 m above the mean sea level and rainfall from 900 mm to 1800 mm, engenders to a variety of agro-ecological situations and niches. Soils are medium deep and fertile. The edaphic conditions are highly salubrious for growing many agricultural crops and animals for improving socio-economic conditions of the farming community. Well distributed rainfall coupled with moderate temperature encourages rich natural vegetation in hilly areas making the soils fertile and rich in organic matter. The district also has a niche or comparative advantage for the production of off-season vegetables, pulses, temperate fruits and medicinal plants. This provides a unique advantage to the farmers of the district to fetch higher prices for off-season production. The incomes of the farmers can be enhanced manifold if they are encouraged to adopt the improved technology at their farms. Pulse production is another speciality of some selected pockets of the district. But, as a result of commercialization, these crops have been relegated to the secondary position in the cropping pattern. The pulse production can be promoted in the potential pockets/niches by providing seed of HYVs, technical knowledge for scientific cultivation, ensuring market and remunerative prices for the produce. The district is endowed with so many natural springs, nallahs, rivulets and rivers providing perennial source of water, which can be a booster for pisciculture. Climatic conditions are

suitable for mushroom cultivation. Road connectivity is good and market yards/ sub-yards are available at accessible distance.

Livestock industry is a prospective industry. Every household is having cattle. About 45 per cent of the cattle population belongs to improved breeds. Owing to various tourist places in the district, there is a good demand for dairy products.

The research stations of both the state universities (HPKV, Palampur & UHF, Solan) as well as KVK of HPKV, Palampur are well provided with the scientists of all disciplines to render their wholehearted services along with various line departments, to bring prosperity to the district. Besides, ICAR institutes like Regional Station, IARI, Katrain and NTRS, Garsa are also instrumental in shaping up the destiny of vegetable growers and dairy farmers.

3.1.2 Weaknesses

Among the weaknesses, the very first point reminds of the small and fragmented land holdings with the farmers. The average size of the holding is 0.67 hectares as against 1.07 of the state. About 60 per cent of the farmers are marginal and 26 per cent are small farmers as against 55 and 22 per cent, respectively in the state. Only 9.83 per cent of the cultivated area in the district is irrigated as against 19 per cent at state level. Though, perennial sources of water are available yet, the potential has not been harnessed and the available water is also not used judiciously and efficiently. Again, 70 per cent of the cultivated area is under food grain crops, the productivity of which has not shown an encouraging increase over the years. The yield of principal crops like maize, paddy and wheat has been reported to be almost stagnant at 28, 12 and 22 quintals per hectare. The input use is highly imbalanced and injudicious increasing the cost of cultivation and spoiling soil and environment because majority of the farmers are uneducated and unaware about the scientific techniques of crop cultivation. Due to insufficient transport and communication facilities, the farmers in the far-flung areas do not have an access to the extension services and thus lack in technical knowledge about the improved practices in agriculture and allied sectors. Similar factors are making agriculture comparatively less remunerative causing disinterest in agriculture among the coming generation. Drunkenness and idleness is also rampant among the people of the district. Hence, the human resource development through peoples' participation and

peoples' education, along with the management of other resources like land and water, can go a long way to improve the lot of people.

Due to climate change, apple, the mainstay of the economy of the district, is moving to higher altitudes, as its chilling requirements are not being met in lower heights.

Lack of market information and intelligence among the farmers is another bottleneck as far as the cultivation of cash crops like vegetables and fruits is concerned. Lack of motivation, training and poor economic status of the marginal and small farmers hinder them from venturing into new enterprises like mushroom cultivation, floriculture, bee keeping, fisheries etc. So far as the livestock production is concerned, 55 per cent of the cattle are still of local breeds. Veterinary dispensaries are not easily approachable in majority of the hilly areas of the district. There are no collection centres and proper/organised markets for milk and milk products. Shortage of fodder especially during summers and non-availability of quality feed also circumscribe the livestock production.

3.1.3 Opportunities

There exist vast opportunities to raise per capita and per hectare income of the farmers by evolving efficient farming systems, efficient management of natural and human resources. It has been observed that the progressive farmers have obtained very high yields of various cereal, vegetable, pulse, oilseed and fruit crops on their farms and there lies a wide chasm between the yields realised by the progressive farmers and the average yields. Similar is the case with livestock and fish production. So, there is vast unharnessed potential that can be harnessed owing to the salubrious edaphic conditions, through pertinent research and extension endeavours. Irrigation potential can be harnessed through water harvesting and efficient use of water can be encouraged through micro irrigation systems. More and more area can be diverted to cash crops like vegetables, pulses, spices, medicinal plants, floriculture and fruits. New improved fruit crops/ varieties suitable to the changing climate and varied altitude can be introduced to keep this sector paying. Local breeds of cattle need replacement with the improved ones. Up to 50 per cent Jersey cross can lead to good dairy enterprise. Value addition by processing of vegetables, fruits, animal products & other agro products can fetch the farmers lucrative returns. There is a scope to develop the cultivable waste and forestland and to improve the nutritive quality & productivity of grasses and

fodders in permanent pasture and grazing lands by planting improved perennial & seasonal fodders. Organic farming and protected cultivation are other potential areas, which can be harnessed in order to enhance the income of the farmers. To make the marketing of inputs and outputs easier and enhance the margins, the farmers should get organized into cooperatives or other farmer groups. There is an opportunity to increase the producers' share in consumers' rupee by providing market information and intelligence services to the farmers.

3.1.4 Threats

Opportunities are always associated with threats which warn us of the risks involved and guide for carefully availing the opportunities. As a result of the commercialisation and diversification, our natural resources i.e. soil, water, natural flora and fauna have started depleting and polluting. If we further intensify on the same lines without optimum and judicious management of resources, the situation may worsen causing severe threat to soil, water and environment. As very less efforts are being done for conservation of rainwater and management *in situ*, all water runs off fast to the rivers without any leaching, taking away the rich top fertile soil. The pressure on ground water for irrigation may lower the water table as in Punjab. Construction of roads and irrigation projects can cause erosion and degradation of land and water resources. Increased production of cash crops may bring glut in the markets and cause a sudden fall in prices. To avoid such situation a prior study of the trends of arrivals and prices in various local and national markets will be needed. Increased focus on commercial crops may cause genetic erosion of traditional crops and varieties. So far as the organic production is concerned, technology development is in progress but to create infrastructural facilities for certification and provide ensured market to the farmers will be a great challenge.

3.2 Issues Emerging out of SWOT Analysis

The first and foremost issue emanating from the SWOT analysis is that the district has a large percentage of geographical area, favourable soil and climatic conditions, so, the net returns per unit of the area should be maximised. For this purpose the following important issues are to be taken care of:

- The irrigation potential should be tapped and area under irrigation must be increased.
- Efficient use of irrigation water needs to be educated, exhorted and encouraged among farmers.
- Diversification (both horizontal as well as vertical) should be advocated and promoted in all the sectors.
- Productivity of all enterprises needs to be enhanced, cost of production needs to be controlled and quality of production needs to be ensured in order to fetch better returns.
- Optimum, balanced and judicious use of various inputs should be exhorted for sustainability and environmental conservation.
- Value addition by processing of vegetables, fruit, animal products & other agro products should be encouraged.

3.3 Sectoral Growth Drivers

- In order to increase area under irrigation, various location specific irrigation projects/schemes viz., lift irrigation, flow irrigation, tank irrigation, ground water irrigation, rain-water harvesting etc., are required to be launched.
- Available irrigation water can be used efficiently by employing micro irrigation like drip or sprinkler irrigation systems.
- For diversification in agriculture we need new/ improved crops/ varieties, improved inputs, technical know-how, credit facilities, markets, roads, transport facilities, market intelligence, processing facilities and regulatory framework etc., to be provided to the farmers.
- For making the dairy industry more remunerative, local breeds warrant replacement with the improved ones. Better AI services by opening more veterinary dispensaries,

assured availability of quality feed in the market, development of pastures and improving the nutritional qualities of fodders, education for balanced feeding, pest management, value addition and marketing need special attention.

- Financial and technical guidance is required to be provided in order to establish small scale processing units at farmers/ farmers' cooperatives/self help groups (SHGs)/farmers interest groups (FIGs) level.
- For the growth of horticultural sector, again new/improved crops/varieties, technical know-how, availability of recommended inputs, roads, storage facilities, markets, market information and intelligence are important factors.
- For adoption and growth of other enterprises like mushroom cultivation, pisciculture, floriculture etc., motivation, training, credit facilities, market for inputs and outputs are the major growth drivers.
- Adoption of new/improved/scientific techniques in agriculture, horticulture, animal husbandry, fisheries, water management & allied sectors has to be exhorted & encouraged among farmers in order to reduce/control the cost of production, enhance productivity and ensure the quality of produce, so that the farmers are able to compete in the global market in the times to come.
- In order to harness the potential of vegetables, fruits, livestock products, fisheries and other allied sectors, marketing system needs to be strengthened and invigorated. To make the marketing of inputs and outputs easier and enhance the margins, the farmers should get organized into cooperatives or other farmers' groups.
- Market information and intelligence services need to be provided so that the farmers are able to plan cropping pattern according to the trends of arrivals & prices in various markets. Farmers need to be educated about the proper cleaning, grading, packaging and attractive presentation of the produce, so that they are able to fetch high prices for their produce.

Chapter IV

DEVELOPMENT OF AGRICULTURE SECTOR

4.1 Land Use Pattern and Soil Health

The block wise land use pattern has been shown in Table 4.1. It can be observed from the table that 71.68 per cent of the total geographical area (50,925 ha.) in the district is cultivated and maximum proportion of the cultivated land (35.5%) lies in Kullu block. The land put to non-agricultural uses comprises of 16.62 per cent. Culturable waste and permanent pastures constitute nearly 4 per cent of the total geographical area. Nearly 7.7 per cent of the cultivated land is lying fallow in the district. Perennial bushes and animal menace are the problems associated with culturable wasteland. Low fertility, lack of irrigation, weed infestation and animal menace are the factors responsible for fallow land. Gap in technology adoption, lack of irrigation, inefficient use of resources and non-availability of quality inputs are some of the circumscribing factors for poor productivity of cultivated land (Table 4.2). The physical estimates of farmers' land to be improved by levelling, raising contour bunding, terracing and to be reclaimed through check dams etc., are given in Table 4.3. The financial estimates for the improvement of such lands and their support lands including private grasslands are given in Table 4.4.

The soils of Kullu district are medium to high in available nitrogen and low to medium in available phosphorus & potassium. The organic carbon status of these soils is medium to high. Majority of the soils are sandy in texture having poor water retention. The soils are deficient in Zn, B and Mo particularly in vegetable and fruit growing areas. The soils are prone to water erosion. Inadequate nutrient management, poor water management and soil erosion are the main problems to be taken care of.

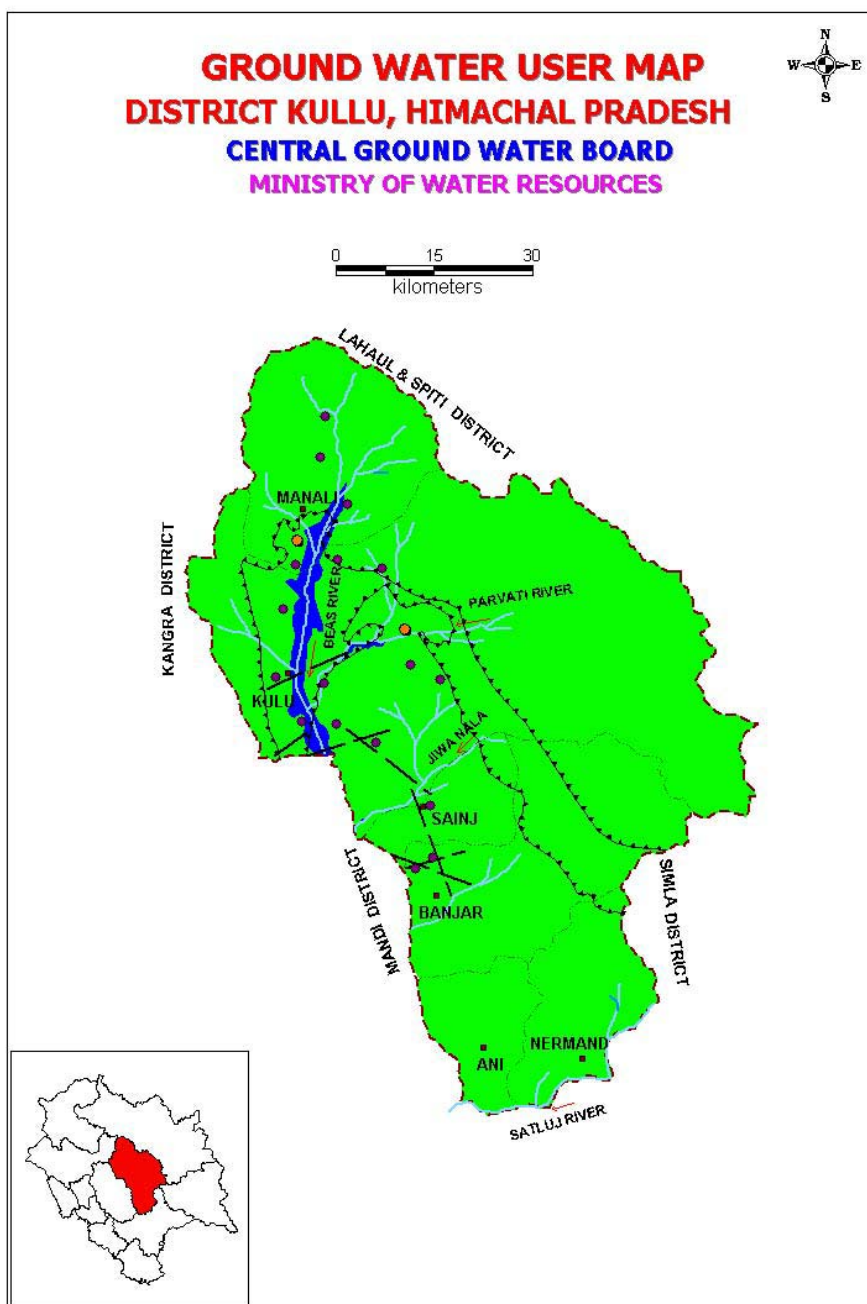
4.2 Water Resources and Management

The district teems with a number of perennial rivers, streams, rivulets, khads and nallahs, which are the source of irrigation through gravity, lift or diversion channels. The Beas and Satluj are the principal rivers of the district and the entire drainage of the district is received by these two rivers. The Beas runs down from the snowy heights of Beas Kund near

Rohtang pass and passes southwards through Manali and Kullu towns till it reaches Larji. It joins its main tributaries, the Parvati at Bhuntar, the Sainj (a fairly large river flowing to the west from 'Supa Kuni' high peak on Spiti boundary) and the Tirthan below Larji. Other tributaries of Beas in the district are Solang nalla, Manalsu, Sujoin, Sarvari and Phozal nullah. Satluj is the other major river on the southern boundary of the district touching Ani and Nirmand blocks. Kurpan stream in the Outer Seraj, flows in the south-east direction from Srikhand peak down to a fertile valley and joins the Satluj below Nirmand. Ani Khad having its origin from Jalori peak, flows through a narrow valley and drains into Satluj near Behna village.

However, these water resources have not been harnessed and harvested properly and there lies a tremendous irrigation potential yet to be explored. At present, only 9.83 per cent of the cultivated area is under irrigation, which can be increased up to 20 per cent. Kullu block has the highest proportion of the irrigated area. Generally, flood irrigation method is practised leading to huge wastage of precious water. So, there is a pressing need to exhort efficient use of irrigation water by employing drip, sprinkler or other micro irrigation systems.

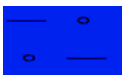






The ground water user map for the district has been given here which shows the feasibility for best harvesting and utilization of the ground water.



Map 4.1: Ground Water User Map of District, Kullu

Ground Water User Map

Legend

	Wells feasible	Rigs suitable	Depth of Well (m)	Discharge (lpm)	Suitable artificial Recharge structures
 Soft rock aquifers	Tube well	DTH with Odex	100-120	1200-2500	Check dam, Check dam cum ground water dam, Recharge shaft
	Dug well	Manual	10-20	300-500	
 Hard rock aquifers	Dug well	Mannual	10-20	300-500	
	Spring development			30-2000	
 Thrust			 Fault/lineament		
 Major drainage # Hot water spring (85 ⁰ C) • Spring			 Tehsil boundary		
			 District boundary		

Other Information

Total area	5503sq.km
Major drainage	Satluj, Beas
Rainfall	945 mm
Temperature	-3° C to 29° C
Regional geology	Alluvium, Metamorphics
Ground Water quality	Good, EC <750 μ 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 Systems and Cropping Pattern

Major cropping systems of the district are as follows:

Maize-wheat/barley/pea/potato/garlic; Maize+pulses-wheat; Paddy-wheat; vegetable based; pulse based and oilseed based. Vegetable based cropping system dominated in the irrigated situations whereas cereal and pulse based cropping systems were followed in the unirrigated situations (Table 4.5).

Wheat occupied the maximum (38.6%) percentage of the agricultural cropped area followed by maize (28.4%). Vegetables accounted for about 12.8 per cent. Peas, potato, cabbage, cauliflower and tomato were among the major vegetable crops. Pulses, oilseeds and spices constituted 8.93, 2.11 and 3.35 per cent of the cropped area, respectively (Table 4.6). Mash and rajmash were the major pulses occupying 88 per cent of the total area under pulses. Similarly, among spice crops garlic alone occupied more than 88 per cent of the area. The total production of cereals in the district was 87,978 tonnes and that of pulses, oilseeds and vegetables was 4,389; 601 and 84,096 tonnes, respectively.

4.4 Input Use and Gaps

The input-use is generally imbalanced and injudicious. In order to ensure proper plant population, the farmers usually administer higher seed rate than that used by progressive farmers of the area (Table 4.7). This practice causes financial loss to the farmers by increasing the cost of seed and debilitating the stand of crop due to overcrowding. Farmer needs to be educated for testing germination percentage of the seed before sowing and use the seed accordingly. Similarly, the fertilizer use is also imbalanced. Farmers generally use nitrogenous fertilizers and least bother about other fertilizers. Lack of knowledge, poor purchasing power and non-availability of recommended fertilizers are the probable reasons for injudicious use. A gap between the actual use and requirement of various fertilizers has also been observed. The requirement of fertilizers was higher than their supply (Table 4.8). Vermicompost is gaining popularity among the farmers of Kullu but its production is very less to meet the requirement. Efforts are being made by the Department of Agriculture, Horticulture and CSK HPKV, HAREC, Bajaura to enhance its production. As a result of commercialization of agriculture, the use of plant protection chemicals has increased. But, the farmers do not possess knowledge about appropriate chemicals, their doses and

time/stage for effective spray, which leads to the increased cost of production and environmental pollution too.

4.5 Yield Gap Analysis

A significant gap was observed between the average yields of various crops and those realised by progressive farmers. This gap tantamounted to be 14.18q for maize, 12q for wheat and 2.61q for paddy (Table 4.9). The yield gap for pulse crops varied between 4.1 to 7.7q per hectare. Among vegetable crops a yawning yield gap ranging from 29q to 166q was observed. Maximum gap was found in case of tomato followed by cabbage.

4.6 Reasons for Gap

The gap in the yield of different crops owes to various reasons which are as follows:

- Lack of knowledge about scientific/modern techniques of crop cultivation
- Gap in technology adoption
- Poor purchasing power
- Lack of irrigation
- Non-availability of recommended inputs in time
- Low/no subsidy on inputs
- Spurious plant protection chemicals in the market
- Inadequate farm advisory services
- Increasing disinterest of coming generations in agriculture
- Poor farm mechanisation because of unfavourable geographical conditions.

4.7 Farm Mechanization

Owing to the hilly terrain of the district, small and scattered holdings, farm mechanization is a herculean task. It was observed that only 10 per cent of the farmers used tractors and 50 per cent still used iron ploughs to cultivate their fields. Threshers were being used by about 59 per cent of the farmers (Table 4.10). As plant protection is indispensable in vegetables and fruit crops, more than 74 per cent of the farmers used spray pumps/power sprayers. The use of power tiller and chaff cutter was almost negligible. High initial investment, low/no

subsidy, complicated procedure for obtaining credit, non-availability of suitable tools/machines also circumscribed the pace of mechanization.

4.8 Ongoing Schemes for Agriculture and Rural Development

Different state departments and state universities are running various schemes in order to ensure agricultural and rural development. At present, state department of agriculture is implementing eight schemes for the overall development of agriculture. These schemes are organic farming, NWDPR, ATMA, ISOPOM (Maize), macro management, SCSP, BASP and TASP (Table 4.11). Market committee, Kullu is facilitating the marketing of agricultural and horticultural produce in the district through its various schemes viz., construction of link roads, establishment/expansion of market yards and collection centres. State universities are endeavouring to disseminate the available technology, generate the new technology w.r.t varieties, plant nutrient management, soil health, plant protection and other agronomic practices through their regional research stations and Krishi Vigyan Kendra at Bajaura. The status of existing irrigation schemes and funds required for their repair and maintenance are shown in Tables 4.12 and 4.13.

4.9 Interventions for District

The crop-wise problems encountered in the cultivation of cereals, pulses and vegetables have been given in Table 4.14 and Table 4.15. The required interventions for these problems are also highlighted in the table. However, some general interventions for agricultural development have been listed below.

I Growth and Diversification of Agriculture

- 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 vermicomposting, popularization of bio-fertilizers, and other ameliorants in addition to judicious and balanced nutrients to crops.
- Promotion of micro-irrigation for efficient management and delivery of required quantities of water as per crop needs.

- Promotion of mechanization compatible to hill farming and equipments & implements to reduce labour and to provide relief to the women folk.
- Strengthening and improvement of quality control infrastructure (seed, pesticides and fertilizer testing laboratories).
- Promotion of protected cultivation along with supporting infrastructure for quality production of high-value cash crops.
- To strengthen the existing marketing infrastructure for high value cash crops including vegetables and fruits.

II Augmentation of Land and Water Resources

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

III Human Resource Development

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

4.10 Research/Extension Gaps

- Non-availability of a range of maturity groups of varieties of wheat for small and diverse pockets within district.
- Non-availability of high yielding and early maturing varieties of maize, paddy, wheat and rajmash, for high altitude areas with disease resistance and cold tolerance.
- Lack of suitable varieties of wheat, maize for low input management and organic farming systems.
- Non-availability of varieties of mash and rajmash suitable for inter cropping with maize.
- Lack of varieties of mustard having high seed yield, earliness, and resistance to white rust and tolerance to *Alternaria* blight.

- Lack of highly nutritive and high regenerating varieties of fodder.
- Prevalence of diseases like yellow & brown rusts, loose smut & powdery mildew in wheat.
- Non-availability of quality seed of improved varieties.
- Poor adoption of improved technology by the farmers.
- Poor market infrastructure, market information and intelligence.
- Heavy yield losses in vegetables like tomato, cauliflower, cabbage, peas and garlic, due to pests.
- Heavy yield loss in mash and rajmash in storage due to field infestation of dhora beetles.
- Problem of white grubs, cutworms, snails and slugs in some areas.
- Water stress problem in rainfed areas.

Crop-wise constraints, breeding strategies and weed problems have been covered in Table 4.16 and Table 4.17.

4.11 Researchable Issues

- Characterization and classification of soils.
- Delineation of the acid soil regions (ASR).
- Issues in solid waste management for organic farming in major cash crops of respective regions.
- 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
- Enhancement of soil health through organic farming in vegetable/cereal based cropping systems.
- Development of high yielding varieties of various crops having wider adaptability and resistance to various biotic and abiotic stresses through exploitation of land races, agronomic basis and alien species using conventional as well as non-conventional breeding approaches. The focus will be on the development of

improved varieties of various nich based crops e.g. red rice, rajmash, mash, special purpose corn like baby corn, sweet corn, pop corn.

- Utilization of diverse gene pool of maize to generate diversified improved genotypes.
- Breeding of barley varieties for value added products like malting & brewing.
- Development of disease resistant varieties of mash and rajmash having high yield and suitability for intercropping.
- Development of varieties of mustard with high yield, resistance to white rust and *Alternaria* blight; suitable as sole as well as mixed with wheat.
- Development/identification of bacterial wilt resistant hybrids/varieties of *solanaceous* vegetables.
- Identification of the most economic crops/ cropping systems and their suitable niches in Kullu and Mandi districts.
- Development, standardization and promotion of protected precision farming of high value vegetable crops.
- Standardization of agro-technology for organic vegetable production.
- Standardization of production technology for rainfed cultivation of potential vegetable crops.
- Formulation of biointensive IPM strategies for the management of *Helicoverpa armigera* (tomato and gram), fruit flies (cucurbits and tomatoes), white grubs (potato, maize, peas, ginger, cabbage etc.) cut worms (cereals and vegetables), diamondback moth and cabbage caterpillar (cole crops), shoot and fruit borer (brinjal and okra), leaf miner and pod borer (peas), mites (pulses and vegetables), plant parasitic nematodes (cereals and vegetables).
- Insect pest and nematode management under protected cultivation situations.
- Management of insecticide resistance in field populations of *Helicoverpa armigera*, *Spodoptera litura*, *Plutella xylostella*, *Leucinodes orbonalis*, *Trialeurodes vaporariorum*.
- Collection and utilization of local strains of entomopathogenic organisms for insect pest management under organic farming situations
- Identification and utilization of native botanicals for eco-friendly pest management.

- Pesticide residue analysis in vegetables and determination of MRL's for consumer safety. Germplasm screening for resistance against major insect pests (cereals, pulses, oilseeds and vegetables).
- Survey and surveillance for identification of new invasion of insect pests.
- Safe management alternatives for the stored grain pests.
- Identification and management of insect-pests of medicinal, aromatic and ornamental plants.
- Survey and surveillance of major diseases and development of disease forecasting modules. Identification of resistant sources and study of genetics of resistance. Marker assisted selection of resistant genes using molecular markers and their use in gene pyramiding for resistance in commercial varieties.
- Development of integrated disease management modules suitable for organic and protected agricultural conditions.
- Development of waste lands and marshy lands/ravenous lands.
- Development of high fodder yielding varieties with high nutritive value and good regeneration capacity e.g. setaria and napier bajra hybrids, and oats among annuals.
- Mechanization of hill Agriculture.
- Validation of ITKs
- Analysing trends and patterns of demand, prices and markets of emerging crops and enterprises in the context of ongoing process of globalisation
- Understanding economic implications of climate change towards cropping systems, cropping patterns and livelihood of the farmers
- Assessing impact of the ongoing process of commercialisation of agriculture on natural resource base (soil, water and environment) and its implications towards livelihood of the farmers
- Studies on impact assessment and policy implications of various developmental programmes/schemes.

Table 4.1 Block-Wise Land Utilization Pattern (Ha)

Sr. No	Particular	Kullu	Banjar	Naggar	Ani	Nirmand	District
1	Total geographical area (Excluding forests)	19244	9122	8115	7853	6591	50925
2	Forests						
	Productive	7978.16	20109	4900	1233.7	25000	59220.86
	Degraded	700	8750	5695	4600.5	9000	28745.50
3	Barren and uncultivable land						
	Rocky	228	254	150	130	100	862
	Stony	--	--	--	150	120	270
	Sloppy	--	--	--	--	---	--
4	Land put to non-agricultural uses						
	Buildings	1885	1005	654	840	390	4774
	Roads/paths/channels	2925	573	50	100	40	3688
5	Culturable waste						
	Weed/bush infested	105	390	313	123	30	961
	Area prone to animal menace	100	223	100	30	60	513
6	Permanent pastures and other grazing lands						
	Productive	72	93	45	20	23	253
	Degraded	120	42	50	80	10	302
7	Land under miscellaneous tree crops and groves	--	--	--	--	--	--
8	Fallow land	--	--	--	--	--	--
	Current fallow	838	527	282	1100	35	2782
	Other fallow	--	--	--	2	13	15
9	Cultivated land	12971	6015	6471	5278	5770	36505

Source: Field Survey, 2007-08.

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

Problem	Intervention	Kullu	Banjar	Nagggar	Ani	Nirma -nd	District
Forests							
Productive							
Degradation	Plantation of fodder trees & grasses.	20		35	15	12	16.4
Encroachment and smuggling	Govt. Plan to discourage theft and encroachment	65		45	60		34
Forest fire	Awareness programme	62	53		35	26	35.2
Path problem	Roads/paths be constructed	22				15	7.4
Soil erosion	Check dams	16	22	41	35	26	28
	Availability of quality planting material	11		8	13		6.4
Degraded							
Degradation	Plantation of good quality trees & grasses	44	23	11	30	40	29.6
Wild thorny plants	Thorn less tree plantation	52			39		18.2
Soil erosion	Terracing		22	36	45		20.6
	People participation	22		18		36	15.2
	Introduction of medicinal and aromatic plants		12			23	7
Forest fire	Awareness programme	12	15			30	11.4
Barren and uncultivable land							
Rocky/Stony/ Sloppy							
Steep sloppy	Land levelling	10		12		8	6
Wild animals	Fencing	56	23		38		23.4
Soil erosion	Terracing	12	35	56			20.6
Rocky	Proper management	10		18	31		11.8
Poor fertility	Plantation of leguminous trees	12		26			7.6
	Land development				34	14	9.6
	Crate wall	12					2.4
Rainfed	Irrigation.		15	20			7
	Contouring				9		1.8
Land put to non-agri uses							
Agricultural land being used for non-agricultural	Buildings	14	29		30	45	23.6

purposes	Framing of land use policy to check conversion of productive agricultural land to non-agricultural uses						
Poor connectivity	Road connectivity	14		26	21	36	19.4
Unmetalled roads	Metalling	25		45			
	Control of soil erosion	10			16		5.2
Drainage & sanitation problem	Proper drainage system	46	26		35	55	32.4
	Awareness	32	22		18		14.4
	Repair of channels	75		58			26.6
Soil erosion	Plantation along paths	32	6		60	13	22.2
	Construction of pucca channels		55			42	19.4
	Check dams	9			25		6.8
	Govt. aid for maintenance	12			41		10.6
Culturable waste							
Weed/bush infested							
Perennial Bushes	Use of recommended tech. for weed control	14	22	15	54	61	33.2
Rocky	Govt. plan to reclaim wasteland.	45			47		18.4
Area prone to animal menace							
Bear problem	Fencing	24	42	23	53		28.4
Monkey menace	Plantation of fruit trees in forests	42			21		12.6
	Establishment of animal parks	25				44	13.8
	Sterilization of monkeys	16			12	23	10.2
	Permission to kill monkeys and wild boars damaging crops	59	36	28	39		32.4
	Help by Govt. agencies	29				69	19.6
Stray cattle	Establishment of gosadan	36			25	89	
	Measures to improve fertility of unproductive stray cattle	56	78	47		86	53.4
Permanent pastures and other grazing lands							
Productive							
Poor	Intro. of leguminous fodder	25	34	62	41	54	43.2

productivity	trees						
Poor quality fodder	Intro. of improved/ high quality grasses	29	52	29	69	76	51
Rain fed	Irrigation	85	40	22			29.4
Rocky	Reclamation measures	12			30		8.4
Degraded							
Poor stand	Location specific grasses	18	21	36	49		24.8
	Intro. of hardy fodder crops	45	18	29	8		20
Low quality fodder	Introduction of improved grasses & trees.	17	22	8	19	10	15.2
Land under miscellaneous tree crops and groves							
Poor quality	Planting improved groves	16	19	36	29	45	29
	Specific fodder grasses	8	15	6		14	8.6
Fallow land							
Current fallow							
Low fertility	Awareness about intro of leguminous crops to retain soil fertility	20	11		13	24	13.6
No irrigation	Irrigation facility	15	10	13			7.6
	Developing suitable crop vars. for rain fed agriculture		25			34	29.5
Weed problem	Control measures for weed eradication	39			52		45.5
Poor productivity	Intensive crop rotation				21	18	19.5
Other fallow							
Low fertility	Awareness about intro of leguminous crops to retain soil fertility	16	40	12	14	10	18.4
	Awareness about crop rotation	20			15	12	15.66
Lack of irrigation	Irrigation	42	19		26	36	24.6
Weed infestation	Control measures for weed eradication	48	53		62		32.6
Wild animals	Control of wild animals	25	72	63	46	54	52
Fear of encroachment by cultivator	Change in land lease policies	35		20		25	26.66
Cultivated land							
Lack of irrigation	Irrigation	45	29	36	72	68	50

	Rainwater harvesting	21	16	8	15	30	18
	Efficient use of water	25				12	7.4
Fertility problem	Awareness about intro of leguminous crops	26		14		10	10
Weed problem	Weed control	18	29		10	26	16.6
Slopy	Terracing		12			18	6
Technological problems	Power tillers			35	50		17
	Scientific cultivation					29	5.8
	Tech. know-how			18			3.6
Damage by hails in fruits	Anti hail nets	15	10	13	12	16	13.2

Source: Field Survey, 2007-08.

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

Particular	Kullu	Banjar	Naggarr	Ani	Nirmand	District
Land levelling	6793.51	4565.72	767.51	715.78	1425.42	14267.94
Contour bunding and terracing	3822.14	5971.50	856.40	381.10	1928.81	12959.95
Fencing (length in m)	2492.64	6843.93	812.02	454.16	1267.55	11870.30
Reclamation	5022.78	2210.23	849.40	175.48	400.13	8658.02
Check dam (Length in m)	4275.40	3599.17	1129.79	552.25	550.28	10106.89

Source: Field Survey, 2007-08.

Table 4.4 Financial Estimates for Land Development of Various Categories Based on Utilization Pattern (Rs. Lakh)

Sr. No.	Particular	Kullu	Banjar	Naggarr	Ani	Nirmand	District
1	Permanent pastures, grazing land, barren & uncultivable land	101	80	78.25	80.75	68	408
2	Land put to non-agri uses						
	Roads/paths/channels	15	5	5	8	4	37
3	Culturable waste						
	Weed/bush infested	9	4	15	10	3	41
	Area prone to animal menace	21	15	10	13	10	69
	Area difficult to manage	--	--	--	--		
4	Land under miscellaneous tree crops and groves	--	--	--	--		

5	Fallow land						
	Current fallow	5	3	10	12	15	45
	Other fallow	--	--	--	--	--	
	Total	151	107	118.25	123.75	100	600

Source: Field Survey, 2007-08.

Table 4.5 Major Cropping Systems

Cropping sequence	Kullu	Banjar	Naggar	Ani	Nirmand
Unirrigated					
Maize-wheat	√	√	√	√	√
Maize+pulses-wheat	√	√	√	√	√
Maize-barley	√	√	√	√	-
Maize-pea	√	√	-	√	-
Maize-potato	√	√	-	-	-
Potato-fallow-wheat (biennial)	√	√	-	√	-
Maize-toria-wheat	-	-	√	-	-
Paddy-wheat	√	-	√	√	√
Pulse based	√	√	√	√	√
Oilseed based	√	√	√	√	√
Vegetable based	√	√	√	√	√
Spice based	√	-	-	√	-
Maize-garlic	√	√	-	-	-
Rajmash-Wheat	√	√	√	-	-
Cabbage/cauliflower- Wheat	-	√	-	-	-
(Rajmash-fallow)	-	√	√	-	-
Irrigated					
Maize-wheat	√		√	-	√
Maize+pulses-wheat	√		√	-	√
Maize-barley	-	√	√	-	-
Maize-pea	√	-	-	-	-
Maize-potato	√	-	-	-	-
Paddy-wheat	√	-	√	-	√
Pulse based	-	√	√	-	√
Oilseed based	-	-	√	-	√
Vegetable based	√	√	√	√	√
Maize- garlic	√	√	√	√	√
Rajmash-wheat	√	√	√	-	-
Cabbage/cauliflower- wheat	-	√	√	-	-
Rajmash-fallow	-	-	√	√	-

Source: Field Survey, 2007-08.

Table 4.6 Cropping Pattern (Ha)

Crop	Kullu	Banjar	Naggarr	Ani	Nirmand	District
Cereals	17220.9	7526.76	5617.6	4135.48	6537.16	41037.9
Maize	7557.9	4621	232	1511.8	2114	16036.7
Paddy	112	50	480	128	859	1629
Wheat	9009.9	2459.4	4516.8	2382.4	3438.06	21806.56
Barley	541.1	396.36	388.8	113.28	126.1	1565.64
Pulses	800.2	1773.26	1197	569.1	703.6	5043.16
Mash	284	239.76	184	163.5	353.6	1224.86
Rajmash	412	1335.5	896	325.6	245	3214.1
Other pulses	104.2	198	117	80	105	604.2
Oilseeds	407.4	212.48	173.7	198.6	204.32	1196.5
Mustard	107.8	77.28	86.2	73.3	58.3	402.88
Other oilseeds	299.6	135.2	87.5	125.3	146.02	793.62
Vegetables	2566.1	1572.25	1212.3	1105.06	813.72	7269.43
Potato	662.2	241.56	24	237.76	118	1283.52
Peas	380	321	256	204	132.5	1293.5
Tomato	477.8	92.88	106.8	42.8	56.68	776.96
Cabbage	228	266.25	200.4	166	125.48	986.13
Cauliflower	198.7	179.56	258.4	182.2	127.3	946.16
French bean	74.2	79.2	58.5	36	41.6	289.5
Capsicum	49	59.2	34.1	12.2	20.8	175.3
Bhindi	53.2	17.5	28.9	13.8	20.8	134.2
Brinjal	115.5	102	86	34	33.02	370.52
Cucurbits	39.2	22	28	12	4.94	106.14
Onion	44.8	55	42	18	26	185.8
Radish	140	54	44	76.8	52	366.8
Others	103.5	82.1	45.2	69.5	54.6	354.9
Fodder crop	12.5	8.5	12.3	5.6	8.9	47.8
Fruits	5082	3786.48	10233.7	1696.28	2948.62	23747.08
Apple	3969	2610.36	8901.2	1361.28	2700.62	19542.46
Citrus	-	-	-	-	10.4	10.4
Mango	-	-	-	-	31.2	31.2
Plum	225	168.84	66.5	110	25	595.34
Apricot	300	250	225	100	-	875
Pear	168	431.28	761	-	104	1464.28
Kiwi	50	20	16	-	-	86
Pomegranate	70	56	39	25	15	205
Peach	300	250	225	100	62.4	937.4
Spices	263.1	691.8	233.2	437.56	270.8	1896.46
Garlic	209.2	617.4	204.4	404.16	245.6	1680.76
Coriander	28.6	29.8	10.3	11.1	8.3	88.1
Chillies	25.3	44.6	18.5	22.3	16.9	127.6

Source: Field Survey, 2007-08.

Table 4.7 Seed Use, Requirement and Gaps (Kg/ha)

Particular	Kullu			Banjar			Naggar		
	U	R	G	U	R	G	U	R	G
Maize	41.24	22.89	-18.35	41.3	25	-16.3	41.12	20.79	-20.3
Paddy	125	112	-13	105	100	-5	100	100	0
Wheat	147.15	114.85	-32.3	161.7	137.1	-24.6	111.8	100	-11.8
Barley	148.68	111.05	-37.63	159.7	100	-59.7	131.3	100	-31.3
Mash	25	20	-5	27.17	25	-2.17	30	25	-5
Rajmash	125	75	-50	110.5	75	-35.5	89.6	87.5	-2.1
Pulses	68.78	85.22	16.44	65	70	5	60	55	-5
Mustard	12	6	-6	15	6	-9	8	6	-2
Oilseeds	8.53	5.17	-3.36	7.5	6.3	-1.2	7	6.8	-0.2
Potato	1274.5	1173.9	-100.6	1455.8	1393.6	-62.2	1875	1575	-300
Peas	128.98	119.57	-9.41	122.12	88.45	-33.67	112.7	110.6	-2.1
Tomato	0.26	0.19	-0.07	0.17	0.17	0	0.2	0.15	-0.05
Cabbage	0.73	0.56	-0.17	0.4	0.36	-0.04	0.68	0.61	-0.07
Cauliflower	0.67	0.61	-0.06	0.36	0.3	-0.06	0.63	0.56	-0.07
Beans	76.67	49.67	-27	75	50	-25	67	50	-17
Capsicum	0.64	0.55	-0.09	0.70	0.65	-0.05	0.67	0.60	-0.07
Bhindi	20.26	14.27	-5.99	18	15	-3	16.5	15	-1.5
Brinjal	2.11	0.57	-1.54	1.5	0.7	-0.8	1.1	0.8	-0.3
Cucurbits	5.08	4.71	-0.37	4.60	4.50	-0.1	4.30	4.10	-0.2
Onion	10.75	8.5	-2.25	10	9	-1	8.5	8.0	-0.5
Radish	7.5	6	-1.5	7	6.5	-0.5	6.80	6.50	-0.3
Garlic	824.2	562	-262.2	779.6	562	-217.6	722.5	596.5	-126

Table 4.7 (contd..)

Particula r	Ani			Nirmand			District		
	U	R	G	U	R	G	U	R	G
Maize	55.2	26.3	-28.9	22.64	20	-2.64	40.3	22.98	-17.32
Paddy	150	112	-38	172.85	125	-47.85	109.57	89.8	-19.77
Wheat	144.6	100	-44.6	136.17	110.0	-26.16	140.28	112.39	-27.89
Barley	157.4	112	-45.4	120	85	-35	119.41	84.61	-34.8
Mash	26	20	-6	22.5	19	-3.5	26.15	21.8	-4.35
Rajmash	100	75	-25	100	75	-25	85.02	62.5	-22.52
Pulses	70	80	10	21.3	21.78	0.48	30.02	34.4	4.38
Mustard	10	12	2	10	12	2	11.25	3.6	-7.65
Oilseeds	12.5	6	-6.5	8.2	6	-2.2	5.84	3.43	-2.41
Potato	2290	1912.2	-377.8	1061.4	906.1	-155.3	1591.4	1392.2	-199.2
Peas	104.71	70.71	-34	107.78	81.14	-26.64	115.26	94.08	-21.18
Tomato	0.28	0.26	-0.02	0.24	0.19	-0.05	0.23	0.19	-0.04
Cabbage	0.87	0.74	-0.13	0.4	0.36	-0.04	0.61	0.52	-0.09
Cauliflow er	0.57	0.55	-0.02	0.6	0.5	-0.1	0.45	0.39	-0.06
Beans	67	50	-17	25	35	10	20.33	16.93	-3.4
Capsicum	0.67	0.60	-0.07	1.25	0.75	-0.5	0.37	0.26	-0.11
Bhindi	18	15	-3	15.6	17.5	1.9	7.17	6.35	-0.82
Brinjal	1.21	0.57	-0.64	0.58	0.52	-0.06	0.53	0.21	-0.32
Cucurbits	6	4.5	-1.5	5.5	5	-0.5	2.11	1.94	-0.17
Onion	9	8.5	-0.5	10	9	-1	2.15	1.7	-0.45
Radish	11	8	-3	7.25	7	-0.25	5.15	4.2	-0.95
Garlic	564.32	561.45	-2.87	750	562	-188	728.2	568.8	-159.4

Note: U: use; R: requirement, G: gap in physical values

Source: Field Survey, 2007-08.

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

Particular	Kullu			Banjar			Naggar		
	U	R	G	U	R	G	U	R	G
Urea	442.15	457.07	14.92	423.45	430.07	6.62	438.82	467.29	28.47
CAN	100	200	100	127.06	130.07	3.01	142.06	145.29	3.23
IFFCO (12:32:16)	379.69	406.60	26.91	331.50	343.47	11.97	321.06	331.06	10
DAP	0.64	2.59	1.95	0.90	1.5	0.60	0.64	1.61	0.97
MOP	100	100	0	103.72	107.66	3.94	105.12	109.40	4.28
FYM	7977	14152	6175	2828	4840	2012	1987	4022	2035
Vermicompost	164.73	920.29	755.56	180	300	120	198.70	279.48	80.79

Table 4.8 (contd..)

Particular	Ani			Nirmand			District		
	U	R	G	U	R	G	U	R	G
Urea	419	421	2	434.62	446.16	11.54	2158.0	2221.6	63.55
CAN	100	150	50	100	150	50	569.12	775.36	206.24
IFFCO (12:32:16)	325.86	334.35	8.49	338.65	346.16	7.51	1696.76	1761.64	64.88
DAP	0.79	1.31	0.52	0.53	0.86	0.33	3.5	7.87	4.37
MOP	107.59	115.20	7.61	112.48	119.61	7.13	528.91	551.87	22.96
SSP	3.56	6	2.44	4.84	6.86	2.02	8.4	12.86	4.46
FYM	2600	3800	1200	2616	3200	584	18008	30014	12006
Vermicompost	250	400	150	190	250	60	983.4	2149.7	1166.3

Note: On the basis of actual use and requirement of panchayats

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

Source: Field Survey, 2007-08.

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

Crop	Kullu			Banjar			Naggar		
Cereals	A	P	G	A	P	G	A	P	G
Maize	24.76	37	12.24	16.61	31	14.39	34.05	50	15.95
Paddy	19	21	2	17	19	2	25	47	22
Wheat	21.44	31	9.56	20.19	31.25	11.06	25	44	19
Barley	17.24	25	7.76	15.86	25	9.14	25	50	25
Pulses									
Mash	6	6	0	3.66	9.25	5.59	10.73	15	4.27
Rajmash	7	9	2	8.05	13	4.95	8.81	12.5	3.69
Other pulses	11.1	19	7.9	10.5	18	7.5	5	10	5
Oilseeds									
Mustard	7.96	14	6.04	5.62	8.75	3.13	19	21	2
Other oilseeds	2.41	10	7.59	2	10	8	5.5	8	2.5
Vegetables									
Potato	125	150	25	60	94	34	112	131	19
Peas	30.31	50	19.69	36.81	81	44.19	64.31	125	60.69
Tomato	125	250	125	282.7	562	279.3	290.48	437	146.52
Cabbage	117.15	200	82.85	100.6	200	99.4	237	325	88
Cauliflower	125	187	62	54.83	150	95.17	75	150	75
French bean	53.33	125	71.67	55	125	70	80	120	40
Capsicum	54.9	120	65.1	45	100	55	50	65	15
Bhindi	28.57	60	31.43	25	50	25	35	55	20
Brinjal	37.03	120	82.97	60	110	50	50	80	30
Cucurbits	54.11	250	195.89	120	220	100	80	120	40
Onion	60	120	60	50	100	50	60	80	20
Radish/turnip	62	100	38	52	102	50	55	70	15
Spices									
Garlic	62	75	13	71.86	125	53.14	126.69	312	185.31
Coriander	35	55	20	30	40	10	25	32	7
Chillies	55	100	45	45	55	10	40	50	10

Table 4.9 contd..

Crop	Ani			Nirmand			District		
Cereals	A	P	G	A	P	G	A	P	G
Maize	12.5	25	12.5	18.9	31	12.1	20.62	34.80	14.18
Paddy	19	28	9	34.9	62.5	27.6	29.09	31.70	2.61
Wheat	13.27	25	11.73	25	37.5	12.5	21.70	33.75	12.05
Barley	12.5	25	12.5	14	17	3	18.21	25.00	6.79
Pulses									
Mash	12.5	19	6.5	7.5	10	2.5	7.72	11.85	4.13
Rajmash	12.5	25	12.5	15	20	5	9.11	15.90	6.79
Other pulses	8.5	15	6.5	5.66	19	13.34	8.53	16.20	7.67
Oilseeds									
Mustard	1	5	4	3	5.5	2.5	7.89	10.85	2.96
Other oilseeds	5	7	2	5	6.25	1.25	3.57	8.25	4.68
Vegetables									
Potato	70.09	112	41.91	84.61	137.5	52.89	90.34	124.9	34.56
Peas	35.29	69	33.71	16.61	50	33.39	36.66	75.00	38.34
Tomato	212.5	350	137.5	233.37	375	141.6	228.8	394.8	166
Cabbage	250	500	250	125	200	75	165.95	285.0	119.05
Cauliflower	100	150	50	90.12	187.5	97.38	88.99	164.9	75.91
French bean	75	125	50	40	85	45	60.66	116	55.34
Capsicum	50	110	60	110	200	90	62	119	57
Bhindi	35	65	30	50	90	40	34.71	64	29.29
Brinjal	40	100	60	133.75	250	116.25	64.16	132.0	67.84
Cucurbits	145	200	55	70	150	80	93.82	188	94.18
Onion	70	90	20	50	60	10	58	90	32
Radish/turnip	87	112	25	150	225	75	81.20	121.8	40.60
Spices									
Garlic	73.02	100	26.98	70	130	60	80.71	148.4	67.69
Coriander	30	45	15	25	30	5	29	40.4	11.4
Chillies	60	90	30	50	65	15	50	72	22

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

Source: Field Survey, 2007-08.

Table 4.10 Farm Machinery Use and Gap

Machinery	Kullu				Banjar				Naggar			
	% users	Number			% users	Number			% users	Number		
		E	R	G		E	R	G		E	R	G
Maize sheller	26.38	65	100	35	-	-	25	25	-	-	-	-
Thresher	78.93	130	170	40	54.2	61	96	35	49.14	130	150	20
Tractor	25.75	300	370	70	2.5	144	186	42	20	200	250	50
Iron plough	73.17	15300	22750	7450	42.28	5850	9600	3750	56.01	5773	10280	4507
Spray pump/ power sprayer	86.16	5800	7280	1480	36.35	5022	6720	1698	82.24	8340	9000	660
Chaff cutter	5.99	192	521	329	-	-	300	300	-	-	350	350
Power tiller	1.4	70	300	230	-	-	360	360	1.02	40	150	110

Table 4.10 (contd.)

Machinery	Ani				Nirmand				District			
	% users	Number			% users	Number			% users	Number		
		E	R	G		E	R	G		E	R	G
Maize sheller					2.38	18	25	7	5.75	83	150	67
Thresher	21.08	42	70	28	91.15	20	30	10	58.9	383	516	133
Tractor	-	-	32	32	-	-	52	52	9.65	644	890	246
Iron plough	37.04	640	1280	640	40.96	4593	5200	607	49.89	32156	49110	16954
Spray pump/ power sprayer	66.08	2504	3016	512	100	4550	7475	2925	74.16	26216	33491	7275
Chaff cutter	-	-	88	88	-	52	227	175	1.19	244	1486	1242
Power tiller	-	-	64	64	-	-	-	-	0.48	110	874	764

Note: E: Existing No., R: Required No., G: Gap

Source: Field Survey, 2007-08.

Table 4.11 Existing Block Level Schemes for Agricultural Development

Scheme			Kullu	Banjar	Naggar	Ani	Nirmand	District
Water harvesting/ water storage structures/ rain water harvesting	No. of Schemes		--	5	--	12	3	20
	Villages covered		--	8	--	10	3	21
	Population covered		--	1000	--	2400	200	3600
	Area covered		--	9.5	--	36	5	50.5
	Beneficiary families (No.)		--	300	--	825	40	1165
	Fund allocation (Rs. Lakh)	Centre share	--	--	--	75	3	78
		State share	--	2.25	--	20.4	--	22.65
		Panchayat	--	--	--	--	--	--
		Banks	--	--	--	--	--	--
		Total budget	--	2.25	--	95.4	3	100.65
	Additional funds required (Rs. Lakh)		--	--	--	10	--	10
	Status	Complete (No.)	--	5	--	10	3	18
		Incomplete (No.)	--	--	--	2	--	2
Soil/land conservation	No. of Schemes		5	3	5	6	2	21
	Villages covered		5	3	5	6	2	21
	Area covered (ha)		10	8	12	15	5	50
	Beneficiary families (No.)		35	23	35	50	10	153
	Fund allocation (Rs. Lakh)	Centre share						
		State share	2.5	1.25	3	5	1.75	13.5
		Panchayat						
		Banks						
		Total budget	2.5	1.25	3	5	1.75	13.5
	Additional funds required (Rs. Lakh)		--	--	--	--	--	--
	Status	Complete (No.)	1	2	3	3	--	9
		Incomplete (No.)	4	1	2	3	2	12
Agricultural schemes	No. of schemes		8	8	8	8	8	--
1. Organic Farming	Villages covered		50	42	37	17	26	172
2. NWD PRA	Area covered		5000	3000	3000	2500	3000	16500
3. ATMA	Beneficiary families (No.)		11000	4000	5000	4000	4200	28200

Table 4.12 Status of Existing Irrigation Schemes

Particular	Kullu	Banjar	Naggar	Ani	Nirmand	District
Completed						
Lift irrigation						
Number	1	11	--	1	--	13
Amount spent (Rs. Lakh)	40.15	203.5	--	3.88	--	247.53
Villages covered (No.)	4	13	--	2	--	19
Beneficiaries (No.)	450	769	--	13	--	1232
Command area (ha)	98.5	622.99	--	18.22	--	739.71
Actual irrigated area (ha)	--	295.33	--	10.2	--	305.53
Groundwater use						
Number	5	--	--	--	--	5
Amount spent (Rs. Lakh)	7.5	--	--	--	--	7.5
Villages covered (No.)	5	--	--	--	--	5
Beneficiaries (No.)	3000	--	--	--	--	3000
Command area (ha)	--	--	--	--	--	--
Actual irrigated area (ha)	--	--	--	--	--	--
Flow Irrigation Scheme						
Number	6	8	8	4	6	32
Amount spent (Rs. Lakh)	38.61	122.43	96.09	9.42	16.86	283.41
Villages covered (No.)	8	12	10	11	15	56
Beneficiaries (No.)	1261	551	1233	238	412	3695
Command area (ha)	220.46	512.86	963	105.86	896.40	2698.58
Actual irrigated area (ha)	72.13	108.60	90.44	45.37	211.43	527.97
Tank irrigation						
Number	22	14	12	10	19	77
Amount spent (Rs. Lakh)	10.5	6	5.4	4	7.52	33.42
Villages covered (No.)	22	14	12	--	16	64
Beneficiaries (No.)	115	95	80	--	90	380
Command area (ha)	50	35	30	--	35	150
Actual irrigated area (ha)	50	35	30	--	35	150
Functional						
Lift irrigation						
Number	1	11	--	1	--	13
Amount spent (Rs. Lakh)	50	203.98	--	40	--	293.98
Villages covered (No.)	4	13	--	4	--	21
Beneficiaries (No.)	500	769	--	460	0	1729
Command area (ha)	--0	622.99	--	--	--	622.99
Actual irrigated area (ha)	50	295.33	--	45	--	390.33

Ground water use						
Number	5	--	--	--	--	5
Amount spent (Rs. Lakh)	7.5	--	--	--	--	7.5
Villages covered (No.)	5	--	--	--	--	5
Beneficiaries (No.)	3000	--	--	--	--	3000
Command area (ha)	--	--	--	--	--	--
Actual irrigated area (ha)	--	--	--	--	--	--
Tank irrigation						
Number	--	--	--	--	2	2
Amount spent (Rs. Lakh)	--	--	--	--	1.13	1.13
Villages covered (No.)	--	--	--	--	2	2
Beneficiaries (No.)	--	--	--	--	40	40
Command area (ha)	--	--	--	--	10	10
Actual irrigated area (ha)	--	--	--	--	6	6
Flow Irrigation Scheme						
Number	2	8	8	4	1	23
Amount spent (Rs. Lakh)	9	122.43	100	70	14.67	316.10
Villages covered (No.)	3	12	14	7	3	39
Beneficiaries (No.)	270	551	1673	800	500	3794
Command area (ha)	10	512.86	295.24	150	16	984.10
Actual irrigated area (ha)	10	103.60	295.24	150	10	568.84
Non-Functional						
Flow Irrigation Scheme						
Number	--	--	7	--	1	8
Amount spent (Rs. Lakh)	--	--	20	--	17	37
Villages covered (No.)	--	--	10	--	11	21
Beneficiaries (No.)	--	--	445	--	400	845
Command area (ha)	--	--	654.78	--	600	1254.78
Actual irrigated area (ha)	--	--	50	--	80	130
On-Going						
Lift irrigation						
Number	1	--	1	--	--	2
Amount allocated (Rs. Lakh)	57.49	--	258.75	--	--	316.24
Villages to be covered (No.)	8	--	15	--	--	23
Beneficiaries (No.)	340	--	800	--	--	1140
Command area (ha)	98.90	--	386.02	--	--	484.92
Flow Irrigation Scheme						
Number	4	2	4	--	2	12
Amount allocated (Rs. Lakh)	86.42	97.02	86	--	145.40	414.84

Villages to be covered (No.)	8	5	7	--	27	47
Beneficiaries (No.)	500	120	700	--	1500	2820
Command area (ha)	591.35	164.96	391	--	303	1450.31
Tank irrigation						
Number	3	2	--	--	2	7
Amount allocated (Rs. Lakh)	1.55	90	--	--	1.13	92.68
Villages to be covered (No.)	3	2	--	--	2	7
Beneficiaries (No.)	18	14	--	--	40	72
Command area (ha)	7	5	--	--	10	22

Source: Field Survey, 2007-08.

Table 4.13 Irrigation Schemes: Funds for Repair and Maintenance (Rs. Lakh)

Particular	Kullu	Banjar	Naggar	Ani	Nirmand	District
Functional						
Lift irrigation						
Number	--	--	--	1	--	1
Annual funds required <i>For maintenance</i>	--	--	--	10.5	--	10.5
Funds required for replacement/overhauling in 10 years	--	--	--	15	--	15
Flow irrigation scheme						
Number	--	--	--	4	1	5
Annual funds required <i>For maintenance</i>	--	--	--	16.5	1	17.5
Funds required for replacement/overhauling in 10 years	--	--	--	38.5	5	43.5
Non-Functional						
Flow irrigation scheme						
Number	--	--	--	--	2	2
Annual funds required <i>For maintenance</i>	--	--	--	--	10	10
Funds required for replacement/overhauling in 10 years	--	--	--	--	0	0

Source: Field Survey, 2007-08.

**Table 4.14 Varietal and Technological Problems and Interventions for Cereal, Pulse and Oilseed Crops
(Per Cent of Panchayats)**

Crop/ Problem	Intervention	Kullu	Banjar	Naggar	Ani	Nirmand
Maize						
Low yield in local varieties	Timely supply of recommended seed	100	100	100	100	100
Cut worms	Awareness about soil treatment	71	50		50	100
White grub	Awareness about soil treatment	71	50	75	50	75
Late maturity	Development of early maturing variety	86		75	75	50
Maize aphid	IPM	14	25	50	25	25
Animal menace	Fencing	71	75	100	100	100
Stem borer	IPM	42	75	75	25	25
Banded leaf and sheath blight	IPM & subsidy on seed & chemicals	28		25		25
Turcicum and maydis leaf blights	Training /demonstration on scientific cultivation		25		75	
Paddy						
Existing seed quality deteriorated	Improved varieties/ HYV seed be availed	86		100	100	100
White grub	IPM			75		75
Low yields	Training /demonstration on scientific cultivation	71	75		75	75
Stem borer	Demonstration on insect control	100	75			25
Black beetle	Demonstration on insect control	28		25		25
Nematodes	IPM	28	50			25
Brown spot	Demonstration on disease control	14		25		
Grass hopper	IPM	14		25		
Grain discolouration	Demonstration on HYVs	14		25		
False smut	Demonstration on disease control					

Wheat							
Weeds	Demonstration on weed control	57			75	25	75
Less seed formation	Training /demonstration on scientific cultivation	42	50				50
Hill bunt	Demonstration on disease control	42				25	25
Loose smut	Demonstration on disease control	42			75	75	25
Yellow rust	Yellow rust resistant varieties		75			50	25
Aphid	Plant protection measures	28			75		25
Barley							
Loose smut		71				75	
Yellow rust		57	50		75		
Weed problem		57	50			75	75
Low yield	Training /demonstration on scientific cultivation	100	75		75	100	75
Local varieties in use	Introduction of new HY & resistant variety	100	100		100	100	25
Seed not available	Timely availability of seed	100	100		100	100	75
Pulses							
Pulse beetles	Training & demonstration on plant protection	86	75			75	75
Local seed	Introduction of HYVs & timely availability of suitable seeds	86					75
Lower yield	Use of phosphatic fertilizers	86				75	
Snail attack	Use of recommended snail kill	42	25		50		
Cut worm	Training & demonstration on plant protection	14	50		50	75	50
Pod borer complex	IPM	86			75		
Bean bug	Training & demonstration on plant protection	14	25			50	
Leaf spots	Demonstration on disease control	14	25		25		
Anthracnose	IPM	14				25	

Insect attack in storage	Training about proper sun drying & storage	86	100	100	100	100
Oilseeds						
Low oil content	Varietal improvement	86	75			
Aphid complex	Bio control of aphids	57	75	100	75	100
Low yield & late maturity	Use of short duration & HYVs	86	75	100		75
White rust	Demonstration on disease control	57				50
Downy mildew	Use of resistant varieties and demonstration on disease control	57	50			
Cabbage caterpillar	IPM	57		75		
Hairy caterpillar	IPM	57			50	
White grubs	IPM	28	25			25

Source: Field Survey, 2007-08.

**Table 4.15 Varietal and Technological Problems and Interventions for Vegetable and Spice Crops
(Per Cent of Panchayats)**

Crop/ Problem	Intervention	Kullu	Banjar	Naggar	Ani	Nirmand
Potato						
Late blight	Demonstration on disease control	100	100	75	75	100
White grubs	Training & demonstration on plant protection	86				75
Poor quality seed	Provision of good quality seed in time		100	75	75	75
Cut worms	Training & demonstration on plant protection		75			
Lack of irrigation	Rain water harvesting	71	50	50	50	50
Potato tuber moth	Awareness of chemicals/ bio control	57	50		25	25
Tomato						
Bacterial wilt	Seed treatment & demonstration on	100	75	100	75	100

	disease control						
Buckeye rot & alternaria	Use of resistant varieties & demonstration on disease control	86	75			50	75
Fruit borer	Training & demonstration on IPM	57			75		75
Cut worms	Training & demonstration on IPM	42					
Fruit fly	IPM	28	50			50	50
Lack of irrigation	Lift irrigation scheme	57	50		50	50	50
Low prices	Training on market intelligence	86	50		50	50	100
Spurious pesticides	Availability of recommended pesticides	57	75		75	25	100
Serpentine leaf miner	Training & demonstration on plant protection		25				25
Nematodes	Training for pest management				25		25
Peas							
Powdery mildew	Availability of seed of resistant variety & seed treatment	100	100		100		100
Leaf miner	IPM	86				75	
Spurious pesticides	Availability of recommended pesticides	71	75		50	50	75
Cut worm	Training on IPM		50			50	
Pod borer complex	IPM				50		
Lack of irrigation	Rain water harvesting	71	50		50	25	50
Snail attack	Use of recommended snail kill						
Cabbage/Cauliflower							
Cabbage butterfly	Training & demonstration on IPM	100	100			75	100
Cut worms	Training on IPM	86					
Lack of irrigation	Rain water harvesting	86	75		100	50	75
Aphid problem	Training & demonstration on plant protection		75		75	50	
Damping off	Training on soil & seed treatment						75
White grub	Soil treatment & IPM		50			50	
Lack of market	Training on market information &	71	50		75	50	50

information	intelligence					
Black rot	Use of resistant varieties & demonstration on disease control	28	25	50		50
DBM	Training & demonstration on IPM	42	25	25	50	25
Stalk rot	Demonstration on disease control	28			25	
Brinjal						100
Bacterial wilt	Training on scientific cultivation	100			75	75
Phomosis blight & fruit rot	IPM		75		75	
Collar rot	Use of resistant varieties & disease control	57			50	
Brinjal shoot and fruit borer	Demonstration on IPM	86		75	75	75
Cut worm	Demonstration on soil treatment	71		75		50
Cucurbits						
Sudden wilt	Seed and soil treatment	86		100		75
Red pumpkin beetle	Training & demonstration on plant protection		25		75	
Mites	Training & demonstration on plant protection	71		75		
Aphids	Training & demonstration on plant protection	57			50	50
Onion						
Onion thrips	Training & demonstration on plant protection	57	75		100	75
Onion maggot	Training & demonstration on plant protection		50			
Aphid	Training & demonstration on plant protection	86				50
Low yield	Availability of recommended pesticides and seed	42	50	50	100	25

Garlic						
Injudicious use of fertilizers	Soil testing & balanced fertilizer use		100	75		75
Stemphyliol blight	Use of recommended fungicides	86	75	75	75	50
Marketing problem	Market information & intelligence	86	75	75	50	50
Non availability of seed	Ensured supply if quality seed		50	50	50	100
Low yield	Training on scientific cultivation	71	50	50	50	50
Chillies/ capsicum						
Pest problem	Training on pest control	100	75	75	100	
Poor prices	Training on market information & intelligence	86		25	75	100
Low yield	Training on scientific cultivation	71	50		75	75
Bacterial wilt	Use of resistant varieties	71		75	50	
Fruit rot (Anthracnose)	Training & demonstration on plant protection	42			25	
Phytophthora rot	Training & demonstration on plant protection	28		50		

Source: Field Survey, 2007-08.

Table 4.16 Crop Wise Constraints & Crop Improvement /Breeding Strategies

Constraint/requirement	Strategies
Wheat i) Prevalence of diseases like yellow & brown rust, loose smut & powdery mildew ii) Occurrence of frequent droughts & cold at crucial crop growth stages hindering thereby the productivity iii) Non availability of a range of maturity groups of varieties for small and diverse pockets within district iv) Lack of suitable varieties for low input management and organic farming systems v) Varietal mixtures vi) Non-availability of quality seed of improved varieties. vii) Some parts of the district being snow bound, winter wheat is the requirement of such areas to utilize the snow period for harvesting higher production as practiced in Europe and North America viii) Lack of potential winter wheat varieties for different tribal and snow bound regions of the state ix) Occurrence of diseases like yellow & brown rusts during off-season makes the hills as foci of infection for the mid hills & plains.	i) Development of drought and cold tolerant and disease resistant wheat varieties utilizing certain innovative biotechnological approaches ii) Acceleration of wheat improvement endeavors for the development of large number of targeted varieties for specific regions following chromosome elimination-mediated doubled haploidy breeding and molecular cytogenetic approaches iii) Development of wheat varieties specifically for low input and organic farming systems following organic plant breeding approaches iv) Training/encouragement to the private growers for the production foundation/certified seed v) Development of quality bread wheat for nutritional security in hills vi) Development of wheat varieties having higher levels of rust resistance, amber grains, high regenerability and suitable maturity through introgression of important genes from the spring wheat following conventional and double haploidy breeding approaches.
Barley i) Non availability of quality seed to the farmers ii) Low yields, as being grown on marginal and less productive land iii) Poor adoption of improved technology by the farmers	i) Breeding for superior hulled and hulless varieties having resistance to yellow rust and barley blight. ii) Breeding for value added products like malting, brewing and other products.
Maize District is enriched with diverse gene pools in respect of this crop, which can be exploited further to generate diversified improved genotypes. Speciality Corn. There is great potential for the production of baby corn. The fruit processing unit of Himachal Pradesh Fruit Processing and Marketing Corporation	i) Development and enrichment of heterotic pools. ii) Improvement of inbred lines. iii) Utilization in recombinant breeding iv) Evaluation and improvement of local germplasm for quality parameters. v) To develop inbred lines for baby corn and sweet corn from local as well as temperate germplasm

<p>(HPMC) at Jarol, in district Mandi has started processing of baby corn. In addition to this there is need to popularize the 'Quality Protein Maize', sweet corn, pop corn among farmers for the upliftment of socio-economic status of farmers.</p> <p>Acreage under maize is decreasing due to the non-availability of market infrastructure.</p>	<p>vi) To develop and evaluate single cross hybrids as well population of baby corn and sweet corn over locations</p> <p>vii) Characterization of quality protein maize and sweet corn germplasm through DNA fingerprinting.</p> <p>viii) To assure nutritional security by meeting nutritional needs. Development of composites/ hybrids to promote the industrial use of maize.</p> <p>ix) Development and evaluation of high yielding single cross hybrids.</p> <p>x) Development and evaluation of high yielding composites for hilly and tribal areas.</p> <p>xi) Development of hybrid oriented source population.</p>
<p>Pulses</p> <p>Mash/Moong</p> <p>i) Leaf spot diseases, YMV, Crinkle leaf virus</p> <p>ii) Blister beetle</p> <p>iii) Non-availability of varieties suitable for inter cropping with maize.</p>	<p>To develop varieties suitable for growing in orchards, inter cropping with maize having resistance to various diseases.</p>
<p>Rajmash</p> <p>i) Anthracnose disease</p> <p>ii) Non-availability of varieties suitable for intercropping with maize.</p>	<p>Development of disease free varieties having high yield and suitability for intercropping.</p>
<p>Brown sarson</p> <p>Lack of varieties having high seed yield, earliness, and resistance to white rust and tolerance to <i>Alternaria</i> blight.</p>	<p>Development of varieties with high yield, resistance to white rust and <i>Alternaria</i> blight and suitable as sole as well as mixed with wheat.</p>
<p>Fodders</p> <p>Lack of highly nutritive and high regenerating varieties.</p>	<p>Development of high fodder yielding varieties with high nutritive value and good regeneration capacity e.g. setaria and napier bajra hybrids, and oats among annuals.</p>

Source: Department of Plant Breeding, CSKHPKV, Palampur.

Table 4.17 Weed Problems in District Kullu

Crops	Weeds (priority wise)
Maize	<i>Digitaria sanguinalis</i> <i>Gallinsoga parviflora</i> , <i>Commelina benghalensis</i> , <i>Eleusine indica</i> , <i>Echinochloa colona</i>
Paddy	<i>Echinochloa crus-galli</i> <i>Ammania baccifera</i> , <i>Marsilia sp.</i> , <i>Cyperus difformis</i> , <i>Cyperus iria</i> ,
Wheat	<i>Ranunculus arvensis</i> <i>Bromus sterilis</i> , , <i>Lolium temulentum</i> , , <i>Poa annua</i> , <i>Veronica persica</i> , <i>Medicago denticulata</i>
Pulses	<i>Cyperus iria</i> , <i>Gallinsoga parviflora</i> , <i>Digitaria sanguinalis</i> , <i>Commelina benghalensis</i> , <i>Kyllinga sp.</i>
Kharif Vegetables	<i>Eleusine indica</i> , <i>Gallinsoga parviflora</i> <i>Digitaria sanguinalis</i> , <i>Commelina benghalensis</i> , <i>Portulaca oleracea</i>
Rabi Vegetables	<i>Poa annua</i> , <i>Veronica persica</i> , <i>Bromus sterilis</i> , <i>Ranunculus arvensis</i>
Weeds of support land	<i>Lantana camara</i> , <i>Parthenium hysterophorus</i> , <i>Ageratum hostonianum</i> , <i>Bidens pilosa</i> , <i>Zizyphus rotundifolia</i> , <i>Cirsium arvense</i> , <i>Artemisia sp.</i> , <i>Equisetum typhoides</i> , <i>Rumex acetocella</i> , <i>Urtica dioica</i> .

Source: Department of Agronomy, CSKHPKV, Palampur.

Chapter V

ALLIED AGRICULTURAL SECTORS

5.1 Horticulture

Horticulture is the mainstay of the economy of the district. It occupies about 23,746 hectares of area. Apple is the major fruit crop accounting for nearly 83 per cent of the total area under fruits. Stone fruits (like peach, plum & apricot), pomegranate, pear and kiwi are the other fruits grown in the district. The total production of fruits in the district was reported to be 3,13,906 tonnes. Root rot, root borer, canker, faulty training pruning, improper ratio of pollinizers are the major problems associated with fruit crops. Plantation of new/improved crops/ varieties, maintenance of proper pollinizer ratio in the orchards, use of bees for better pollination, following recommended spray schedule, proper training pruning and scientific management are the suggested measures to boost the horticultural production. Horticulture department is working for the upliftment of the orchardists through 15 schemes being run by it focussing mainly on the promotion and production of fruits, floriculture, aromatic and medicinal plants, protected cultivation, vermicompost, mushroom cultivation, processing, beekeeping and micro irrigation schemes. The available information about existing block-level schemes being run for the horticultural development has been given in Table 5.1. The existing and potential area and production of apple and other fruits have been shown in Table 5.2. The implementation of agricultural plan under RKVY is expected to double the production of fruits.

5.2 Animal Husbandry

Animal husbandry is a supplementary source of livelihood for a large chunk of population in the district. It also serves as a source of FYM to agriculture. In fact, agriculture and animal husbandry are complementary enterprises; both are inter-dependant and provide support to each other. Various schemes for feed & fodder development, milk production, genetic up gradation of cattle and animal health improvement are being implemented by the Department of Animal Husbandry (Table 5.3). There are about 1.54 lakh cows in the district of which 45 per cent are crossbred (Table 5.4). The average milk production realised

for crossbred and local cows was 6.08 and 1.57 litres per day. About 50% of the crossbred and 25% of the local cows (as suggested by department of animal husbandry) were considered to be in milk and the lactation period for crossbred cows was generally 250 days and that of local cows was 200 days. Total milk production was reported to be 59,345 tonnes in the district. Total sheep and goat population was about 3.5 lakh.

5.3 Fisheries

As has been emphasised earlier, also that there is great potential for fish production in the district. The status and potential of cultured fishery is given in Table 5.5. At present 36 households are engaged in cultured fisheries and rainbow trout is being reared in Kullu, Naggar and Banjar blocks which can be extended to Ani and Nirmand blocks too. Arctic chhar is another potential species. At present, 23.5 mt of fish is being produced in the district, which can be increased to 178 mt by the implementation of the proposed plan. High construction cost of raceways, costly seed & feed, lack of technical know-how and non-availability of farm equipments and chemicals were reported to be the major constraints for the farmers to venture into this enterprise. Technical guidance, financial assistance and provision of farm equipments, chemicals, feed and seed locally at reasonable prices can render a boost to this sector.

5.4 Poultry

The poultry production is also a paying enterprise in the district. There are more than 45,000 poultry birds at present (Table 5.4). Total annual egg production is 52.70 lakhs with an average of 116 eggs/bird/year. Coccidiosis, ranikhet and merek's disease were the main problems associated with poultry.

5.5 Rabbitry

Rabbit farming is highly climate specific. Therefore, very few areas of the country are suitable for rabbit farming. District Kullu is endowed with suitable climate for rabbit farming. It was remunerative enterprise in the district a few years ago. Many farmers were having commercial rabbitry units. But, recently it has turned to be a non-viable enterprise because wool prices are very low at 600-700 rupees a kg. Feed is very costly (Rs. 1100 Per kg). Scabies, pneumonia and ear canker are the main reported diseases. Technology for spinning of wool at farmers' level is lacking because of which the farmers are coerced to sell

their raw produce at throwaway prices. Government intervention for purchase of wool at reasonable prices is direly needed to revive this enterprise in the district. Government should provide spun wool to the farmers so that they are able to prepare its thread and garments at their own.

5.6 Mushroom

Mushroom cultivation is a remunerative enterprise and can be very easily adopted along with agriculture. It can help to generate income and employment for farming community. In district Kullu, both types of mushrooms i.e. white button and dhingri are being grown. At present, 20-25 farmers in the district are engaged in mushroom production. Four compost units located at Chambaghat, Palampur, Bajnath and Bajaura are providing compost as well as seed to the farmers. Lack of technical know-how, poor market information (both input and output), perishability and lack of funds with the department to provide training and subsidy to the farmers are the major constraints for poor adoption rate.

5.7 Medicinal/Aromatic Plants

There exists a tremendous scope for cultivation of medicinal and aromatic plants in Kullu because of favourable climate, wide range of altitude and topography. Small land holdings of the farmers restrain them to go for cultivation of medicinal herbs. There are about 10-12 farmers in the district who are growing these plants on commercial basis and are reaping rich dividends by growing different medicinal plants. Pateesh, tulsi, kadhu, turmeric, lavender, geranium, nihani, salampanja, bamkari, taxus, baccata, guchhi, brich and Bulgarian rose are some of the medicinal and aromatic plants being grown in the district. Regarding the industrial utilization of medicinal and aromatic plants in the district, there are 4-5 units/pharmacies in existence, which manufacture the Ayurvedic medicines. Potential can be harnessed by motivating the farmers, providing them with quality planting material and other inputs, providing technical and financial help and ensuring market at remunerative prices.

5.8 Beekeeping

In district Kullu, beekeeping is mainly taken up for the pollination purpose in the apple orchards. There remains a great demand of bee colonies during the pollination period of apple. There are 15-20 full time beekeepers in the district and some of them go for migratory beekeeping with Italian honeybee (*Apis mellifera*) and are earning between 1.75 to 2 lacs of rupees per annum. However, majority of the people still practise traditional beekeeping with deshi honey bee (*Apis cerana*) to meet their honey and pollination requirements.

5.9 Agricultural Marketing

Estimates of production and disposal of agricultural produce, fruits, vegetables, animal products and live animal stock are given in Table 5.6 and 5.7. The entire marketable surplus of cereals, pulses and oilseeds was sold in the local markets. In case of vegetables too, majority (82%) of the produce was sold in local markets. But, in case of fruits only 37 per cent of the produce was sold in local markets and 52 per cent was sold in distant markets outside the state. Nearly 12 per cent of the marketable surplus of fruits was sold in distant markets within the state. Total milk production was estimated to be 59,345 tonnes in the district out of which about 74 per cent was consumed and remaining quantity was marketed in the local areas or at the tourist places like Kullu and Manali. Average wool production was 1.59 kg/ year/sheep with a total production of 319 tonnes per year. Wool was sold to various private weavers/cooperatives in the district. Bhuttico was one of the most successful cooperative societies in the area. Total sheep and goat population was about 3.5 lakh, of which nearly 20 per cent were sold for meat purpose. The total meat production in the district amounted to about 1,052 tonnes.

5.10 Agricultural Infrastructure

5.10.1 Physical

District level market committee (APMC for Kullu and L&S) established by State Marketing Board is working to facilitate the marketing of agricultural produce. This committee ensures proper implementation and supervision of market rules & regulations and safeguards the interests of farmers as well as those of traders. Market Committee office is situated at Kullu. Different regulated market yards/sub yards are working under the control of this committee. There are six markets/market yards located at Kullu, Bhuntar, Banjar, Patlikuhl, Chouribihal

and Bandrol which facilitate the marketing of agricultural produce of the district. Market yards at Takoli (district Mandi) and Rampur (district Shimla) also serve the farmers of district Kullu. Promotion of cooperative marketing societies, establishment of collection centres and market information centres is demanded for improving efficiency of the system. The important existing and required marketing infrastructure and financial estimates for these are shown in Table 5.8 and Table 5.9.

5.10.2 Institutional

The research station (HAREC) and Krishi Vigyan Kendra of HPKV, Palampur at Bajaura are conducting the research and extension activities in field crops. Regional Horticultural Research Station (RHRS) of UHF, Solan at Bajaura and Seobagh are working in the areas of horticulture, forestry and floriculture. Besides, ICAR institutes like Regional Station, IARI, Katrain and NTRS, Garsa are also instrumental in shaping up the destiny of vegetable growers and dairy farmers. The office of Dy Director Horticulture, Dy Director Agriculture, Dy Director Animal Husbandry at Kullu and Dy Director Fishery at Patlikuhl are extending all sorts of training and assistance to the farmers in various developmental activities. These institutions need to be strengthened so that the important researchable/extensionable issues are taken up efficiently and effectively.

5.10.3 Human Resource

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

5.11 Rural Enterprises

The status of rural enterprises in the district is not very encouraging with a few exceptions. People are generally engaged in agriculture and horticulture. There were 74,741 unemployed youth of various categories (matriculate, graduate, post graduate and technically trained) in the district (Table 5.12). The status of existing enterprises in the district is given in Table 5.13. Some of the rural enterprises where people are engaged are flourmill, oil expeller, bakery, vermicomposting and nursery raising. Handlooms and handicrafts i.e. making of shawls, *pattus*, borders, caps, socks and other woollen garments is also one of important

enterprises providing employment and livelihood to a large chunk of people. However, agro processing, fruit & vegetable nursery raising, medicinal & aromatic plants, mushroom cultivation and bee keeping are the important potential enterprises, which can ensure sufficient employment and income to the unemployed (Table 5.14). Training and financial assistance need to be provided in order to encourage rural enterprises.

5.12 Agro-Processing

Agro processing is also very poor in the district. However, a few units at Mahila Mandal or SHG level are working successfully for preparation of value added products of locally produced fruits, vegetables and spices. Establishment of small-scale processing units in public as well as private sector needs attention not only to avoid spoilage of marketable surplus but also to enhance the income of farming community. The existing number, requirement and gaps of agribusiness establishments are given in Table 5.15.

5.13 Drudgery of Women

Women dominantly perform the agricultural operations especially those performed manually. Use of power machinery for the operations like clod breaking, transplanting, fertilization, intercultural operations, and winnowing etc., is negligible. All these operations are performed manually and women contribute more than 60 per cent of the total labour. Similarly, in case of livestock, the contribution of women is more than their male counterparts. The operations like fodder collection, feeding, cleaning of animals and animal sheds, milking, churning of milk and preparation of milk products are the major operations carried out by women. The tools and techniques being used by them were of traditional in nature (Table 5.16) and hence the drudgery was on the higher side. This advocates that women, the main workers in these enterprises, should be trained for the improved and scientific techniques so as to enhance work efficiency and reduce drudgery. Special extension programmes should be designed keeping in view the educational level of women, their learning capability and time availability with them. Development of the light machinery for various operations suitable to be used by women should be promoted.

5.14 Input Use and Gaps

In horticultural crops, the major gap was observed in the use of fertilizers and plant protection chemicals. Chemicals and their concentrations were not used as per the

recommendations. Proper proportion of the pollinizers was not maintained in the orchards. The use of honeybees as pollinators has also not gained the required momentum as yet. As a result, fruit setting in majority of the orchards is not up to the mark. In case of livestock, a significant gap in the use of concentrates and minerals was observed (Table 5.17). Concentrates were fed only to milch cattle whereas the use of mineral mixture in the animal feed was almost nil. Green and dry fodder fed to animals was also of poor quality. In poultry again, the use of concentrates was not as per requirement. Other allied sectors encountered similar constraints and gaps in the input use.

5.15 Yield Gap Analysis

Owing to the above mentioned input gaps, a considerable gap in the average yield and that realised by the progressive farmers was observed. The production of fruit crops especially that of apple on well maintained orchards was quite high which measured to 117q higher than the average yield (Table 5.18). A significant gap in the yield of stone fruits, pomegranate, pear and kiwi was also reported. The yields of these fruit crops experienced a difference ranging from 58 to 90 quintals per hectare. In average milk yield per animal per day, a gap of 5 and 2.5 litres was reported for crossbred and local cows, respectively (Table 5.19). Average wool yield was about 0.97 kg lesser than the wool yield of progressive farms. On the contrary, no significant difference in the average egg yield was observed when compared with the yield at progressive poultry farms. Average yields in other enterprises viz., mushroom cultivation, fisheries, rabbitry, beekeeping also experienced a chasm when compared with progressive farmers' yields. It shows that there exists a lot of unexploited potential that can be reaped.

5.16 Reasons for Gap

Gap in the adoption of recommended scientific technology and injudicious/imbalanced/improper use of critical inputs, poor purchasing power coupled with low/no subsidy on inputs, non-availability of quality inputs are the factors responsible for low yields in horticulture, dairy, fishery and other allied sectors. Lack of quality planting material for orchards, improper training pruning, inappropriate proportion of pollinizers in orchards and spurious plant protection chemicals in the market circumscribe in reaping bumper yields in orchards.

5.17 Interventions for the District

Horticulture

The crop-wise problems and interventions have been given in Table 5.20, which can be summarised as below keeping in view some expansion and diversification in horticulture.

- Introduction and popularization of new varieties and fruit crops adapted to changes in climatic conditions of the valley.
- Testing of organic manures, bio-fertilizers and micronutrients in different crops vis a vis the yield and growth parameters.
- Use of drip irrigation, fertigation, growth regulators and standardization of pruning and training.
- Selection of potential cultivars of chrysanthemum and their evaluation for off-season production.
- Testing of different methods for off-season cut flower production and their standardization, demonstration and promotion among farmers.
- Development of location specific recommendations for plant protection through on farm research and its validation at different locations and refinement according to the suitability of the area.
- Periodical survey for occurrence of various insect-pests of pomegranate, their identification, biology and bionomics.
- Evaluation of summer oils, acaricides and bio pesticides against insects and mite pests and development of integrated spray schedule and their validation.
- Provision of quality plant material to promote fruit production and harness available potential.
- Construction of adequate number of CAS (Control Atmosphere Storage) at appropriate places.
- To install anti-hail guns/nets at vulnerable points.

Livestock and Fisheries

The incidence and mortality of livestock diseases has been given in table 5.21. Problems of endo and ectoparasites, mange and diarrhoea are prevalent among sheep. Diarrhoea, pneumonia, FMD and tympany are the main diseases of cattle reported from different

blocks. Problem of repeat breeding is major circumscribing factor for the livestock industry. Financial estimates for livestock disease management have been given in Table 5.22. Scarcity of fodder and quality feed are also among the major constraints. Prompt and effective veterinary services, trained staff, veterinary dispensaries at easy access, accelerating the process of replacing indigenous breed of cattle, sheep and goat with improved breeds, pasture improvement by planting improved grasses and fodders were some of the suggestions for development of this sector. Provision of market infrastructure viz., chilling plants, refrigerated vans, cheese making, paneer making and packaging machines can further boost the growth of dairy industry. The financial estimates for these infrastructural facilities have been enclosed in Table 5.23. Costly seed, feed and construction of raceways were the major constraints for fishery development. Financial and technical assistance were the suggested interventions for which the financial estimates have been given in Table 5.24.

Bee keeping

- Promotion of bee keeping as an enterprise by providing easy access to subsidies.
- Establishment of apiaries with farmers for honey production and pollination along with training for proper management.
- Entrepreneur development w.r.t. bee keeping.
- Plantation of bee forage/multi purpose plants by forest department and local social institutions like panchayats so that flora for bees are available for maximum period of the year.

Other sectors

- Motivating farmers for adoption.
- Providing training and financial assistance.
- Strengthening input and output market services.
- Organizing farmers into cooperatives or farmer groups.

5.18 Research/Extension Gaps

Horticulture

- Lack of diversification in horticulture.
- Irregular bearing in pomegranate
- Crop failure of some varieties/hybrids of vegetables in different vegetable growing pockets.
- Lack of knowledge regarding different agro techniques like polyhouse cultivation of vegetables.
- Lack of technology for the cultivation of off-season cut flower production of chrysanthemum.
- Non-availability of quality planting material of the appropriate crops/varieties suitable for varied altitude and agro-climatic conditions.
- Lack of eco-friendly and location specific techniques for integrated pest management for different crops.
- Lack of agro techniques for new fruit species/varieties.
- Lack of farmer training facilities at HRS, Seobagh under RHRS, Bajaura.

Livestock

- Lack of documentation about ITK and ethno-veterinary practices being used by dairy farmers in the district.
- Poor nutritive quality of the available fodders and grasses.
- Increasing infertility among cattle giving rise to stray cattle menace.
- Poor health care for sheep and goat.
- Lack of veterinary dispensaries at accessible distance.
- Poor extension services especially for women who contribute more than 70 % of the labour force.
- Problem of repeat breeding in cattle.

Bee keeping

- Areas/ localities for honey production and organic honey production are not identified.
- Difficulty in the adoption of available technology for wasp control at farmers' level.
- Poor management of colonies for pollination and honey production.
- Non-availability of identified colonies among two spp. for specific traits.
- Complicated procedure for availing subsidy.

5.19 Researchable Issues

Horticulture

- Cultivation of market/climate oriented fruit crops.
- Development of the techniques for use of organic manures or bio-fertilizers and micronutrients in fruit crops.
- Developing techniques for crop regulation in pomegranate.
- Location specific testing of varieties/hybrids.
- Developing package of practices for protected cultivation of vegetables.
- Standardization of technology for off-season cut flower production of chrysanthemum.
- Development of eco-friendly methods for integrated management of important insect-pests in apple, pomegranate and other fruit crops.
- Varietal diversification in apple, pear, cherry, plums, kiwi, persimmon and walnut through introduction and testing of improved genotypes.
- Popularisation of spur type apple cultivars in low-lying areas.
- Evaluation of cherry rootstocks for wider adaptability.
- Identification and multiplication of clonal rootstocks for higher yields in pears.
- Flower regulation as per market demands.
- Development of resource (soil and water) conservation practices in horticulture.
- Development of technology for improving water use efficiency fertigation in different fruit crops.
- Evolving improved frost protection technology.

Livestock

- Documentation of the prevailing ethno-veterinary practices among rural livestock farmers, their scientific validation and subsequent mass dissemination.
- Analytical study of the contribution of women to animal husbandry operations.
- Analysis of the constraints in the adoption of improved dairy husbandry practices /technology by livestock farmers in the district, perceptions of stakeholders i.e. livestock-keepers, veterinarians, paravets and development agencies.
- Documentation and scientific validation of the livestock husbandry-related indigenous technical knowledge (ITK) among dairy farmers.
- Development of a sustainable dairy husbandry package for livestock farmers in the face of 'LIVESTOCK REVOLUTION 2020'.
- An action research project for cultivation and propagation of nutritious fodder grasses in wastelands.
- Scope study for the development of an Integrated Livestock (cattle, fish and poultry) Production Model (ILPM) for hill farmers in Kullu district.
- Identification and nutritional evaluation of the high nutrition fodder grasses in high altitude areas of Kullu district.
- A technical study into the genesis of stray cattle menace and its sustainable remedy.

Bee keeping

- Identification of honey potential areas for two spp. i. e. *Apis cerana* and *Apis mellifera*.
- Refinement in the technology for control of wasps predating on honey bees.
- Disease and pest management in honey bees, management of bee colonies for pollination in different crops for higher productivity, management practices for migratory beekeeping for better economic returns, quality analysis of honey from different sources for value addition.
- Identification of niches for organic honey production.
- Selection in *Apis cerana* and *Apis mellifera* for some biological and economic traits.

Table 5.1 Existing Block Level Schemes for Horticultural Development

Particular	Kullu	Banjar	Naggar	Ani	Nirmand	District
No. of Schemes	15	15	15	14	14	--
Village covered (No.)	32	42	22	50	22	168
Population covered (No.)	300	320	240	160	100	1120
Area covered (Ha)	50	40	30	20	15	155
Beneficiary families (No.)	100	80	60	40	30	310
Total budget (Rs. Lakh)	NA	NA	NA	NA	NA	NA
Additional funds required (Rs. Lakh)	-	-	-	-	-	-

NA: Not available.

Source: Field Survey, 2007-08.

Table 5.2 Existing Status and Potential for Horticultural Development

(Area in Ha; Production in Tonnes)

Crop	Status	Parameter	Kullu	Banjar	Naggar	Ani	Nirmand	District
Apple		Area	3969	2610.36	8901.2	1361	2700.62	19542.18
		Production	49779.2	33788.5	107633.3	25212.5	42237.7	258651.2
		No. of households	5170	2096	6270	1640	3807	18983
	P	Area	4069	2672.36	8984.2	1377	2774.62	19877.18
		Production	101725	66809	224605	34425	69365.5	496929.5
		No. of households	25	20	15	10	25	95
Stone fruits	E	Area	825	668.84	516.5	310	87.4	2407.74
		Production	10312.5	10951.6	12586.59	3100.0	961.4	37912.08
		No. of households	450	500	400	225	260	1835
	P	Area	930	793.84	631.5	362	149.4	2866.74
		Production	16275.0	19846.0	18945.0	5430.0	2091.6	62587.60
		No. of households	100	150	150	50	150	600
Pear	E	Area	168	431.28	761	0	104	1464.28
		Production	1260.0	3533.47	6747.03	0	873.6	12414.1
		No. of households	300	500	900	0	200	1900
	P	Area	190	471.28	776	0	154	1591.28
		Production	1900.0	9425.6	14511.2	0	1925.0	27761.81
		No. of households	30	150	25	0	110	315
Kiwi	E	Area	50	20	16	0	0	86
		Production	1000.0	300.0	339.2	0	0	1639.2
		No. of households	110	40	80	0	0	230
	P	Area	90	35	36	0	0	161
		Production	2700.0	735.0	900.0	0	0	4335.08
		No. of households	80	40	20	0	0	140
Pomegranate	E	Area	70	56	39	25	15	205
		Production	1260.0	840.0	585.0	375.0	180.0	3240.0
		No. of households	100	40	40	30	30	240

	P	Area	115	81	64	45	45	350
		Production	2587.5	1620.0	1792.0	900.0	675.0	7574.50
		No. of households	80	40	20	25	60	225
Citrus fruits	E	Area	0	0	0	0	10.4	10.4
		Production	0	0	0	0	10.4	10.4
		No. of households	0	0	0	0	40	40
	P	Area	0	0	0	0	218.4	218.4
		Production	0	0	0	0	273.0	273.0
		No. of households	0	0	0	0	140	140
Mango	E	Area	0	0	0	0	31.2	31.2
		Production	0	0	0	0	39.0	39.0
		No. of households	0	0	0	0	52	52
	P	Area	0	0	0	0	551.2	551.2
		Production	0	0	0	0	1047.28	1047.28
		No. of households	0	0	0	0	200	200

Note: E- Existing; P- Potential

Source: Field Survey, 2007-08.

Table 5.3 Existing Block Level Schemes for Livestock Development

Particular	Kullu	Banjar	Naggar	Ani	Nirmand	District
No. of schemes	1	2	2	2	1	--
Villages covered (No.)	50	20	30	50	22	172
Population covered (No.)	60000	25000	30000	50000	18000	183000
Beneficiary families (No.)	15000	10000	12000	12000	9000	58000

Source: Field Survey, 2007-08.

Table 5.4 Livestock Population (No.)

Type of Animal	Kullu	Banjar	Naggar	Ani	Nirmand	District
Productive						
Crossbred cows	37030	6768	14160	4704	6552	69214
Local cow	30030	23004	16200	13888	2314	85436
Buffaloes	2450	-	-	-	-	2450
Goats	72450	40176	1000	5568	31200	150394
Sheep	112140	47340	12680	2752	26000	200912
Poultry	12530	15912	12920	-	3900	45262
Broilers	42000	-	60000	-	-	102000
Young stock	18760	10800	13000	2400	-	44960
Bullocks	32270	16380	1880	1696	-	52226
Equines	1190	720	2800	320	-	5030
Unproductive*	9310	1620	1000	1760	1222	14912

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

Source: Field Survey, 2007-08.

Table 5.5 Status and Potential for Cultured Fisheries

Particular	Status	Kullu	Banjar	Naggar	Ani	Nirmand	District
Households engaged (No.)	E	10	7	15	4	--	36
	P	40	25	52	10	5	132
Fish production (Mt)	E	10	4	9	0.5	Nil	23.5
	P	53	40	70	10	5	178
Ponds/ Raceways (No.)	E	10	5	11	2	--	28
	P	53	40	70	10	5	178
Ponds/Raceways (Area in sq meters)	E	300	150	330	60	Nil	840
	P	1590	1200	2100	300	150	5340
Existing Species		Rainbow trout in all blocks.					
Potential of new species		Rainbow trout in all blocks. Arctic chhar at higher altitude in all blocks and rainbow trout in Ani & Nirmand Blocks too.					
Diseases	1 2 3 4 5	Bacterial Fungal Viral Parasitic Fin rot & Gill rot etc.					

Note: E- Existing; P- Potential

Source: Field Survey, 2007-08.

Table 5.6 Production and Disposal of Agricultural Produce (Tonnes)

Commodity	Kullu	Banjar	Naggar	Ani	Nirmand	District
Cereals						
Total production	39175	13354.62	14253.96	5435.04	15760.06	87978.68
Consumption	31340	10683.70	11403.17	5435.04	12607.05	71468.92
Marketed surplus	7835	2670.91	2850.79	0	3153.01	16509.76
Post harvest losses	2	1	0.5		0.5	4.0
Markets where sold (%)						
Local (within area)	100	100	100		100	100
Distant (within state)						
Distant (outside State)						
Pulses						
Total production	574.46	1370.73	1051.16	679.37	712.64	4388.36
Consumption	60.16	134.3	125	62.35	75	456.81
Marketed surplus	514.30	1236.43	926.16	617.02	637.64	3931.55
Post harvest losses	0	0	0	0	0	0
Markets where sold (%)						
Local (within area)	100	100	100	100	100	100
Distant (within state)						
Distant (outside State)						
Oilseeds						
Total production	158.01	70.47	211.90	69.98	90.5	600.86
Consumption	95	44.8	133.2	43	52	368
Marketed surplus	63.01	25.67	78.70	26.98	38.50	232.86
Post harvest losses	0	0	0	0	0	0
Markets where sold (%)						

Local (within area)	100	100	100	100	100	100
Distant (within state)						
Distant (outside State)						
Vegetables						
Total production	21775	15695	17310	7733	21603	84096
Consumption	217	156	173	77	216	839
Marketed surplus	21558	15539	17137	7656	21387	83277
Post harvest losses	711	528	579	291	708	2817
Markets where sold (%)						
Local (within area)	100	41.36	67.42	100	100	81.75
Distant (within state)	0	58.64	0	0	0	11.73
Distant (outside State)	0	0	32.58	0	0	6.52
Fruits						
Total production	63611	49413	127891	28686	44305	313906
Consumption	636	494	1278	286	443	3137
Marketed surplus	62975	48919	126613	28400	43862	310769
Post harvest losses	636	494	1278	286	443	3137
Markets where sold (%)						
Local (within area)	100	3.77	60.28	0	22.36	37.28
Distant (within state)	0	53.63	0	0	0	10.73
Distant (outside state)	0	42.59	39.72	100	77.64	51.99

Source: Field Survey, 2007-08.

Table 5.7 Production and Disposal of Livestock and their Products

Particular	Kullu	Banjar	Naggar	Ani	Nirmand	District
Milk (Mt/yr)						
Total production	28445.8	9022.4	13022.9	3945.5	4908.4	59345
Consumption	17377	8517	10487	3337	4197.3	43915.3
Marketed surplus	11068.8	505.4	2535.9	608.5	711.1	15429.7
Wool (Mt/yr)						
Total production	216.43	55.86	16.86	3.30	26.55	319
Consumption	11.8	11.98	8.76	2	5	39.54
Marketed surplus	204.63	43.88	8.1	1.30	21.55	279.46
Eggs (Lakhs/yr)	17.30	15.17	18.84	0	3.90	52.70
Meat (Mt/yr)	553	262	41	24.95	171	1051.95
Cattle sold (No./yr)	6520	3630	1360	5520	3200	20230
Buffalo sold (No./yr)	120					120
Poultry bird sold (No./yr)	10230	12223	12230		2500	37183
Sheep/ goat sold (No./yr)	36866	17467	2733	1633	11400	70099
Equines sold (No./yr)	556	235	495	102		1388

Source: Field Survey, 2007-08.

Table 5.8 Marketing Infrastructure (No.)

Particular	E/R	Kullu	Banjar	Naggar	Ani	Nirm and	District
Agricultural produce (fruits & vegetables) collection centres	E	-	-	-	-	-	-
	R	4	3	4	2	2	15
Market sub-yard & market information centre	E	2	1	2	1	0	6
	R	3	3	3	1	1	11
Storage/ godown (Hi-tech) Control Atmosphere Store (CAS)	E	2	1	2	1	0	6
	R	3	3	3	2	2	13
Co-operative marketing society	E	4	2	5	1	1	13
	R	10	12	10	10	10	52
Agri/Horti input supply centre including PACS	E	29	12	19	9	11	80
	R	40	20	30	20	20	130
Banking and insurance facility	E	-	-	-	-	-	-
	R	1	1	1	1	1	5

Note: E- Existing; R- Required; Source: Field Survey, 2007-08.

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

Particular	Kullu	Banjar	Naggar	Ani	Nirma nd	Distr ict
Agricultural produce (fruits & vegetables) collection centres	10	10	10	10	10	50
Market sub-yard & market information centre	460	160	380	100	230	1330
Link road	80	80	80	50	50	340
Training seminar hall	12	--	12	12	12	48
Kisan rest house	35	--	35	35	35	140
Total	597	250	517	207	337	1908

Source: Field Survey, 2007-08.

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

Particular		Kullu	Banjar	Naggar	Ani	Nirmand	District
SMS (Agri)	S	1	1	1	1	1	5
	P	1	1	1	1	0	4
	R	1	1	1	1	1	5
	G	0	0	0	0	0	0
ADOs	S	2	2	2	2	2	10
	P	2	1	2	0	1	6
	R	3	3	3	3	3	15
	G	1	1	1	1	1	5
AEOs	S	10	8	8	9	8	43
	P	5	1	5	2	2	15
	R	11	9	10	10	10	50
	G	1	1	2	1	2	7
SMS (Horti)	S	1	0	0	1	0	2
	P	1	0	0	1	0	2
	R	1	0	1	2	0	4
	G	0	0	1	1	0	2
HDOs	S	3	2	2	4	2	13
	P	2	1	1	0	1	5
	R	4	3	4	6	4	21
	G	1	1	2	2	2	8
HEOs	S	17	6	11	6	6	46
	P	11	6	7	3	3	30
	R	19	9	13	8	9	58
	G	2	3	2	2	3	12

Sr. Veterinary officers	S	1	0	0	1	0	2
	P	0	0	0	1	0	1
	R	1	1	1	1	0	4
	G	0	1	1	0	0	2
Veterinary doctors	S	10	2	2	1	3	18
	P	10	2	2	1	2	17
	R	10	2	2	1	3	18
	G	0	0	0	0	0	0
Veterinary pharmacist	S	47	15	19	18	16	115
	P	46	15	19	18	15	113
	R	47	15	19	18	16	115
	G	0	0	0	0	0	0
Extension specialists for							
Bee keeping	S	1	0	0	0	0	1
	P	0	0	0	0	0	0
	R	1	0	2	0	0	3
	G	0	0	2	0	0	2
Mushrooms	S	0	0	0	0	0	0
	P	0	0	0	0	0	0
	R	1	0	1	0	0	2
	G	1	0	1	0	0	2
Floriculture	S	1	0	0	0	0	1
	P	0	0	0	0	0	0
	R	1	0	1	0	0	2
	G	0	0	1	0	0	1
Fisheries	S	2	0	0	1	1	4
	P	0	0	0	1	0	1
	R	2	0	0	0	1	3
	G	0	0	0	0	0	0
Sericulture	S	1	0	0	0	0	1
	P	0	0	0	0	0	0
	R	0	0	0	0	0	0
	G	0	0	0	0	0	0
AADO	S	0	0	0	1	0	1
	P	0	0	0	1	0	1
	R	0	0	0	1	0	1
	G	0	0	0	0	0	0
ADO (Soil conservation)	S	2	0	1	1	1	5
	P	1	0	1	0	1	3

	R	3	1	2	1	1	8
	G	1	1	1	0	0	3
JE (Soil conservation)	S	2	1	0	0	0	3
	P	1	1	0	0	0	2
	R	2	3	1	1	0	7
	G	0	2	1	1	0	4
AEO (Soil conservation)	S	4	2	2	2	2	12
	P	4	0	0	1	0	5
	R	8	5	5	2	2	22
	G	4	3	3	0	0	10

Note: S – Sanctioned, P – Position, R – Required, G- Gap (R-S).

Source: Field Survey, 2007-08.

Table 5.11 Financial Estimates for Human Resources (Rs. Lakh)

Position	Kullu		Banjar		Naggar		Ani		Nirmand		District	
	G	Funds	G	Funds	G	Funds	G	Funds	G	Funds	G	Funds
1. Additional manpower		126		154.2		249.6		99.6		90		719.4
ADOs	1	15	1	15	1	15	1	15	1	15	5	75
AEOs	1	9	1	9	2	18	1	9	2	18	7	63
SMS (Horti)	0		0		1	18	1	18	0		2	36
HDOs	1	15	1	15	2	30	2	30	2	30	8	120
HEOs	2	18	3	27	2	18	2	18	3	27	12	108
Sr. Veterinary officers	0		1	27	1	27	0		0		2	54
Extension specialist for:												
Bee keeping	0		0		2	36	0		0		2	36
Mushrooms	1	18	0		1	18	0		0		2	36
Floriculture	0		0		1	18	0		0		1	18
ADO (Soil conservation)	1	15	1	15	1	15	0		0		3	45
JE (Soil conservation)	0		2	19.2	1	9.6	1	9.6	0		4	38.4
AEO (Soil conservation)	4	36	3	27	3	27	0		0		10	90
2. Capacity building of extension personnel @ 3%		3.8		4.6		7.5		2.5		3.1		21.5
Total (1+2)		129.8		158.8		240.4		85.9		92.7		741.0

Note: G- Gap, means additional requirement of human resources.

Source: Field Survey, 2007-08.

Table 5.12 Unemployment Status (No.)

Education	Sex	Kullu	Banjar	Naggar	Ani	Nirmand	District
Matriculate	M	3250	2790	4090	11040	4095	25265
	F	1370	2205	3140	7760	3152	17627
	T	4620	4995	7230	18800	7247	42892
Plus two	M	1780	3933	2670	2360	1852	12595
	F	870	3195	1510	1240	1007	7822
	T	2650	7128	4180	3600	2860	20418
Graduate	M	900	1620	1020	784	1300	5624
	F	390	765	480	336	598	2569
	T	1290	2385	1500	1120	1898	8193
Post graduate	M	350	477	320	352	669	2168
	F	160	180	240	152	338	1070
	T	510	657	560	504	1007	3238
Tech. trained	M	20	585	350	72	130	1157
	F	0	315	150	48	201	714
	T	20	900	500	120	331	1871

Note: M – Male, F – Female, T – Total

Source: Field Survey, 2007-08.

Table 5.13 Status of Enterprises

Enterprise		Block					District	Assistance Required	
Atta chakki		Kullu	Banjar	Naggar	Ani	Nirmand		Credit	Training
Existing	No. of units	6	3	1	1	1	12	√	
	Person employed	12	10	5	5	5	37		
	Investment (Rs. Lakh)	3.00	1.50	0.50	0.50	0.50	6.00		
	Prod kg/day	123	100	50	130	200	0		
Potential	No. of units	2	5	2	2	2	13	√	
	Employment	4	15	4	4	4	31		
	Investment (Rs. Lakh)	1.0	2.50	1.0	1.0	1.0	6.5		
Oil expeller									
Existing	No. of units	1	3	--	--	1	5	√	
	Person employed	5	3	--	--	1	9		
	Investment (Rs. Lakh)	1.50	1.50	--	--	0.70	3.70		
	Prod l/day	123	50	--	--	100	0		
Potential	No. of units	2	10	--	--	--	12	√	
	Employment	10	10	--	--	--	20		
	Investment (Rs. Lakh)	2.50	5.00	--	--	--	7.50		
Rice sheller									
Existing	No. of units	--	--	10	--	--	10	√	
	Person employed	--	--	10	--	--	10		
	Investment (Rs. Lakh)	--	--	0.10	--	--	0.10		
Potential	No. of units	--	--	--	--	--	--		
	Employment	--	--	--	--	--	--		
	Investment (Rs. Lakh)	--	--	--	--	--	--		
Bakery									
Existing	No. of units	3	1	4	1	1	10	√	
	Person employed	31	2	4	2	2	41		
	Investment	9.22	1.00	1.00	0.50	0.40	12.12		

	(Rs.Lakh)								
	Prod kg/day	39	22	35	25	20	0		
Potential	No. of units	5	5	--	--	--	10	√	√
	Employment	40	10	--	--	--	50		
	Investment (Rs. Lakh)	12.00	5.00	--	--	--	17.00		
Maize sheller									
Existing	No. of units	--	--	--	--	55	55	√	
	Person employed	--	--	--	--	110	110		
	Investment (Rs. Lakh)	--	--	--	--	1.00	1.00		
Potential	No. of units	--	--	--	--	--	--	√	
	Employment	--	--	--	--	--	--		
	Investment (Rs. Lakh)	--	--	--	--	--	--		
Vermi-compost									
Existing	No. of units	30	15	70	2	10	82	√	√
	Person employed	30	15	70	1	15	86		
	Investment (Rs. Lakh)	0.80	0.45	2.00	0.03	1.50	4.78		
	Prod. t/season	80	40	15	2	10	0		
Potential	No. of units	150	100	100	130	30	108	√	√
	Employment	15	200	350	3	30	368		
	Investment (Rs. Lakh)	5.00	6.00	5.18	2.00	3.00	21.18		
Mushroom compost									
Existing	No. of units	1	--	--	1	--	2	√	
	Person employed	10	--	--	1	--	11		
	Investment (Rs. Lakh)	10	--	--	1.00	--	11.00		
	Prod. kg/season	--	--	--	20	--	0		
Potential	No. of units	--	25	--	2	--	27	√	√
	Employment	--	50	--	4	--	54		
	Investment (Rs. Lakh)	--	25.00	0.22	2.00	--	27.22		
Rural craft									
Existing	No. of units	5	--	--	2	2	9	√	
	Person employed	41	--	--	16	4	51		

	Investment (Rs. Lakh)	16.78	--	--	10.00	10.00	36.78		
Potential	No. of units	3	--	--	--	--	3	√	√
	Employment	25	--	--	--	--	25		
	Investment (Rs. Lakh)	15.00	--	--	--	--	15.00		
Nursery raising									
Existing	No. of units	--	9	20	2	1	32	√	√
	Person employed	--	45	130	21	20	216		
	Investment (Rs. Lakh)	--	2.00	5.00	0.24	0.20	7.44		
	Prod. Plants/season	--	9000	15000	111595	1000	0		
Potential	No. of units	13	20	10	20	--	143	√	√
	Employment	20	100	560	20	--	700		
	Investment (Rs. Lakh)	10.00	10.00	0.67	10.00	--	30.67		
Feed mill									
Existing	No. of units	1	--	--	--	--	1		
	Person employed	20	--	--	--	--	20		
	Investment (Rs. Lakh)	5.0	--	--	--	--	5.0		
Potential	No. of units	--	1	--	--	--	1	√	
	Employment	--	10	--	--	--	10		
	Investment (Rs. Lakh)	--	2.00	--	--	--	2.00		
Fruit and vegetable processing									
Existing	No. of units	1	--	1	--	--	2	√	
	Person employed	15	--	15	--	--	30		
	Investment (Rs. Lakh)	46.00	--	40.00	--	--	86.00		
Potential	No. of units	3	1	--	1	1	6	√	√
	Employment	36	10	--	5	4	55		
	Investment (Rs. Lakh)	150.00	5.00	0.75	2.00	2.00	159.75		
Pickles/squashes									
Existing	No. of units	3	--	1	--	--	4		√
	Person employed	45	--	15	--	--	60		
	Investment	1.50	--	0.50	--	--	2.0		

	(Rs. Lakh)								
Potential	No. of units	--	2	--	1	2	5	√	√
	Employment	--	20	--	36	10	36		
	Investment (Rs. Lakh)	--	1.00	--	2.00	4.00	7.00		
Pulse processing									
Existing	No. of units	--	--	--	--	--	--		
	Person employed	--	--	--	--	--	--		
	Investment (Rs. Lakh)	--	--	--	--	--	--		
Potential	No. of units	--	10	--	--	--	10	√	√
	Employment	--	50	--	--	--	50		
	Investment (Rs. Lakh)	--	5.00	--	--	--	5.00		
Beekeeping equipments									
Existing	No. of units	--	--	--	--	--	--		
	Person employed	--	--	--	--	--	--		
	Investment (Rs. Lakh)	--	--	--	--	--	--		
Potential	No. of units	--	1	--	--	--	1	√	√
	Employment	--	1	--	--	--	1		
	Investment (Rs. Lakh)	--	1.00	--	--	--	1.00		
Honey processing									
Existing	No. of units	1	--	--	--	--	1		
	Person employed	15	--	--	--	--	15		
	Investment (Rs. Lakh)	0.5	--	--	--	--	0.5		
Potential	No. of units	5	5	--	--	--	10	√	√
	Employment	50	50	--	--	--	100		
	Investment (Rs. Lakh)	2.50	2.50	--	--	--	5.0		
Wool carding									
Existing	No. of units	60	--	--	--	--	60	√	
	Person employed	512	--	--	--	--	512		
	Investment (Rs. Lakh)	68.73	--	--	--	--	68.73		
Potential	No. of units	20	2	--	--	--	22	√	√

	Employment	160	10	--	--	--	170		
	Investment (Rs. Lakh)	40.00	2.00	--	--	--	42.00		
Cotton carding									
Existing	No. of units	3	--	--	--	--	3	√	
	Person employed	18	--	--	--	--	18		
	Investment (Rs. Lakh)	12.14	--	--	--	--	12.14		
Potential	No. of units	--	--	--	--	--	--		
	Employment	--	--	--	--	--	--		
	Investment (Rs. Lakh)	--	--	--	--	--	--		
Shawl, woolen garments									
Existing	No. of units	--	18	20	1	--	39	√	
	Person employed	--	100	115	2	--	217		
	Investment (Rs. Lakh)	--	0.32	0.40	0.20	--	0.92		
	Prod. shawls/season	--	4000	4500	500	--	0		
Potential	No. of units	--	50	--	1	--	51	√	√
	Employment	--	250	--	2	--	252		
	Investment (Rs. Lakh)	--	1.00	--	1.00	--	2.00		
Essential oil extraction									
Existing	No. of units	1	--	1	--	1	3		
	Person employed	10	--	10	--	10	30		
	Investment (Rs. Lakh)	5	--	5	--	5	15		
Potential	No. of units	1	--	1	--	1	3		
	Employment	10	--	10	--	10	30		
	Investment (Rs. Lakh)	5	--	5	--	5	15		

Source: Field Survey, 2007-08.

Table 5.14 Potential Enterprises for Unemployed and Assistance Required

Enterprise	Mandays/year	Assistance	
		Training	Credit
Agro-based processing unit	720	√	√
Vegetable nursery raising	600	√	
Agro-tourism	550		√
Floriculture	500	√	√
Fruit production	3085	√	√
Mushroom cultivation	1765	√	√
Value addition	240	√	√
Small scale industries	1150	√	√
Marketing & market intelligence	300	√	
Bee Keeping	1540	√	
Vegetable production	3310	√	
Medicinal & aromatic plants	1270	√	√
Processing unit	1170	√	√
Off Season & exotic vegetable production	800	√	√
Horticulture nursery raising	300	√	√
Hand looms and handicraft	550	√	√
Dairy	510	√	
Training & pruning	300	√	
Agro- services	150	√	
Organic farming	1150	√	

Source: Field Survey, 2007-08.

Table 5.15 Agribusiness Establishments (No.)

Agri-business	Kullu			Banjar			Naggarr			Ani			Nirmand			District		
	E	R	G	E	R	G	E	R	G	E	R	G	E	R	G	E	R	G
Agro sale centres	294	394	100	7	9	2	40	50	10	6	8	2	37	40	3	384	501	117
PACS	36	40	4	60	80	20	8	20	12	22	32	10	--	--	--	126	172	46
Rural handicraft																		
Public	95	100	5	10	20	10	0	50	50	--	--	--	--	--	--	105	170	65
Private	--	--	--	--	--	--	88	100	12	11	20	9	--	--	--	99	120	21
Cooperatives																		
Public	1	2	1	15	20	5	1	10	9	--	1	1	--	--	--	17	33	16
Private	0	2	2	15	20	5	0	1	1	--	0	0	--	--	--	15	23	8
Farmers co-operatives	36	43	7	13	15	2	1	20	19	--	2	2	1	10	8	51	90	39
Others	20	50	30	--	--	--	--	--	--	--	--	--	--	--	--	20	50	30

Note: E-Existing; R-Required; G-Gap.

Source: Field Survey, 2007-08.

Table 5.16 Drudgery of Women (Per Cent Response)

Particular	Mode of operation	Kullu	Banjar	Naggar	Ani	Nirmand	District
Agricultural operations							
	Clod breaking						
	Manually	45.97	58.57	100	68.11	54.45	65.42
Paddy transplanting	Using digging hoe						
	Manually	-	-	100	100	98.28	59.66
	Manuring & fertilization						
	Manually	56.36	50	100	30.94	49.18	57.30
Intercultural operations	Power machinery						
	Manually	61.98	74.59	100	48.11	77.61	72.46
	Power machinery						
Threshing & winnowing	Manually	45.47	77.55	43.08	77.17	40	56.65
	Power machinery						
Livestock rearing operations							
Fodder resources	Cultivated	67.95	92.45	91.2	10.4	15.9	55.58
	Ghasni	55.5	100	13.04	89.6	62.76	64.18
	Both						
Fodder cutting	Traditional tools	100	73.97	100	93.66	91.15	91.75
	Improved tools	-	26.03	-	6.34	8.85	8.24
Fodder transportation	On head/backload	61.75	100	100	100	84.88	89.33
	Tractor-trolley						
Fodder chaffing	Chaff cutter	5	-	-	10	6.56	7.19
	Without chaff-cutter	95	100	100	90	87.5	94.5
Feeding system	Inside manger	12.33	17.6	3.64	7.02	10	10.20
	On floor	87.97	94.64	97.4	91.95	81.73	90.74
Feeding practices	Stall feeding	42.12	20	87.61	50.72	50.28	50.146
	Grazing	28.76	30	33.92	49.28	31.06	34.60
	Both						

Animal waste disposal	Bio-gas plant							
	Head/back-load to field	96	47.25	-	85.43	82.2	62.18	
	FYM	48.8	76.43	100	14.57	14.76	50.91	
Cleaning of animals & sheds	Manually	100	100	100	100	68.63	93.73	
	Water pressure jet							
Milking operation	Hand milking	100	100	100	100	98.81	99.76	
	Machine milking							
	Within village	21.1	-	89.76	41.82	25	35.53	
Selling of milk	Distant market	12.57	12.78	16.52	69.51	75	37.27	
	Manually	84.2	83.34	73.97	100	95.24	87.35	
Churning of milk	Using machine	16.8	19.11	28.11	0	-	12.80	
	Natural service	34.77	26.75	50	70	29.39	42.18	
Breeding methods	AI	65.23	73.25	50	30	70.61	57.82	
Animal shed	Kachha	96.65	90.36	77.83	97.32	62.39	84.91	
	Pucca	3.35	9.64	22.17	2.68	37.61	15.09	
Animal shed floor	Kachha	80.52	90.36	85.85	97.32	82.84	87.38	
	Pucca	19.48	9.64	14.15	2.68	17.16	12.62	

Source: Field Survey, 2007-08.

Table 5.17 Livestock Feeding Practices (Kg/animal/day)

Type of animal	Fodder/feed	Kullu	Banjar	Naggar	Ani	Nir mand	District
Crossbred cows	Green fodder	19.69	16.36	15.44	12.56	44.79	21.76
	Dry fodder	9.11	2.53	10.26	4.19	22.39	9.69
	Concentrate	2	1.5	1.59	0.84	2.7	1.72
Local cow	Green fodder	8.94	7.08	14.41	3.89	15	9.86
	Dry fodder	5.34	2.43	9.25	1.56	9.45	5.60
	Concentrate	1.25	0.61	0.72	0.39	1	0.79
Buffaloes	Green fodder	-	-	-	-	-	-
	Dry fodder	17.5	-	-	-	-	3.5
	Concentrate	3	-	-	-	-	0.6
Young stock	Green fodder	7.67	3.24	5	5.57	4	5.09
	Dry fodder	4.22	1.5	5.77	5.93	5	4.48
	Concentrate	-	-	2.42	-	-	0.48
Bullocks	Green fodder	13.96	14.99	10.88	8.69	7	11.10
	Dry fodder	10.27	3.52	14.58	11.31	10	9.93
	Concentrate	-	-	7.16	-	-	1.43
Goats	Green fodder	-	-	3	-	-	0.6
	Dry fodder	0.5	1	1.5	1	2.5	1.2
Sheep	Green fodder	-	-	1.52	-	-	0.30
	Dry fodder	1.5	1	2	2.5	1.2	1.64
	Concentrate	-	-	0.03	-	-	0.006
Poultry	Concentrate	0.12	0.8	0.1	-	0.13	0.212
	Minerals	2	1.5	2.5	-	1.8	1.56
Equines	Green fodder	4.32	5.5	5	4.5	-	3.86
	Dry fodder	3.74	1.5	2.86	3	-	2.22
	Concentrate	-	-	3.14	-	-	0.63
Unproductive	Green fodder	2.69	3.72	5.3	2	2.71	3.28
	Dry fodder	4.18	2	6.1	2.73	2.29	3.46
	Concentrate	-	-	2.4	-	-	0.48

Source: Field Survey, 2007-08.

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

Fruit crop	Kullu			Banjar			Naggar		
	A	P	G	A	P	G	A	P	G
Apple	125.42	250	124.58	129.44	250	120.56	120.92	250	129.08
Pomegranate	180	225	45	150	200	50	150	280	130
Mango									
Citrus									
Stone fruits (peach, plum, apricot)	125	175	50	163.74	250	86.26	243.69	300	56.31
Pear	75	100	25	81.93	200	118.07	88.66	187	98.34
Others (Kiwi)	200	300	100	150	210	60	212	250	38

Table Yield 5.18 contd..

Fruit crops	Ani			Nirmand			District		
	A	P	G	A	P	G	A	P	G
Apple	185.25	250	64.75	156.4	250	93.6	132.36	250.00	117.64
Pomegranate	150	200	50	120	150	30	158	216.41	58.41
Mango				12.5	19	6.5	12.5	19	6.5
Citrus				10	12.5	2.5	10	12.5	2.5
Stone fruits (peach, plum, apricot)	100	150	50	110	140	30	157.46	218.32	60.86
Pear				84	125	41	84.78	174.46	89.68
Kiwi							190.60	269.26	78.66

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

Source: Field Survey, 2007-08.

Table 5.19 Livestock Production Estimates

Product/type of animal	Kullu			Banjar			Naggar			Ani			Nirmand			District		
	A	P	G	A	P	G	A	P	G	A	P	G	A	P	G	A	P	G
Milk (L/day)																		
Crossbred cows	5.7	14	8.3	4.44	8	3.56	6.63	14	7.37	5.1	9	3.9	5.8	10	4.2	6.08	11	4.92
Local cow	1.37	5	3.63	1.96	4	2.04	1.59	4.5	2.91	1.33	4	2.67	1.58	3	1.42	1.57	4.1	2.53
Buffalo	8	15	7	0	0	0	0	0	0	0	0	0	0	0	0	8	15	7
Goats				0	0	0	2	2	0	0	0	0	0	0	0	2	2	0
Wool (Kg/yr/sheep)																		
Sheep	1.93	3	1.07	1.18	2	0.82	1.33	2	0.67	1.2	2	0.8	1	2	1	1.59	2.56	0.97
Poultry (Eggs/yr/bird)	138	180	42	95	120	25	146	190	44	0	0	0	100	100	0	116	118	2

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

Source: Field Survey, 2007-08.

Table 5.20 Varietal and Technological Problems and Interventions for Fruit Crops (Per Cent of Panchayats)

Crop/ problem	Intervention	Kullu	Banjar	Naggar	Ani	Nirmand
Apple						
Root -rot	Training on plant protection		100	75		75
Root borer	Training on plant protection	100	75		50	75
Collar rot	IPM strategies be followed	71		75	50	50
Canker	Spray schedule suggested by UHF Solan be followed		75		25	
Sanjose scale	Spray schedule suggested by UHF Solan be followed	86	75	50	25	25
Faulty training & pruning (T&P)	Proper training & pruning	86		75	75	75
Mites & thrips	Training on plant protection		50		25	
Woolly aphids	Training on plant protection	42		50	25	50
Low percentage of pollinizers	Maintaining proper ratio of pollinizers	57	100	75		50
Scab	Training on scientific management	42	50	25		25
Non-availability of quality planting material	Planting material be availed from university/ department	57	75	50		50
Non-availability of recommended pesticides	Timely availability of chemicals on subsidized rates be ensured	86	75	50		50
Poor fruit setting	Introduction of bees	42	75	25		25
Damage from hail stones	Anti hail nets/ guns	28	50	50		50
Mango						
Die back	Training on scientific management					75
Fruit fly	Training on scientific management					75
Frost in low valley						50

areas									
Citrus									
Diamond back moth	Training on scientific management								50
Die back	Training on scientific management								25
Stone fruits									
Canker	Spray schedule suggested by UHF Solan be followed	86	75				75		75
Termite	Training on termite control	71				75		50	50
Low yield	Introduction of new varieties and encouragement for area expansion		50			50			50
Poor management	Training on scientific management	57				25			25
Pomegranate									
Attack of anar butterfly	Training on IPM	100	100			75		75	100
Fruit cracking	Encouragement for area expansion	87	75					50	75
Kiwi									
Small size of the fruit	Treatment with recommended chemical for maintaining size	86	100			75			
Faulty T&P	Demonstration on T&P	71	75			25			

Source: Field Survey, 2007-08.

Table 5.21 Incidence and Mortality of Livestock Diseases (Per Cent)

Type of animal/ disease	Kullu		Banjar		Naggar		Ani		Nirmand		District	
	I	M	I	M	I	M	I	M	I	M	I	M Treat. Avail.
Cattle and Buffaloes												
a. FMD	15	2	40	2	15	2	15	2	20	2	21	2 Y
b. Hemorrhagic septicemia	7	1	20	5	5	2	7	1	10	0	8	2.25 Y
c. Tympny	20	2	30	10	5	0	20	2	20	5	19	4.75 Y
d. Pneumonia	15	3	50	30	10	0	15	3	10	7	20	10.75 Y
e. Diarrhoea/dysentery	30	5	60	10	15	0	30	5	70	0	41	6.67 Y
f. Calf scour	10	1	50	8	5	2	10	1	12	1	15	2.6 Y
g. Endoparasites	60	0	90	0	10	0	100	0	35	0	59	-- Y
h. Ectoparasites	85	0	90	2	10	0	80	0	90	0	71	2 Y
i. Repeat breeding	25	0	30	0	15	0	25	0	40	0	27	-- Y
j. Enzootic bovine haematuria	--	--	20	0	10	2	10	2	--	--	2	2 Y
k. Retention of urine	--	--	--	--	12	1	--	--	--	--	10	1 Y
Sheep & Goats												
a. PPR/CCPP	15	8	30	6	15	7	15	8	5	10	16	7.8 Y
b. Mange	80	10	50	10	10	10	35	0	10	8	29	9.5 Y
c. Lice and ticks	100	3	60	10	10	0	40	0	80	0	50	6.5 Y
d. Endoparasites	95	15	90	3	10	0	35	0	85	0	56	9.0 Y
e. Diarrhoea/dysentery	40	10	40	10	10	0	50	2	70	2	32	12.0 Y
Poultry												
a. Coccidiosis	10	10	--	--	10	8	--	--	--	--	4	9.0 Y
b. Ranikhet disease	--	--	--	--	10	8	--	--	--	--	2	8 Y
c. Fowl pox	--	--	--	--	10	6	--	--	--	--	2	6 Y

d. Merek's disease	--	--	--	--	--	5	50	--	--	--	--	10	5	Y
Equine														
a. Respiratory distress	40	10	40	30	12	0	12	30	--	--	--	18.4	20	Y
b. Colic	60	8	30	20	5	2	5	20	--	--	--	29	10	Y
c. Internal parasites	100	10	60	12	10	0	10	12	--	--	--	72	11	Y
d. Ectoparasites	--	--	--	--	10	0	10	--	--	--	--	2	--	Y
Rabbits														
a. Pneumonia	25	15	--	--	20	10	20	--	--	--	--	9	12.5	Y
b. Diarrhoea	20	5	--	--	20	10	20	--	--	--	--	8	7.5	Y
c. Ear canker	30	5	--	--	5	0	5	--	--	--	--	7	5	Y
d. Mange	10	2	--	--	10	0	10	--	--	--	--	4	2	Y
e. Scabies	--	--	--	--	10	0	10	--	--	--	--	10	0	Y

Note: Infected, M-Mortality, Y- Yes

Source: Field Survey, 2007-08.

**Table 5.22 Interventions for Livestock Disease Management and Financial Estimates.
(Rs. Lakh)**

Type of animal	Disease/intervention	Kullu	Banjar	Nagggar	Ani	Nirmand	District
Cattle and buffaloes	a. FMD 1. Vaccination 2. Proper quarantine measures	23.0	19.0	17.0	15.0	15.0	89
	b. Hemorrhagic septicemia 1. Vaccination 2. Proper quarantine measures 3. Availability of medicines	18.0	15.0	15.0	13.0	11.0	72
	c. Tympany 1. First aid to animals 2. Knowledge about Prophylactic measures 3. Deworming 4. Proper feeding 5. Knowledge about scientific management 6. Training programmes	8.0	5.0	7.0	2.0	5.0	27
	d. Pneumonia 1. First aid to animals 2. Medicare 3. Proper feeding 4. Knowledge about prophylactic measures 5. Cleanliness of animals & sheds 6. Training programmes	10.0	9.0	10.0	3.0	6.0	38
	e. Diarrhoea/ dysentery 1. Routine deworming 2. First aid to animals 3. Proper feeding 4. Cleanliness of animal & sheds 5. Knowledge about etiological factors	8.0	7.0	9.0	6.0	6.0	36
	f. Calf scour 1. Medicare 2. Cleanliness in animal shed 3. Training camps 4. Measures to check occurrence	7.0	5.0	8.0	4.0	4.0	28
	g. Endoparasites 1. Medicare 2. Routine deworming	12.0	6.0	10.0	9.0	7.0	44

	h. Ectoparasites 1. Ventilation & cleaning of shed 2. Training programme 3. Availability of drugs 4. Better housing	14.0	9.0	10.0	9.0	7.0	49
	i. Repeat breeding 1. Better AI services 2. Cleanliness 3. Knowledge about balanced ration 4. Regular clinical camps 5. Routine deworming 6. Maintenance of reproductive health of animal	14.0	12.0	15.0	9.0	10.0	60
	j. Enzootic bovine haematuria 1. Medicare 2. Knowledge about scientific management		9.0	9.0	9.0		27
	k. Retention of urine 1. Treatment 2. Balanced feeding			8.0			8
Sheep & goats	a. PPR/CCPP 1. Vaccination 2. Availability of medicines	15.0	15.0	9.0	11.0	10.0	60
	b. Mange 1. Dipping 2. Medicare 3. Knowledge about regular use of endectocides	6.0	9.0	8.0	10.0	9.0	42
	c. Lice and ticks 1. Proper deworming 2. Control of ectoparasites 3. Dipping & drenching	8.0	8.0	8.0	8.0	8.0	40
	d. Endoparasites 1. Proper deworming 2. Drenching 3. General awareness	6.0	9.0	5.0	10.0	8.0	38
	e. Diarrhoea/ dysentery 1. Awareness about regular deworming 2. Medicare	4.0	6.0		7.0	7.0	24
	f. Retained placenta 1. Medicare 2. Vaccination schedule should be followed			5			5

Poultry	a. Coccidiosis 1. Knowledge about use of coccidiostats 2. Knowledge about prophylactic measures	7.0					7
Equine	a. Respiratory distress 1. Awareness about the causes of disease & prophylactic measures 2. Knowledge about protection from internal parasites 3. Proper nutrition to animals & cleanliness	6.0					6
	b. Colic 1. Awareness about the causes of disease & prophylactic measures 2. Knowledge about protection from internal parasites 3. Proper nutrition to animals & cleanliness	3.0					3
	c. Internal parasites Routine deworming	2.0					2
Rabbits	a. Pneumonia b. Diarrhoea c. Ear canker d. Mange 1. Good feeding practices 3. Quarantine measures	3.0		5.0			8
Total		174	143	158	125	113	713

Source: Field Survey, 2007-08.

Table 5.23 Financial Estimates for Marketing Infrastructure of Livestock Products (Rs. Lakh)

Block	Cold storage		Chilling plants		Refrigerated vans		Packaging machines		Baling machine		Wool sorting machine	
	No.	Funds	No.	Funds	No.	Funds	No.	Funds	No.	Funds	No.	Funds
Kullu	2	6.00	2	46.00	2	20.00	2	10.00	1	3.00	1	12.00
Banjar	1	3.00	1	23.00	1	10.00	1	5.00	1	3.00	1	12.00
Naggar	1	3.00	1	23.00	1	10.00	1	5.00	1	3.00	1	12.00
Ani	1	3.00	1	23.00	1	10.00	1	5.00	1	3.00	1	12.00
Nirmand	1	3.00	1	23.00	1	10.00	1	5.00	1	3.00	1	12.00
District	6	18.00	6	138.00	6	60.00	6	30.00	5	15.00	5	60.00

Table 5.23 (contd.)

Block	Cheese making machine		Milk powder machine		Paneer making machine		Total Funds
	No.	Funds	No.	Funds	No.	Funds	
Kullu	10	2.5	5	5	10	1	105.50
Banjar	8	2.00	5	5	10	1	64.00
Naggar	8	2.00	5	5	10	1	64.00
Ani	8	2.00	5	5	10	1	64.00
Nirmand	8	2.00	5	5	10	1	64.00
District	42	10.50	25	25	50	5	361.50

Source: Field Survey, 2007-08.

Table 5.24 Constraints, Interventions and Financial Estimates for Cultured Fisheries (Rs. Lakh)

Constraint	Intervention	Kullu	Banjar	Naggar	Ani	Nirmand	District
High construction cost of raceways	50% financial assistance for the construction of raceways.	30.10	24.50	41.30	5.60	3.50	105
Costly seed	50% financial assistance in 1 st year	70.00	58.50	98.50	13.50	8.50	249
Costly feed	50% financial assistance in 1 st year	52.00	42.40	71.20	9.60	4.00	179.20
Lack of knowledge in trout culture	Training & exposure visits	15.00	15.00	15.00	8.00	8.00	61
Lack of marketing knowledge	Training & exposure visits	7.00	7.00	7.00	7.00	0.50	28.50
Non availability of farm equipments & chemicals	Provision of farm equipments locally	0.50	0.50	0.50	0.50	0.40	2.40
Perishability	Provision of thermo coal box & ice for safe transportation	2.00	2.00	2.00	0.40	0.40	6.60
Total		176.60	149.9	235.5	44.60	25.30	631.70

Note: No medication is required to control the disease incidence in fisheries as the disease incidence is below economic threshold level. Only prophylactic measures are to be adopted to control diseases, which have been covered under constraints and interventions.

Source: Field Survey, 2007-08.

Chapter VI

DISTRICT PLAN

The detailed description of the district in terms of different parameters like location, climate, rainfall, temperature, soils, forests, flora and fauna, population, literacy, water resources, basic infrastructural facilities, analysis of strengths, weaknesses, opportunities and threats (SWOT) and existing status of agricultural and allied sectors like crop production, horticulture, animal husbandry, fisheries, beekeeping, mushroom cultivation, and so on have thrown up numerous valuable insights about the existing status in terms of yield gaps, constraints and interventions to realize the potential of agricultural development in the district. Likewise, the analysis has also brought out potential for irrigation development, water harvesting and requirement for infrastructural facilities like rural roads and rural markets to accelerate growth in agriculture and allied sectors. The present chapter gives the financial estimates of the plan along with their sectoral and yearly allocation, new schemes/works that are proposed in the plan, projected growth rates of production of food grains, vegetables, fruits and milk, projected input requirement, growth drivers and vision for the next plan.

6.1 Plan Estimates

The details about the total plan outlay and its sectoral allocation and yearly distribution are given in Table 6.1. The total plan outlay is 413.38 crores out of which around 5.22 per cent is earmarked for crop sector to bridge the gaps between the average and potential yields by undertaking measures like promotion of high yielding variety seeds, improvement of soil health, protection of crops against biotic and abiotic stresses, promoting water use efficiency, and so on. The most important feature of the plan is that as high as 64.6 per cent of the total plan outlay is earmarked for infrastructure development which is focused at irrigation development both through developing major, medium and minor irrigation schemes and water harvesting through watershed development programmes, improvement in road connectivity and development of rural markets. An understanding of the grass root realities and interactions with farmers in different parts of the state reveal that lack of irrigation, road connectivity and insufficient & inefficient rural markets are some of the

formidable constraints in the ongoing process of agricultural development. The development of irrigation potential is expected to give a big fillip to the overall development of agricultural sectors including livestock and horticulture. Natural resource conservation is also one of the vital factors for the sustainable development of all the sectors and has been allocated 18.4 per cent of the total budget. Nearly 5.7 per cent of the plan outlay is earmarked for the development of livestock sector while horticulture sector accounts for nearly 3 per cent. It needs to be mentioned here that a huge amount of investment is also being made in the horticultural sector under National Horticulture Mission. Over the five year period, the plan outlay has been allocated in the proportion of 15 per cent for the first year of the plan, 20 per cent for the next three years and the remaining 25 per cent is proposed to be spent in the fifth year of the plan.

6.2 Innovative Schemes

As a result of PRA with the panchayat level functionaries, the progressive farmers and NGOs etc. the following innovative schemes have been identified for accelerating growth in agriculture sector and of the whole economy. The innovative schemes for agriculture and rural development and irrigation development have been given in Table 6.2 and Table 6.3. The financial estimates for such innovative schemes have been given in Table 6.1. The innovative schemes include:

- Quality seed production of suitable crops.
- Organic cultivation of vegetables, pulses and spices and promotion of vermiculture.
- Creation of water harvesting structures like ponds, check dams, etc.
- Provision of irrigation through the development of major and minor *Kuhls* from the potential sources and incentives for the development of micro irrigation structures namely sprinkler, drip and tank structures, at individual farmer level.
- Natural resource (soil, land and water) conservation and resource use efficiency.
- Protection of crops against biotic and abiotic stresses.
- Exotic vegetable cultivation, mushroom cultivation, floriculture and beekeeping.
- Cultivation of market/climate oriented horticultural crops/cultivars, zero energy cool storage structures and installation of modern scientific equipment—anti-hail guns/nets etc.

- Trout fish farming through pond construction and provision of fish seed & feed.
- Livestock development (management/improvement and fodder development, supply of feed kits, efficient veterinary services).
- Diversified farming through protected cultivation.
- Agro tourism.
- Development of rural infrastructure (rural markets, rural roads, bridges and ropeways etc.) and market intelligence services.
- Agricultural mechanization (incentives on improved tools and hill specific machinery like power tillers, tractors, crop planters/harvesters, sprayers, clod breakers, chaff cutters, milk churners etc.) to reduce women drudgery.

6.3 Prioritisation of Schemes

Various schemes for the development of agriculture, horticulture, animal husbandry and other sectors that were identified through PRA technique have been shown in Table 6.4. These schemes have been enlisted below.

Agriculture

1. Improvement /enhancement in irrigation facilities
2. Training on scientific crop production
3. Promotion and use of hybrid/improved varieties
4. Strengthening of market information and intelligence
5. Assured and timely availability of recommended seed, fertilizers and other inputs
6. Crop diversification

Horticulture

1. Demonstration and training programmes for proper training, pruning and spray schedule
2. Ensuring proper ratio of pollinizers in the orchards
3. Provision of planting material of new/ improved crops/varieties
4. Expansion of area under crops like pomegranate, pear, plum and apricot
5. Strengthening of market infrastructure and improving market information among farmers
6. Provision of subsidy on critical inputs

Animal Husbandry

1. Provision of veterinary dispensaries within accessible distance
2. Awareness and training about scientific management
3. Efficient A.I. services
4. Replacement of local breeds with improved ones
5. Encouraging balanced feeding by providing quality feed and fodder
6. Control of diseases and parasites of animals

Other Enterprises

Among other enterprises following were the suggested priority areas

1. Exotic vegetable cultivation
2. Rainwater harvesting
3. Mushroom cultivation
4. Lift irrigation schemes
5. Nursery raising in horticulture and vegetables
6. Cultivation of medicinal and aromatic plants
7. Bee keeping

6.4 Projected Outcomes, Growth Rates and Input Requirement

The implementation of the proposed plan is expected to accelerate the pace of agricultural development in the district. Assuming that the assured irrigation facilities are provided by harnessing the irrigation potential and harvesting rain water, the food grains production is expected to grow at a rate of 4.66 per cent per annum. Likewise, the augmentation of land and water resources shall have significant impact on enhancing productivity of these scarce resources. The detailed outcomes are listed below.

- Food grain production shall increase from 99,812 metric tons to 1,12,888 metric tons after the implementation of the plan recording a growth rate of 2.62 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 food grains production shall be 1.85 per cent per annum.

- Production of vegetables would increase from 89,944 metric tons to 1, 52,207 metric tons in scenario I registering a growth rate of 13.84 per cent per annum when the proportion of area under these crops remains same and to 1, 95,131 metric tons recording a growth rate of 23.89 per cent per annum in scenario II when 20 per cent of the irrigated area is brought under these crops. This will generate a marketable surplus of 1,75,619 metric tons which in monetary terms amounts to Rs. 175.62 crores.
- The apple production in the district will increase at the rate of 7.68% per annum. Stone fruits like apricot, plum, peach etc. are the other important fruits of the area. The production of these fruits shall increase at the rate of 5.43% per annum. Similarly, the production of other fruits viz., pomegranate, kiwi, pear,(mango and citrus in Nirmand block) is expected to rise from 17,342 metric tonnes to 40,991 metric tonnes thus giving a growth rate of 11.36% per annum (Table 6.8).
- The milk production from crossbred cows will increase at the rate of 16.17% per annum as a result of the implementation of the plan. The milk production from indigenous cows as well is expected to rise from 6,705.7 metric tonnes to 17,514.4 metric tonnes thus enabling it to grow at the rate of 32.23% per annum (Table 6.10).
- Sheep are maintained for both meat and wool purpose. The wool production is expected to increase by 12.22% per annum. The number of sheep and goats sold for meat purpose will increase by 1.51% per annum. Honey production will increase by 3-4 times.
- Irrigation potential will be created which will provide irrigation to an area of 3,923 hectares.
- Available water potential will be exploited and thereby 3,923 hectares of land will be brought under protective and assured irrigation.
- With the implementation of plan 20.58 per cent of the arable land will have assured irrigation facilities compared to existing 9.83 per cent.
- Land amounting to 10,951 hectares infested with soil erosion, stream bank erosion, etc., will be treated by adopting soil conservation measures.
- The projected sectoral growth rates are 13.38 per cent for agriculture, 16.24 per cent for horticulture and 16.83 per cent for animal husbandry. The overall agricultural

growth rate is projected at 15.48 per cent per annum during the plan period (Table 6.12).

- Support land (private grasslands) of 555 hectares will be treated against invasive weeds and shrubs (Table 6.13). This will improve the fodder production to the approximate level of 55.5 metric tons.
- The projections for different fertilizers are given in Table 6.14. The projected demand for 2012-13 w.r.t. urea, 12:32:16, Kisan khad (15:15:15) and MOP is 3,855; 3,712; 2,594 and 1,500, respectively

6.5 Growth Drivers

- In order to increase area under irrigation, various location specific irrigation projects/schemes viz., lift irrigation, flow irrigation, tank irrigation, ground water irrigation, rain-water harvesting etc., are required to be launched.
- Available irrigation water can be used efficiently by employing micro irrigation like drip or sprinkler irrigation systems.
- For diversification in agriculture, we need new/ improved crops/ varieties, improved inputs, technical know-how, credit facilities, markets, roads, transport facilities, market intelligence, processing facilities and regulatory framework etc., to be provided to the farmers.
- For making the dairy industry more remunerative, local breeds warrant replacement with the improved ones. Better AI services by opening more veterinary dispensaries, assured availability of quality feed in the market, development of pastures and improving the nutritional qualities of fodders, education for balanced feeding, pest management, value addition and marketing need special attention.
- Financial and technical guidance is required to be provided in order to establish small scale processing units at farmers/ farmers' cooperatives/self help groups (SHGs)/farmers' interest groups (FIGs) level.
- Human resource requirement in various research, extension and developmental departments/agencies should be met.

- Need based training to the extension personnel within and outside the country is also imperative for improving extension services.
- For the growth of horticultural sector, again new/improved crops/varieties, technical know-how, availability of recommended inputs, roads, storage facilities, markets, market information and intelligence are important factors.
- For adoption and growth of other enterprises like mushroom cultivation, pisciculture, floriculture, medicinal plants, bee keeping etc., motivation, training, credit facilities, market for inputs and outputs are the major growth drivers.
- For attaining quality of production, better productivity and controlled cost of production, adoption of new/improved/scientific techniques should be exhorted and encouraged in all enterprises and sectors.
- For sustainable growth of all the sectors, research institutions must be provided with sufficient resources (human as well as financial) to take up the researchable issues.

6.6 Vision of Next Plan

The implementation of the proposed plan in its entirety shall accelerate the ongoing process of crop diversification promoting the cultivation of vegetables, pulses, spices, fruits medicinal & aromatic plants, floriculture and exotic vegetables. This will enable the district to sustain as well as enhance the production of vegetables, fruits and other cash crops strengthening the economy of the populace. Irrigation potential will be boosted through various irrigation schemes, which is expected to stabilize the productivity of different crops and enhance the acreage under cash crops. Diversification in horticulture, keeping in view the climate change scenario, will bring sustainability to the sector. Introduction of improved varieties/root stocks of apple will help in improving and sustaining the apple production. Productivity as well as quality of fruits produced will be improved. Two times increase in the productivity is expected. The condition of existing orchards will improve and their productive life will be increased which will considerably check the declining rate of productivity. Studies on bio-control agents, bio-fertilizers and organic manures will bring out important technical input for organic farming, which is the need of the hour. Organic cultivation of vegetables, spices, pulses, medicinal and aromatic plants/herbs can further

boost the income of the farmers as the organic produce can be sold at a premium price both in the domestic and international markets. Likewise, improving rural connectivity and providing marketing infrastructure shall encourage the production of cash crops and enhance the returns to the producers.

With the implementation of the proposed plan the honey production will be increased 3-4 times. Pollination services provided by bee colonies will raise the productivity of all the cross-pollinated crops manifold. For example, the productivity of apple has been reported to increase by 180-6950% by keeping bee colonies in the orchards. Promotion of bee keeping will help generate income and employment by various means viz., rental pollination, sale of honey and bee colonies, supply of equipments, transportation of bee colonies for migratory bee keeping, rent of land for keeping colonies etc.

As a result of all this, there will be a significant increase in the income and employment of the farmers. This whole process is expected to give rise to a number of rural non-farm activities encouraging the process of transfer of workers from agriculture to non-agricultural sector and hence reducing the dependence on agriculture sector.

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

Sr. No.	Schemes	Total Plan Outlay	Yearly Allocation				
			I	II	III	IV	V
I	Interventions to Promote Sustainability of Crop Production System	2160	324	432	432	432	540
1	Improvement of productivity of cereal, pulse, oilseed, vegetable and spice crops through promotion of HYV seeds including hybrids	260	39	52	52	52	65
2	Improvement of soil health through vermicomposting, bio-fertilizers, micro nutrients, soil testing etc.	180	27	36	36	36	45
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	1100	165	220	220	220	275
	(i) Sprinkler	900	135	180	180	180	225
	(ii) Drip	200	30	40	40	40	50
5	Agricultural mechanization through popularization of improved tools and hill specific machinery like power tillers, tractors, crop planters/ harvesters, sprayers, clod breakers and	150	22.5	30	30	30	37.5

	gender friendly post harvesting equipments etc. to remove women drudgery						
6	Protected (poly house) cultivation to minimize risk factors and enhance quality and productivity	300	45	60	60	60	75
7	Strengthening and improvement of quality control infrastructure (seed, pesticides, fertilizer testing laboratories)	5	0.75	1	1	1	1.25
8	Strengthening of seed production farms and promotion of infrastructure to improve seed production and replacement	15	2.25	3	3	3	3.75
II	Need Based Infrastructure Development	26693	4003.95	5338.6	5338.6	5338.6	6673.25
1	Irrigation	1491	223.65	298.2	298.2	298.2	372.75
2	Improvement of on-farm water delivery and efficiency of existing irrigation systems	97	14.55	19.4	19.4	19.4	24.25
3	Rural markets	1908	286.2	381.6	381.6	381.6	477
4	Rural roads for connectivity	23197	3479.55	4639.4	4639.4	4639.4	5799.25
III	Natural Resource Conservation and Management	7625	1143.75	1525	1525	1525	1906.25
1.	Soil conservation of arable and non-arable land through engineering measures	25	3.75	5	5	5	6.25
2.	Water harvesting check dams, ponds, tanks, etc	7000	1050	1400	1400	1400	1750
3.	Land improvement	600	90	120	120	120	150
IV	Niche Based	122	18.3	24.4	24.4	24.4	30.5

	Enterprises for Rural Entrepreneurs						
	(i) Organic farming	122	18.3	24.4	24.4	24.4	30.5
V	Fruit Production	1377	206.55	275.4	275.4	275.4	344.25
VI	Livestock, Poultry & Fisheries	2352	352.8	470.4	470.4	470.4	588
1	Livestock improvement	1720	258	344	344	344	430
2	Fisheries	632	94.8	126.4	126.4	126.4	158
VII	Human Resources	741	111.15	148.2	141.6	141.6	185.25
1	Additional man power requirement	719	107.85	143.8	137.4	137.4	179.75
2	Capacity building of extension personnel	22	3.3	4.4	4.2	4.2	5.5
VIII	Research & Extension	268	40.2	53.6	53.6	53.6	67
IX	All Sectors & Schemes	41338	6200.7	8267.6	8267.6	8267.6	10334.5

Source: Field Survey, 2007-08.

Table 6.2 New Schemes for Agriculture and Rural Development

Development Schemes	Block	Kullu	Banjar	Naggar	Ani	Nirmand	District
Watershed development/ water storage structures/ check dams, ponds, etc.	No. of schemes	--	--	20	20	20	--
	Village (No.)	--	--	30	50	30	110
	Beneficiary families (No.)	--	--	6000	250	6000	12250
	Potential area (Ha)	400	500	650	600	650	2800
	Funds required (Rs. Lakh)	1000	1250	1625	1500	1625	7000
Soil/land conservation schemes	No. of schemes	15	20	20	5	3	--
	Village (No.)	15	20	20	5	3	63
	Beneficiary families (No.)	90	125	130	40	20	405
	Potential area (Ha)	30	45	55	15	9	154
	Funds required (Rs. Lakh)	5	7	9	3	1	25
Horticultural schemes	No. of schemes	15	15	15	14	14	--
	Village (No.)	50	37	42	17	26	172
	Beneficiary families (No.)	--	--	--	--	--	--
	Potential area (Ha)	--	--	--	--	--	--
	Funds required (Rs. Lakh)	--	--	--	--	--	1377.15
Livestock improvement schemes	No. of schemes	4	9	2	2	2	--
	Village (No.)	100	42	30	78	20	270
	Beneficiary families (No.)	2000	7427	1800	9000	1200	21427
	Funds required (Rs. Lakh)	150	175	100	120	100	645
Agricultural schemes	No. of schemes	9	9	9	9	9	--
	Village (No.)	50	37	42	17	26	172
	Beneficiary families (No.)	26000	11950	8896	8150	8422	63418
	Potential area (Ha)	13809	6471	6542	6450	6087	39359
	Funds required (Rs. Lakh)	507	394	437	222	300	1860
Organic farming	Village (No.)	50	37	42	17	26	172
	Funds required (Rs. Lakh)	35.40	26.20	29.75	12.05	18.40	121.80

Protected cultivation	Village (No.)	50	37	42	17	26	172
	Funds required (Rs. Lakh)	60	60	60	60	60	300
Rural roads (kms)	No. of schemes (Kms)	25	45	9	5	9	318
	Villages & sub villages (No.)	100	57	40	20	37	254
	Beneficiary families (No.)	5000	900	350	140	350	6740
	Funds required (Rs. Lakh)	9442	12921	100	200	50	22713
Bridges/pullies	No. of schemes	4	1	25	--	8	38
	Village (No.)	60	9	50	--	50	169
	Beneficiary families (No.)	1000	200	8000	--	300	9500
	Funds required (Rs. Lakh)	226	50	108	-	100	484
Rural markets							
1.) Link road	No. of schemes	16	16	16	10	10	68
	Village (No.)	64	72	68	38	29	271
	Population (No.)	1272	1060	1470	690	540	5032
	Potential area (Km)	80	80	80	50	50	340
	Beneficiary families (No.)	1272	1060	1470	690	540	5032
	Funds required (Rs. Lakh)	80	80	80	50	50	340
2.) Collection centre	No. of schemes	1	1	1	1	1	5
	Village (No.)	12	9	16	7	6	50
	Population (No.)	2170	1460	2850	720	560	7760
	Beneficiary families (No.)	720	690	1110	470	380	3370
	Funds required (Rs. Lakh)	10	10	10	10	10	50
3.) Establishment/ expansion of market yard	No. of schemes	3	1	2	1	1	8
	Village (No.)	80	12	46	35	16	189
	Population (No.)	15600	3480	9660	4230	1870	37840
	Beneficiary families (No.)	3070	198	1837	918	629	6652
	Funds required (Rs. Lakh)	460	160	380	100	230	1330
4.) Training seminar hall	No. of schemes	1	--	1	1	1	4
	Village (No.)	80	--	46	35	16	177
	Population (No.)	15600	--	9660	4230	1870	31360

	Beneficiary families (No.)	3070	--	1837	918	629	6454
	Funds required (Rs. Lakh)	12	--	12	12	12	48
5.) Kisan rest house	No. of schemes	1	--	1	1	1	4
	Village (No.)	80	--	46	35	16	177
	Population (No.)	15600	--	9660	4230	1870	31360
	Beneficiary families (No.)	3070	--	1837	918	629	6454
	Funds required (Rs. Lakh)	35	--	35	35	35	140
Total funds for rural markets (APMC for Kullu & LS)		597	250	517	207	337	1908

Source: Field Survey, 2007-08.

Table 6.3 Potential/New irrigation Schemes

Particular	Kullu	Banjar	Naggar	Ani	Nirmand	District
Lift irrigation						
Number	4	--	--	--	8	12
Amount Required (Rs. Lakh)	30	--	--	--	42	72
Villages to be covered	35	--	--	--	300	335
Beneficiaries (No.)	2000	--	--	--	35	2035
Command area (Ha)	20	--	--	--	28	48
Groundwater use						
Number	50	--	--	--	--	50
Amount Required (Rs. Lakh)	200	--	--	--	--	200
Villages to be covered	50	--	--	--	--	50
Beneficiaries (No.)	100	--	--	--	--	100
Command area (Ha)	100	--	--	--	--	100
Flow Irrigation Scheme						
Number	10	5	15	1	1	32
Amount Required (Rs. Lakh)	250	312.5	475	116.25	65	1218.75
Villages to be covered	25	10	45	14	5	99
Beneficiaries (No.)	800	250	1200	282	90	2622
Command area (Ha)	200	250	380	93	52	975

Source: Field Survey, 2007-08.

Table 6.4 Prioritization of Schemes/ Works (Ranks)

Schemes	Kullu	Banjar	Naggar	Ani	Nirmand	District
Agriculture						
Strengthening of irrigation facilities	1	1	2	1	2	1
Training on crop production	2	2	3	4	2	2
Promotion of hybrids/ improved varieties	3	3		1	3	3
Market for produce	7	7		2	4	7
Subsidy on chemicals & crop insurance	8	8	1	6		8
Crop diversification	6	2		5	6	6
Market information & intelligence	4	4	5			4
Ensuring timely availability of fertilizers & other inputs	5	5		7		5
Vermicomposting	9	9	4			9
Horticulture						
Training & demonstration on T&P, spray schedule	1	1	6	1	1	1
Market infrastructure and information	3	5	5		4	5
Subsidy on sprinkler & drip irrigation system	7		7	3	5	7
Pollinizers	2	2	1	2	2	2
Availability of new variety nursery plants	5	3	3		3	3
Spray pumps & chemicals on subsidy	6		2	6	6	6
Cold store	8				8	8
Area expansion under crops like Pomegranate, pear, plum and apricot.	4	4	4	5	7	4
Anti hail net	9			4	9	9
Crop diversification	10	6			10	10
Animal Husbandry						
Vet. dispensary/ clinical facilities	1	3	1	1	4	1
Introduction of perennial grasses & leguminous fodders in pasture land	9	6	4	9	1	9
Training & awareness about scientific management	3	1	2	6	2	2
Improved breeds	4	4		4	6	4

Milk collection centres	2	7	7	7	5	7
Exhorting proper feeding practices	5	8	5	5		5
Rehabilitation of stray animals	7		8	8	7	8
A.I. facilities needed	8	2	6	3	3	3
Control of diseases & parasites	6	5	3	2		6
Provision of easy credit				10	8	10
Other						
Bee keeping	9		7	8	7	7
Fodder tree plantation	11	10	6	7	10	10
Lift irrigation	2	3	4	4	7	4
Rain water harvesting	5	2	3	1	2	2
Collection centres	4	9	10	9	5	9
Exotic vegetable production	1	5	1	2	1	1
Fruit & vegetable nursery raising	6	1	5	5	4	5
Mushroom cultivation	7	8	2	3	3	3
Medicinal & aromatic plants	3	4	9	6	6	6
Formation of co-op. society	8	6	8	10		8
Consolidation of holdings	13	7		11	8	13
Rural handicrafts	10	11	11			11
Agri-services	12		12		9	12

Source: Field Survey, 2007-08.

Table 6.5 Projected Output Growth of Agriculture

Crop	Area (Ha)	Output (Mt)			Growth (%/p.a.)	
		Existing	Scenario I	Scenario II	Scenario I	Scenario II
Maize	16497	46192	53006	50028	2.95	1.66
Paddy	952	1153	1774	1700	10.78	9.49
Wheat	21001	47252	3403	3212	2.93	1.64
Barley	2496	2247	54716	51670	3.16	1.87
Pulses	3500	2968	2577	2432	293	1.64
All foodgrains	44446	99812	112888	109042	2.62	1.85
Vegetables	4126	89944	152207	195131	13.84	23.89

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

Table 6.6 Projected Output Growth in Production of Agricultural Crops

Particular	Existing			Potential			Growth rate (% p.a.)
	Area (Ha)	Production (Mt)	Yield (Q/ha)	Area (Ha)	Production (Mt)	Yield (Q/ha)	
Maize	16036.7	33068	20.62	16036.7	55807.72	34.80	13.75
Paddy	1629.0	4738.8	29.09	1629.0	5163.93	31.70	1.79
Wheat	21806.6	47320	21.70	21806.5	73597.28	33.75	11.10
Barley	1565.6	2851	18.21	1565.6	3914	25.00	7.46
Pulses	5043.2	4388.36	8.70	5043.2	7540.68	14.95	14.37
Vegetable & spices	9165.89	84096	91.75	9165.89	145660	158.9	14.64

Source: Field Survey, 2007-08.

Table 6.7 Projected Value of Output and Growth in Agricultural Crops

Particular	Existing			Potential			Growth rate (% p.a.)
	Area (Ha)	Production (Mt)	Value of output (Rs. Lakh)	Area (Ha)	Production (Mt)	Value of output (Rs. Lakh)	
Maize	16036.7	33068	2645.41	16036.7	55807.72	4464.61	13.75
Paddy	1629.0	4738.8	568.65	1629.0	5163.93	619.67	1.79
Wheat	21806.6	47320	6151.64	21806.6	73597.28	9567.64	11.10
Barley	1565.6	2851	256.58	1565.6	3914	352.26	7.46
Mash	1224.86	945.59	520.07	1224.86	1451.46	798.30	10.69
Rajmash	3214.1	2928	1229.77	3214.1	5110.42	2146.37	14.90
Other pulses	604.2	515.38	206.15	604.2	978.80	391.52	17.98
Mustard	402.88	317.87	38.14	402.88	437.13	52.46	7.51
Other oilseeds	793.62	283.32	50.99	793.62	654.74	117.85	26.22
Potato	1283.52	11595	1159.53	1283.52	16031.16	1603.11	7.65
Peas	1293.5	4742	948.39	1293.5	9701.25	1940.25	20.92
Tomato	776.96	17777	2133.22	776.96	30674.38	3680.92	14.51
Cabbage	986.13	16365	818.24	986.13	28104.70	1405.23	14.35
Cauliflower	946.16	8419.9	1515.57	946.16	15602.184	2808.39	17.06
French bean	289.5	1756.1	316.09	289.5	3358.2	604.47	18.24
Capsicum	175.3	1086.9	239.10	175.3	2086.07	458.93	18.38
Bhindi	134.2	465.81	60.55	134.2	858.88	111.65	16.88
Brinjal	370.52	2377.3	213.95	370.52	4890.86	440.17	21.14
Cucurbits	106.14	995.81	89.62	106.14	1995.43	179.58	20.07

Onion	185.8	1077.6	118.54	185.8	1672.2	183.94	11.03
Radish	366.8	2978.4	178.70	366.8	4467.62	268.05	10
Garlic	1680.76	13565	2713.08	1680.76	24942.48	4988.49	16.77
Coriander	88.1	255.49	153.29	88.1	355.92	213.55	7.86
Chillies	127.6	638	574.2	127.6	918.72	826.84	8.79
Total	56088.5 5	177064	22899.47	56088.5 5	292775.53	38224.2 5	13.38

Table 6.8 Projected Output Growth in Fruit Production

Particular	Existing			Potential			Growth rate (% p.a.)
	Area (Ha)	Production (Mt)	Yield (Q/ha)	Area (Ha)	Production (Mt)	Yield (Q/ha)	
Apple	19542.2	258651.20	132.36	19877.20	496930	250	7.68
Stone fruits	2407.74	37912.08	157.46	2866.74	62587.61	218.32	5.43
Other fruits	1796.88	17342.70	96.52	2871.88	40991.70	142.73	11.36

Source: Field Survey, 2007-08.

Table 6.9 Projected Value of Output and Growth in Fruit Production

Particular	Existing			Potential			Growth rate (% p.a.)
	Area (Ha)	Production (Mt)	Value of output (Rs. Lakh)	Area (Ha)	Production (Mt)	Value of output (Rs. Lakh)	
Apple	19542.2	258651.20	38797.68	19542.2	488555	73283.25	17.78
Stone fruits	2407.74	37912.08	4549.45	2407.74	52565.8	6307.9	7.73
Other fruits	1796.88	17342.70	3121.69	1796.88	25646.9	4616.44	9.58
Total	23746.82	313905.98	46469	23746.82	566767.7	84207.59	16.24

Source: Field Survey, 2007-08.

Table 6.10 Projected Output Growth in Livestock Products and Live Animals for Sale

Particular	Existing			Potential			Growth rate (% p.a.)
	No.	Production (Mt/yr)	Milk yield (L/day)	No.	Production (Mt/yr)	Milk yield (L/day)	
Milk (crossbred cow)	69214	52639.4	6.08	69214	95169.2	11	16.17
Milk (indigenous cow)	85436	6705.7	1.57	85436	17514.4	4.1	32.23
Wool (sheep)	200912	319	1.59 (kg/yr)	200912	514	2.56 (kg/yr)	12.22
Sheep & goat for meat	70099	-	-	75394	-	-	1.51

Source: Field Survey, 2007-08.

Table 6.11 Projected Value of Output and Growth in Livestock Products and Live Animals for Sale

Particular	Existing			Potential			Growth rate (% p.a.)
	No.	Production (Mt/yr)	Value of output (Rs. Lakh)	No.	Production (Mt/yr)	Value of output (Rs. Lakh)	
Milk (Crossbred cow)	69214	52639.4	7369.52	69214	95169.2	13323.7	16.16
Milk (Indigenous cow)	85436	6705.7	938.80	85436	17514.4	2452.02	32.23
Wool (sheep)	200912	319	319	200912	514	514	12.22
Sheep & goat for meat	70099	-	525.74	75394	-	565.45	1.51
Total			9153.06			16855.17	16.83

Source: Field Survey, 2007-08.

Table 6.12 Projected Value of Output and Growth in Agriculture and Allied Sectors

Sectors	Current value of output (Rs. Lakh)	Projected value of output (Rs. Lakh)	Growth rate (% per annum)
Agriculture	22899.47	38224.25	13.38
Horticulture	46469.00	84207.59	16.24
Animal husbandry	9153.06	16855.17	16.83
All sectors	78521.53	139287	15.48

Table 6.13 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
Kullu	12971	1043	72	120	369	320	400
Banjar	6015	1140	93	42	1171	250	500
Naggar	6471	695	45	50	993	380	650
Ani	5278	1255	20	80	124	93	600
Nirmand	5770	138	23	10	931	80	650
District	36505	4271	253	302	3588	1123	2800

Source: Field Survey, 2007-08.

Table 6.14 Fertilizer Demand, Actual Supply and Projections for 2012-13 (Mt)

Year	CAN		Urea		12:32:16		15:15:15		SSP		MOP		10:26:26	
	D	S	D	S	D	S	D	S	D	S	D	S	D	S
2003-04	3000	1955.6	3200	2127.5	2800	1635.4	1000	731.5	2200	1335.1	1500	979.9		
2004-05	2800	1531.2	3000	2018.85	700	217.65	1000	639.8	800	334.9	1200	717.9		
2005-06	1000	632.95	3000	2186.2	3000	2200.9	1000	875.1	1000	780.8	1200	684.8		
2006-07	1200	656.85	2500	1950.5	3000	1637.7	1200	986.5	1200	670.2	1200	719.7		
2007-08	1500	642.3	3500	2262.9	3200	1563.8	1500	934.8	1500	663.2	1500	882.1	1000	590.5
Growth rate (% p. a)	-10	-13.4	1.88	1.27	2.86	-0.88	10	5.56	-6.36	-10.1	0.00	-2.0	-	-
Projection for 2012-13	-	-	3855	2414	3712	-	2594	1257	-	-	1500	-	-	-
Projection making allowance for crop diversification @ 1 %	-	-	4251 (2.88)	2663 (2.27)	4089 (3.86)	-	2839 (11)	1381 (6.56)	-	-	1657 (1)	-	-	-
Projection making allowance for irrigation@ 2 %	-	-	5153 (4.88)	3232 (4.27)	4949 (5.86)	-	3395 (13)	1663 (8.56)	-	-	2016 (3)	-	-	-

Note: i) Figures in parentheses are growth rates per cent per annum. ii) D- Demand, S- Supply.

Source: (i) Data on Demand and Supply of fertilizers from the Office of Deputy Director Agriculture, Kullu
(ii) Projections by the consultant following the methodology adopted by Fertilizer Association of India, New Delhi

APPENDIX TABLES

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

Sr. No.	Particular	Kullu	Banjar	Naggar	Ani	Nirmand	District
1.	Gram panchayats	70	36	40	32	26	204
2.	Villages	50	42	37	17	26	172
3.	Households	21574	7427	17278	12068	14400	72747
4.	Total population	59542	26228	45056	25722	24583	181131
	Male	54698	25537	42024	24754	23334	170347
	Female						
	Schedule caste	32004	14710	19617	15597	21490	103418
	Schedule tribe	2050	211	6889	52	142	9344
	Rural	NA	41415	NA	55488	47917	NA
	Urban	NA	NA	NA	NA	NA	NA
	Sex ratio	1088	973.65	932	962	949	980.93
5.	Literacy rate	84.35	83.04	84.03	81.78	80.75	82.79
	Male	59.41	57.6	62.06	57.16	56.64	58.57
	Female	NA	NA	NA	NA	NA	NA
	Schedule caste	NA	NA	NA	NA	NA	NA
	Schedule tribe	NA	NA	NA	NA	NA	NA
6.	Households economic status	NA	187	1186	1109	2423	NA
	Antodaya households	3293	6138	604	1690	NA	NA
	BPL households	19765	1622	NA	NA	NA	NA
	APL1 households	NA	949	NA	NA	NA	NA
	APL2 households	NA	NA	NA	NA	NA	NA
7.	Village amenities	50	42	37	17	26	172
	Drinking water supply	50	42	37	17	26	172
	Villages electrified	1137	2400	NA	NA	13320	NA
	Tel connection to panchayats						

	Post office	38	37	31	23	28	157
	Fair price shops						
	<i>Co-op depots</i>	4	51	37	60	18	170
	<i>Private dealers</i>	15	17	NA	9	NA	NA
8. Educational and health institutions	Primary schools	230	132	139	111	106	718
	Middle schools	33	19	19	20	16	107
	High schools	12	14	8	9	6	49
	Technical institutions						
	<i>Polytech/Engg</i>	--	--	--	--	1	1
	<i>ITI</i>	2	--	--	--	1	3
	<i>College of Education</i>	2	1	--	1	--	4
	PHC	4	3	4	2	3	16
	Dispensaries	--	--	--	2	--	2
	Health centres	24	14	18	17	12	85
	Community HCs	1	--	--	2	1	4
	Hospitals	1	1	1	--	--	3
	Medical college cum hospitals	--	--	--	--	--	--
	Veterinary hospitals	7	2	1	2	3	15
	Veterinary dispensaries	33	11	22	13	19	98
	Gosadan	3	--	1	--	--	4
	Other health institutions	--	12	--	--	--	12
	Anganwaries/ balwaries	286	177	69	173	91	796
9. Village/community organizations	Mahila mandals	227	122	208	124	126	807
	Self help groups	96	68	--	67	--	231
	Youth clubs	--	10	150	27	55	242
	NGOs	9	1	3	--	--	13
	Farmers co-operatives	20	--	1	1	1	23

		Any other	--	--	--	--	--	--	--	--
10	Banking institutions	Commercial banks	10	5	14	9	7	45	--	--
		RRBs	4	--	--	--	--	4	--	--
		Central co-operative banks	3	3	3	2	6	17	--	--
		Co-operative credit societies	--	32	--	--	--	32	--	--
		Any other (NABARD)		1	2	3	9	15	--	--

Source: Field Survey, 2007-08.

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

Particular	Kullu	Banjar	Naggar	Ani	Nirmand	District
Workers						
Agri. labour	37630	20573	28119	19649	17825	123796
Household industry	1053	71765	3635	83	429	76965
Others	22055	2656	1522	2792	3427	32452
Total	60738	94994	33276	22524	21681	233213
Main workers	50096	NA	NA	22524	21681	NA
Marginal workers	19164	NA	NA	7590	4914	NA
Cultivators						
Landless	114	187	NA	39	58	NA
Marginal	26037	6138	2946	6084	6245	47450
Small	3619	1621	847	1368	1482	8937
Large	603	949	239	110	5	1906
Total	30373	8895	NA	7601	7790	NA

Source: Field Survey, 2007-08.

APPENDIX 3 Status of Migrant Labour (No.)

Status/origin	Kullu	Banjar	Naggar	Ani	Nirmand	District
Own State						
Skilled		450	2570			3020
Semi skilled	700	810	2850			4360
Unskilled	1633		6400			8033
Total	2333	1260	11820			15413
Other States						
Skilled		270	1530		1647	3447
Semi skilled	4603	387	1600	2133	2383	11106
Unskilled	11130		3500			14630
Total	15733	657	6630	2133	4030	29183
Total						
Skilled		720	4100		1647	6737
Semi skilled	5303	1197	4450	2133	2383	15466
Unskilled	12736		9900			22663
Total	18066	1917	18450	2133	4030	44596

APPENDIX 4 Farm Gate Prices of Different Commodities

(Rs./q)	
Commodity	Price
Maize	800
Paddy	1200
Wheat	1300
Barley	900
Mash	5500
Rajmash	4200
Other pulses	4000
Mustard	1200
Other oilseeds	1800
Potato	1000
Peas	2000
Tomato	1200
Cabbage	500
Cauliflower	1800
French bean	1800
Capsicum	2200
Bhindi	1300
Brinjal	900
Cucurbits	900
Onion	1100
Radish	600
Garlic	2000
Coriander	6000
Chillies	9000
Apple	1500
Stone Fruits	1200
Other Fruits	1800
Milk	1400
Wool	10000
Live animal for meat	750/animal

