



Department of Agriculture
Himachal Pradesh

DISTRICT AGRICULTURE PLAN

BILASPUR, HIMACHAL PRADESH

Volume - I



Consulting Agency
CSK, Himachal Pradesh Agricultural University
Palampur, 176 062

Reference citation :

DOA. 2009. District Agriculture Plan: Bilaspur, H.P., Vol. I

First Printed: April, 2009

Printed at :

Azad Hind Stores (P) Ltd.,

S.C.O. 34, Sector 17-E, Chandigarh

Ph. : +91 - 172 - 2704511-14

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 Bilaspur was prepared by Dr. Kamlesh Singh and Dr. H. R. Sharma. In addition, a large number of scientists and administrative staff of the university were involved in the first ever such state wide field survey for weeks. I wish to place on record my appreciation of the wonderful work done by each one of the above named persons and those I could not mention by name.

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



DR TEJ PARTAP
Vice Chancellor

Palampur, March 18, 2009

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Executive Summary

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

Sr. No.	Schemes	Total Plan Outlay	Yearly Allocation				
			I	II	III	IV	V
I	Interventions to Improve and Enhance Sustainability of Crop Production System	3050	457.5	610	610	610	762.5
1	Improvement of productivity of cereals, pulses, oilseeds, vegetables and spice crops through promotion of HYV seeds including hybrids	360	54	72	72	72	90
2	Improvement of soil health through vermi-composting, bio-fertilizers, micro nutrients, soil testing etc.	350	52.50	70	70	70	87.50
3	Protection of crops against biotic stresses (diseases, pests, weeds) and abiotic stresses (hailstorms, drought, flash floods, etc) and other risk factors	260	39	52	52	52	65
4	Water use efficiency through micro irrigation	560	84	112	112	112	140
	(i) Sprinkler	500	75	100	100	100	125
	(ii) Drip	60	9	12	12	12	15
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 etc. to remove women drudgery	65	9.75	13	13	13	16.25
6	Protected (poly house) cultivation to minimize risk factors and enhance quality and productivity	1400	210	280	280	280	350
7	Strengthening and improvement of quality control infrastructure (seed, pesticides, fertilizer testing laboratories)	25	3.75	5	5	5	6.25
8	Strengthening of seed production farms and promotion of infrastructure to improve seed production and replacement	30	4.5	6	6	6	7.5
II	Need Based Infrastructural Development	2617	392.55	523.4	523.4	523.4	654.25
1	Improvement of on-farm water delivery and efficiency of existing irrigation systems	2499	374.85	499.8	499.8	499.8	624.75
2	Rural markets	118	17.7	23.6	23.6	23.6	29.5

III	Natural Resource Conservation and Management	9975	1496.25	1995	1995	1995	2493.75
1.	Soil conservation of arable and non-arable land through engineering measures	87	13.05	17.4	17.4	17.4	21.75
2.	Water harvesting check dams, ponds, tanks, etc	9384	1407.6	1876.8	1876.8	1876.8	2346
3.	Land improvement	504	75.6	100.8	100.8	100.8	126
IV	Niche Based Enterprises for Rural Entrepreneurs	85	12.75	17	17	17	21.25
	(i) Organic farming	60	9	12	12	12	15
	(ii) Agro-tourism	25	3.75	5	5	5	6.25
V	Fruit Production	945	141.75	189	189	189	236.25
VI	Livestock, Poultry & Fisheries	1873	280.95	374.6	374.6	374.6	468.25
1	Livestock improvement	1645	246.75	329	329	329	411.25
2	Fisheries	228	34.2	45.6	45.6	45.6	57
VII	Human Resource Development	356	53.4	71.2	71.2	71.2	89
1	Additional man power requirement	346	51.9	69.2	69.2	69.2	86.5
2	Capacity building of extension personnel	10	1.5	2	2	2	2.5
VIII	Research & Extension	477	71.55	95.4	95.4	95.4	119.25
IX	All Sectors & Schemes	19378	2906.7	3875.6	3875.6	3875.6	4844.5

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

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

Sr. No.	Schemes	Total Plan Outlay	Yearly Allocation				
			I	II	III	IV	V
I	Interventions to Improve and Enhance Sustainability of Crop Production System	3050	457.5	610	610	610	762.5
1	Improvement of productivity of cereals, pulses, oilseeds, vegetables and spice crops through promotion of HYV seeds including hybrids	360	54	72	72	72	90
2	Improvement of soil health through vermi-composting, bio-fertilizers, micro nutrients, soil testing etc.	350	52.50	70	70	70	87.50
3	Protection of crops against biotic stresses (diseases, pests, weeds) and abiotic stresses (hailstorms, drought, flash floods, etc) and other risk factors	260	39	52	52	52	65
4	Water use efficiency through micro irrigation	560	84	112	112	112	140
	(i) Sprinkler	500	75	100	100	100	125
	(ii) Drip	60	9	12	12	12	15
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 etc. to remove women drudgery	65	9.75	13	13	13	16.25
6	Protected (poly house) cultivation to minimize risk factors and enhance quality and productivity	1400	210	280	280	280	350
7	Strengthening and improvement of quality control infrastructure (seed, pesticides, fertilizer testing laboratories)	25	3.75	5	5	5	6.25
8	Strengthening of seed production farms and promotion of infrastructure to improve seed production and replacement	30	4.5	6	6	6	7.5
II	Need Based Infrastructural Development	7453	1117.95	1490.6	1490.6	1490.6	1863.25
1	Irrigation	3382	507.3	676.4	676.4	676.4	845.5
2	Improvement of on-farm water delivery and efficiency of existing irrigation systems	2499	374.85	499.8	499.8	499.8	624.75
3	Rural markets	237	35.55	47.4	47.4	47.4	59.25
4	Rural roads for connectivity	1335	200.25	267	267	267	333.75

III	Natural Resource Conservation and Management	19358	2903.7	3871.6	3871.6	3871.6	4839.5
1.	Soil conservation of arable and non-arable land through engineering measures	87	13.05	17.4	17.4	17.4	21.75
2.	Water harvesting check dams, ponds, tanks, etc	18767	2815.05	3753.4	3753.4	3753.4	4691.75
3.	Land improvement	504	75.6	100.8	100.8	100.8	126
IV	Niche Based Enterprises for Rural Entrepreneurs	85	12.75	17	17	17	21.25
	(i) Organic farming	60	9	12	12	12	15
	(ii) Agro-tourism	25	3.75	5	5	5	6.25
V	Fruit Production	945	141.75	189	189	189	236.25
VI	Livestock, Poultry & Fisheries	1873	280.95	374.6	374.6	374.6	468.25
1	Livestock improvement	1645	246.75	329	329	329	411.25
2	Fisheries	228	34.2	45.6	45.6	45.6	57
VII	Human Resource Development	356	53.4	71.2	71.2	71.2	89
1	Additional man power requirement	346	51.9	69.2	69.2	69.2	86.5
2	Capacity building of extension personnel	10	1.5	2	2	2	2.5
VIII	Research & Extension	477	71.55	95.4	95.4	95.4	119.25
IX	All Sectors & Schemes	33597	5039.55	6719.4	6719.4	6719.4	8399.25

III. Projected Output Growth in Foodgrains and Vegetables Production

Crops	Existing			Potential production (MT)		Growth (% p.a.)	
	Area (Ha)	Production (MT)	Yield (Q/ha)	Scenario I	Scenario II	Scenario I	Scenario II
Maize	25158	49800	19.79	60649	59543	4.36	3.91
Paddy	1412	1912	13.54	2863	2820	9.95	9.50
Wheat	26252	62879	23.95	77593	76197	4.68	4.24
Barley	204	294	14.38	349	342	3.75	3.31
Pulses	442	310	7.01	368	361	3.75	3.31
Foodgrains	53474	115431	21.59	142303	140391	4.66	4.32
Vegetables	2053	50082	244.00	98090	219197	19.17	67.54

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

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

Crop	Current production (Quintals)	Projected production (Quintals)	Growth rate (% p.a.)
Maize	648532.3	1099285	13.90
Paddy	18587.1	37216.73	20.05
Wheat	476756.5	881017.9	16.96
Barley	2928.66	4706.775	12.14
Mash	3064.691	4546.225	9.67
Gram	2456.849	3810.25	11.02
Sesame	410.0992	891.52	23.48
Sarson	722.814	1363.8	17.74
Toria	2811.619	5869.185	21.75
Ghobi sarson	73.4474	127.92	14.83
Potato	2792.4	4200	10.08
Peas	7991.2	12120	10.33
Tomato	199565.6	310781.3	11.15
Cabbage	5541.3	7875	8.42
Cauliflower	11362.5	18000	11.68
Beans	3236.5	5500	13.99
Capsicum	9261	10875	3.49
Bhindi	10484.12	12455	3.76
Brinjals	7902	10400	6.32
Cucurbit	2535.4	4400	14.71
Onion	6410	11250	15.10
Ginger	11907	17887.5	10.05
Garlic	1580.8	2200	7.83

Note: Projections are based on the average yields and yields obtained by the progressive farmers

V. Projected Growth in Fruit Production

Particulars	Existing			Potential (MT)			Growth rate in production (% p.a.)
	Area (Ha)	Production (MT)	Yield (Q/ha)	Area (Ha)	Production (MT)	Yield (Q/ha)	
Mango	3955	2670	6.75	4312	4528	10.50	5.80
Litchi	137	28	2.04	149	75	5.50	13.99
Citrus	960	436	4.54	1083	921	8.50	9.27
Pear	881	946	10.73	959	2398	25.00	12.79
Peach	168	30	1.78	180	72	4.00	11.67
Plum	147	14	0.95	154	31	2.00	10.12
Amla	53	29	5.47	84	69	8.25	11.49

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

VI. Projected Growth in Livestock and Fish Production

Particulars	Existing			Potential (MT)			Growth rate in production (% p.a.)
	No.	Production (000 MT/day)	Milk yield (L/day)	No.	Production (000 MT/day)	Milk yield (L/day)	
Milk							
Crossbred cows	2210	12.86	5.82	2100	17.85	8.50	7.76
Local cows	4212	8.93	2.12	3791	11.37	3.00	5.46
Buffaloes	46788	154.87	3.31	44449	311.14	7.00	20.18
Goats	11702	5.50	0.47	11117	11.12	1.00	20.44
Fish (M. T. per annum)	-	456.50	-	-	1175.0	-	31.48

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 given to all farmers
- Promotion of integrated nutrient management through vermi-composting, popularization of bio-fertilisers, and other ameliorants in addition to judicious and balanced nutrients to crops.
- Promotion of micro irrigation for efficient management and delivery of required quantities of water as per crop needs.
- Promotion of mechanization conducive to hill farming; equipments and 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
- Creation of monkey sanctuaries, planting of wild fruit species in the forests and taking other measures like sterilization to control the most serious problem of monkey menace as a consequence of which hundred of farmers in the district have abandoned cultivation.

Research and Extension Support

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

VII. 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
Bilaspur Sadar	10856	4438	12021	12021	1520	2010	2000
Jhandutta	9831	1933	3862	1287	588	81	1500
Ghumarwin	9188	2535	6240	4160	1080	250	4000
District	29875	8906	22123	17468	3188	2341	7500

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

Fertilisers	Scenario-I	Scenario-II	Scenario-III
CAN	651.56	786.86	946.95
UREA	4200	5119.78	6217.03
IFFCO	2288.78	2755.99	3307.35
SSP	150	182.85	222.04
MOP	195.47	236.06	284.08

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

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

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

IX. Projected Value of Output and Growth of Agriculture and Allied Sectors

Sector	Current value of output (Rs. Lakh)	Projected value of output (Rs. Lakh)	Growth rate (% p. a.)
Agriculture	11754	20282	14.51
Horticulture	126	216	13.76
Animal husbandry	113695	219376	18.59
Fisheries	799	2056	31.48
Over-all without fisheries	125575	239874	18.12

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

X. Potential Enterprises for Gainful Employment

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

XI. Human Resource Requirement (No.)

Block	Crop Production	Horticulture	Animal Husbandry	Others	Total
Bilaspur Sadar	-	1	6	7	14
Ghumarwin	-	-	-	-	-
Jhandutta	-	1	-	6	7
District	-	2	6	13	21

Intervention

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

XII Expected Quantitative Outcomes

- Foodgrain production shall increase from 1,15,431 metric tons to 1,42,303 metric tons after the implementation of the plan recording a growth rate of 4.66 per cent per annum in scenario I. Even in scenario II when 20 per cent of irrigated land is shifted to vegetable production, the growth rate in foodgrains production shall be 4.32 per cent per annum
- Production of vegetables would increase from 50,082 metric tons to 98,090 metric tons in scenario I registering a growth rate of 19.17 per cent per annum when the proportion of area under these crops remains same and to 2, 19,197 metric tons recording a growth rate of 67.54 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, 97,277 metric tons which in monetary terms amounts to Rs. 197.28 crores. The market disposal of this surplus shall generate huge employment opportunities for rural unemployed youths through forward and backward linkages.
- Based on the yields of average farmers and that of progressive farmers of different crops and the current area under different crops, the projected production of different crops have been worked out. The growth rate over the existing production are very high ranging from as high as 23.48 per cent in case of sesame followed by toria (21.75 per cent per annum) and sarson (17.74 per cent). The growth in case of cereal crops are projected at 13.90 per cent for maize, 20.05 per cent for paddy and 16.96 per cent for wheat.
- Based on yields of progressive farmers, the production of different fruit crops is expected to register high growth rates. For example, the production of important fruit crops like mango, citrus and pear is expected to increase at a growth rate of 5.80 per cent, 13.99 per cent, and 12.79 per cent per annum respectively.
- The milk production is expected to increase by more than fifty per cent. Insofar as milk production of different categories of animals is concerned. The milk from crossbred cows, local cows and buffaloes is expected to increase at a rate of 7.76 per cent, 5.46 per cent and 20.18 per cent, respectively.
- Irrigation potential shall be created which will provide irrigation to an area of 9841 hectares.

- Available water potential shall be exploited and thereby 9841 (2341 hectares through irrigation source + 7500 through water harvesting) of land shall be brought under protective and assured irrigation.
- With the implementation of plan 32.94 per cent of the arable land will have assured irrigation facilities compared to existing 10.67 per cent.
- A huge chunk of land amounting to 8962.5 hectares infested with soil erosion, stream bank erosion, etc shall be treated by adopting soil conservation measures.
- Support land (private grasslands) of 39591 hectares shall be treated against invasive weeds and shrubs. This shall improve the fodder production to the approximate level of 3959.1 metric tons.
- The demand for different types of fertilisers like CAN, UREA, IFFCO, SSP and MOP is projected to increase to 651.56, 4200, 2288.78, 150 and 195.47 metric tonnes, respectively by the year 2012-13 under scenario I. Under scenario II, the demand for these fertilisers is projected to increase at 786.86, 5119.78, 2755.99, 182.85 and 236.06 metric tonnes respectively. And in scenario III it is projected to increase to 946.95, 6217.03, 3307.35, 222.04 and 284.08 metric tonnes, respectively.
- Agriculture, horticulture and animal husbandry sectors are projected to grow at 14.51 per cent per annum, 13.76 per cent per annum and 18.59 per cent per annum respectively. The overall growth rate of agriculture excluding fishery is projected to grow at 18.12 per cent per annum. The fish production is projected to grow at 31.48 per cent per annum.

XIII Researchable Issues

Crop Production

- Characterization and Classification of soils of different districts of Himachal Pradesh
- Delineation of the Acid Soil Regions (ASR)
- Integrated Nutrient Management Technology demonstration on farm fields.
- Issues in solid waste management for Organic farming in major cash crops of respective region
- Evaluation of resource conservation technologies (like conservation tillage, deficit water management, pressurized irrigation systems, nutrient-water interaction studies, recycling of waste organic residues etc) for irrigated and rain fed areas
- Issues related to increasing water productivity of stored water through crop diversification and soil and water management practices

- 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
- Development of improved varieties of various niche based crops, for example, scented basmati rice special purpose corn e.g. baby corn, sweet corn and pop corn and hybrids of maize and rice to raise overall productivity of these two important crops.
- Concerted efforts on ensuring effective selection, conservation evaluation, documentation and utilization of genetic resources
- Formulation of bio-intensive IPM strategies for the management of *Helicoverpa armigera* (tomato and gram), fruit flies (cucurbits and tomatoes);, white grubs (potato, maize, peas, ginger, cabbage etc);, cut worms (cereals and vegetables); fruit borer (brinjal and okra);, leaf miner and pod borer (peas);, hairy caterpillar (mash, til, soybean);, stem borer and aphids (maize), mites (pulses and vegetables); and 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*;, *leucinodes orbonalis*: and *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:
- Germplasm screening for resistance against major insect pests (cereals, pulses, oilseeds and vegetables).
- Survey and surveillance for identification of new invasion of insect pests and of major diseases in the district.
- Safe management alternatives for the stored grain pests.
- Disease and pest management in honey bees; management of bee colonies for pollination in different crops for higher productivity; management practices for migratory beekeeping for better economic returns; quality analysis of honey from different sources for value addition:
- Identification and management of insect-pests of medicinal, aromatic and ornamental plants

- Development/Identification of bacterial wilt resistant hybrids/varieties of *solanaceous* vegetables
- Development/Identification of hybrids and varieties of potential vegetable crops for protected cultivation and Identification of vegetable based promising cropping sequences.
- Standardization of agro-technology for organic vegetable production
- Development/Refinement of production technology in ginger
- Weed management studies in potential vegetables
- Standardization of production technology of hybrids
- Standardization of production technology for rain fed cultivation of potential vegetable crops
- Identification of resistant sources and study of genetics of resistance
- Marker assisted selection of resistance genes using molecular markers and their use in gene pyramiding for resistance in commercial varieties
- Development of integrated disease management modules suitable for organic and protected agricultural conditions
- Development of detection techniques for pathogens of quarantine importance and certification purposes
- Development of IDM module
- Analysing trends and patterns of demand, prices and markets of emerging crops and enterprises in the context of ongoing process of globalisation
- Understanding economic implications of climate change towards cropping systems, cropping patterns and livelihoods of the farmers
- Assessing impact of the ongoing process of commercialisation of agriculture on natural resource base (soil, water and environment) and its implications towards livelihoods of the farmers
- Studies on impact assessment and policy implications of various developmental programmes/schemes

Animal Husbandry

- Issues related to animal health problems faced by livestock farmers on migratory routes used in Bilaspur district.

- Documentation of the prevailing ethno-veterinary practices among migratory shepherds (*Gaddis*); their scientific validation and subsequent mass dissemination.
- Issues related to appropriateness of the recommended animal husbandry technologies / practices for mid-hill region of the district.
- Development of a profitable dairy husbandry package for mid-Hill livestock farmers in the face of the in-coming ‘LIVESTOCK REVOLUTION 2020’
- Development of an integrated livestock (cattle, fish and poultry) production model (ILPM) for farmers of district Bilaspur.
- To develop endocrinological tools to augment production and reproduction in dairy animals.
- Surveillance, monitoring and control of the diseases of animals and birds including wild fauna
- Issues related to pharmacokinetic behaviour of the drugs on local breeds of animals and pharmacokinetic interaction of herbal bio-enhancers.
- Development of herbal nutraceuticals for health and production of farm animals
- Pharmacological and toxicological studies on the poisonous plants and characterization of their toxic principles and anti nutritional factors.
- Investigation on the etiological agents of infectious infertility among bovine, ovine and caprine including male animals with special emphasis on *Brucella*, *Chlamydia*, *Mycobacterium* and fungal agents including their molecular diagnosis
- Preparation and testing of multiserotype vaccine against haemorrhagic septicaemia
- Serosurveillance of some important infectious diseases in livestock
- Investigations on the epidemiology and serodiagnosis of *mycobacterium bovis* infection in bovines in the district.
- Molecular diagnosis and genetic diversity analysis of important pathogens responsible for major animal diseases and zoonoses.

- Identification of the indigenous livestock health practices among livestock farmers in the district.
- To generate database for various surgical disorders in small and large animals of the district.
- Diagnostic imaging for early and accurate management of surgical afflictions in animals.
- Evaluation of medicinal plants/herbs utilized in soft and hard tissue healing in animals.
- Development of safe and suitable balanced anaesthetic techniques for ponies and wild animals of the district.
- Standardization of various orthopedics (external and internal) techniques in large, small and companion animals.
- Standardization and further application of endoscopic and laproscopic techniques in clinical cases of abdominal disorders in small and large animals.
- Application of various diagnostic and operative ophthalmic procedures in surgical cases of small and large animals.
- Evaluation of various prosthetics and biomaterials in the management of abdominal trauma/fracture/muscular skeletal disorders in animals.
- Diagnostic and surgical approaches to neoplasm in small and large animals.
- To develop state of art in diagnostic and operative facilities including intensive care unit for small and large animals.
- Survey of prevalence of acarine fauna of veterinary importance involved in tick typhus in mid-and low-hill areas of the district.
- Potential of phytotherapy as an alternative to conventional anthelmintic medication for parasite control.
- Studies on routine and immunodiagnosis of parasitic aetiopathogen causing neonatal diarrhea and mortality in calves.

Horticulture

- The development of technology for frost management

- Management of mango mealy bug with emphasis on bio-rational methods
- Development of management strategies for mango malformation and diseases of ornamental crops like gladiolus, carnation, liliun, etc.
- Research on controlling fruit in cracking and fruit drops in litchi.
- Development of efficient propagation for litchi, mango, amla, etc.
- Generation of data base of pollinator diversity in different horticultural crops
- Identification of potential bee keeping belts in different districts
- Safe waiting periods of pesticides on horticultural crops
- The development of varieties which give regular fruits
- Expansion of area under fruits through varietal testing of low chill apples and pears
- Identification of niche area and remapping of different fruit growing belts
- Diversification of fruits and their varieties with under utilised fruits
- To develop technology for improving water use efficiency fertiliser in different fruit crops
- Integrated pest/disease management
- Integrated nutrient management

XIV. Sum Up

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

Chapter-I

INTRODUCTION

1.1 Background

Planning is an act or process of preparing or carrying out a focussed activity with goals, procedures and policies for economic emancipation of a social or economic unit in a given time frame. The document containing goals, targets and policies to accomplish plan targets is defined as plan. Planning in the context of district agricultural plans is an exercise of 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 focused 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 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, to technology fatigue versus policy fatigue and persistent neglect of agriculture and gradual withdrawal of state from active participation in development activities. It is evident from

declining plan outlay, declining public sector capital formation, dwindling credit supply; 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 coverage of commodities under MSP scheme and actual procurement of produce. 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 emphasized fast and inclusive growth, especially of agricultural sector, so that the benefits of growth percolate down to the most vulnerable sections of the society like landless labour, marginal and small farmers, scheduled caste, scheduled tribes, women, and so on. A number of new initiatives have been launched to revive growth in agriculture. One of such important innovation that has been introduced in the Eleventh Five Year- Plan is Rashtriya Krishi Vikas Yojna (RKVY) with an outlay of Rs. 25,000 crores to give states more flexibility and autonomy in planning and executing programmes for agriculture, achieve goals of bridging the yield gaps in important crops, maximize 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 mechanizations, soil health and productivity, development of rain-fed farming systems, integrated pest management, market infrastructure, horticulture, animal husbandry, dairying and fisheries, completion of projects that have definite time lines, support to institutions that promote agriculture and horticulture, etc organic and bio-fertilisers are given priority. The District Agricultural Plan (DAP) should determine each district's final resource envelops its production plan and the associated input plan. It has also been emphasized to integrate these district level agricultural plans with the state plans.

Against above background, the Himachal Pradesh State Department of Agriculture entrusted the task of preparing these plans to the University 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, women drudgery, 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 department like agriculture and horticulture and the scientists working at different KVKs and regional research stations. The details of the methodological framework have been provided in subsequent sections.

1.2 Data and Methods

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

1.2.1 Sampling Plan

The state has been divided into 77 developmental blocks. Though all the developmental blocks in the state were taken, sampling approach was adopted to select the panchayats. The sample panchayats were to be selected in such a way so that variations in micro climatic niches, farming systems and cropping patterns in a particular block are captured. To meet this requirement, it was decided to select 10 per cent of the total panchayats from each of the block with a minimum of four panchayats in those districts, where number of panchayats was more than 200. In other districts, where number of panchayats was less than 200, 15 per cent of the panchayats were selected again with a minimum condition of selecting four panchayats. Wherever 10 per cent 15 per cent of the total panchayats from a block was not an integer (5.5 say) in those cases the next higher integer (say 6) was to be taken. Following this methodology, the number of panchayats selected in district Bilaspur was 23. The details of the sample panchayats are provided in Table 1.1

Table 1.1 The Sample Plan

Block	No of selected Panchayats	Name of selected panchayats	Total Panchayats in block
Bilaspur Sadar	10	Balh Balhwana, Tanval, Markri Markand, Bassi, Sui Surhaad, Panjgal Khud, Nichli Bhatar, Bandla, Ree, Swahan	63
Jhandutta	7	Behna Jattan, Jhandutta, Amarpur, Berthin, Paplah, Gharan, Saneehra	48
Ghumarwin	6	Meheri Kathla, Hatwar, Luharwin, Hawan, Harlog, Bharai	40
District	23		151

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 the panchayat 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. Teams of scientists were constituted to collect data from the sample panchayats and blocks. 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, 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 severe time constraint. Further, under current dispensations while most of the data are being collected and prepared at the tehsil level, the developmental schemes are being implemented at block level whose geographical area seldom coincides with that of tehsil. This mismatch between the administrative boundaries of tehsil and development blocks 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

DESCRIPTION OF THE DISTRICT

2.1 Physiography and Location

Bilaspur district comprises the erstwhile princely state. Prior to the merger of hilly states, this territory was under the rule of Ranas and Thakurs. These diminutive states were at loggerhead among themselves constantly and therefore became easy prey to superior forces, and it was in this manner that Bilaspur and all the larger hill states of later time were founded. The district was integrated with Himachal Pradesh on July 1, 1954 and became the fifth district. It is situated in the sub-mountain and low hills sub-tropical zone of Himachal Pradesh. The district lies between $31^{\circ} 12' 30''$ and $31^{\circ} 35' 45''$ north latitude and $76^{\circ} 23' 45''$ and $76^{\circ} 55' 40''$ east longitude in the outer hills of Himalayas next to the Punjab plains. The total geographical area of the district is 1167 sq kilometres which accounts for 2.1 per cent of the state geographical area. It forms a part of the basin of river Sutlej which flows 90 kilometres across it. It is bounded on the north by Mandi and Hamirpur districts, and on the west by Hamirpur and Una districts and on its south it has boundary with Solan district. While from the east to west maximum length of the district is about 51 kilometres, the maximum width from north to south is about 43 kilometres. The district is mostly hilly and elevation of the lowest point is about 290 meters and that of highest is about 1980 meters. There are seven hill ranges in the district. These are Naina Devi, Kot, Jhanjhar, Tiun, Bandala, Bhadarpur and Rattanpur. The district is also known as Satdhar Kahloor since princely times. Administratively, the district is divided into three blocks, namely, Bilaspur Sadar, Ghumarwin, and Jhandutta, two sub-divisions viz. Ghumarwin and Sadar and three tehsils and one sub-tehsil. It has four towns i.e. Bilaspur, Ghumarwin, Berthin and Namhol. There are two National Highways passing through the district (Chandigarh-Manali, Kangra-Shimla via Jukhala). The total number of panchayats is 151 which have 1061 villages, out of which 965 are inhabited and 96 are un-inhabited.

Bilaspur district is situated in the sub-mountain low hill sub-tropical zone of Himachal Pradesh. A large proportion of the area of the district falls below 650 meters from the

mean sea level. Most of the soils have been formed from the sedimentary rocks with sand and stone, dolomite, shales, calcite and quartz as primary materials. The soils are shallow, light textured, low in fertility and neutral in reaction with PH ranging from 6.5 to 7.5. Soil reaction is neutral and availability status of NPK is medium to low. Water holding capacity of soils is low which is susceptible to soil erosion. The minimum and maximum temperature ranges from as low as 0.3⁰ C to as high as 37⁰C. The rainfall pattern during different seasons of the year and total rainfall between 1990-91 and 2003-04 has been given in Table 2. 1. The table displays wide inter season and inter-year fluctuations in rainfall. For example, during the monsoon period, the amount of rainfall varied from as high as 1585.5 millimetres in 1996-97 to as low as 557.5 millimetres in 2002-03. More or less similar pattern was discernible in the amount of rainfall in other seasons. Taking the total amount of precipitation in all the four seasons, it varied from as 757.7 millimetres in 2002-03 to as high as 2176.8 millimetres in 1997-98.

2.2 Demographic Features

The population of the district (Table 2. 2), increased from 2, 47,368 in 1981 to 2, 95, 387 in 1991 recording a decadal growth rate of 19.41 per cent. It further increased to 3,40,735 in 2001 registering a decadal growth rate of 15.35 per cent as per 2001 census. The district accounted for 5.61 per cent of the total population of the state. The density of population increased from 212 persons per square kilometre in 1981 to 292 persons per square kilometre in 2001. The literacy rate in the district increased significantly during the two decades; from 34.76 per cent in 1981 to 78.80 per cent in 2001. It was, however, interesting to see that while in the former year the literacy rate in the district was lower than that of state average, in the latter year it was higher for male,

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

Year	Monsoon	Winter	Post Monsoon	Pre-Monsoon	Total
1990-91	858.9	129.4	101.0	146.4	1235.7
1991-92	621.2	99.3	48.5	98.2	867.2
1992-93	846.0	147.7	14.4	40.5	1048.6
1993-94	648.9	146.1	5.5	102.1	902.6
1994-95	1564.6	146.1	11.7	102.1	1818.3
1995-96	1191.1	192.7	4.2	114.0	1502
1996-97	1585.5	117.2	50.5	219.2	1972.4
1997-98	1182.6	189.2	427.5	377.5	2176.8

1998-99	1540.5	274.9	84.8	142.5	2042.7
1999-2000	1084.9	127.9	3.5	112.3	1328.6
2000-01	664.0	16.0	-	175.1	855.1
2001-02	645.9	76.6	35.1	94.8	852.4
2002-03	557.5	96.1	13.5	90.6	757.7
2003-04	864.3	96.1	18.1	90.6	1069.1

Source: Annual Season and Crop Reports, Different Issues, Directorate of Land Records, Government of Himachal Pradesh, Shimla.

Table 2.2 Demographic Features

Particular	Year	Population (No.)					Literacy %		
		Person	% to state	Dec. growth	Density/ Sq/km	Sex ratio	Male	Female	Total
Bilaspur	1981	247368	5.78	26.99	212	1002	44.69	54.65	34.76
	1991	295387	5.71	19.41	253	1002	77.97	56.55	67.17
	2001	340735	5.61	15.35	292	992	87.13	70.53	78.80
H. P.	1981	4280818	100.00	23.71	93		53.19	31.46	42.48
	1991	5170877	100.00	20.79	93	976	75.36	52.13	63.86
	2001	6077248	100.00	17.39	109	970	86.02	68.08	77.13

Source: Census of HP, 1991 & 2001

Table 2.3 Tehsil Wise Demographic Features of District Bilaspur, 2001

Tehsil	Persons	Male	Female	Sex ratio
Ghumarwin	120442 (100.00)	58682 (48.72)	61760 (51.28)	1053
Bilaspur Sadar	97622 (100.00)	50338 (51.56)	47284 (48.44)	939
Sh. Naina Deviji	41322 (100.00)	21557 (52.17)	19765 (47.83)	917
Jhandutta	81499 (100.00)	40686 (49.92)	40813 (50.08)	1003
District	340885 (100.00)	171263 (50.24)	169622 (49.76)	992

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

Table 2.4 Tehsil Wise Rural and Urban Population of District Bilaspur, 2001

Tehsil	Total			Rural			Urban		
	Persons	Male	Female	Persons	Male	Female	Persons	Male	Female
District	340885	171263	169622	318934	159488	159446	21951	11775	10176
Ghumarwin	120442	58682	61760	114721	55666	59055	5721	3016	2705
Bilaspur Sadar	97622	50338	47284	84564	43374	41190	13058	6964	6094
Sh. Naina Deviji	41322	21557	19765	40161	20822	19339	1161	735	426
Jhandutta	81499	40686	40813	79488	39626	39862	2011	1060	951

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

Table 2.5 Tehsil Wise Proportion of Rural and Urban Population of District Bilaspur, 2001

Tehsil	Rural			Urban		
	Persons	Male	Female	Persons	Male	Female
District	93.56	93.12	94.00	6.44	6.88	6.00
Ghumarwin	95.25	94.86	95.62	4.75	5.14	4.38
Bilaspur Sadar	86.62	86.16	87.11	13.38	13.84	12.89
Sh. Naina Deviji	97.19	96.59	97.84	2.81	3.41	2.16
Jhandutta	97.53	97.39	97.66	2.47	2.61	2.34

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

female and all persons. The sex wise distribution of population has been brought out in Table 2.3. The table shows that among different tehsils female population accounted for more than 50 per cent in Ghumarwin and Jhandutta. In the remaining two tehsils their proportion was less than fifty per cent. At the district level, the proportion of female population was marginally less than fifty per cent. Tehsil wise distribution of rural and urban population is given in Tables 2.4 and 2.5. As may be seen from these tables, a preponderant majority of population lived in rural areas; among different tehsils the proportion of rural population varied from 93 per cent to nearly 98 per cent.

The distribution of workers into main and marginal workers in district Bilaspur and state of Himachal Pradesh has been presented in Table 2.6. The table reveals that workers constituted nearly half of the total population in the district, and out of total workers nearly two-thirds were main workers. Similar pattern was discernible at the state level as well. Further, among male and female workers, while the proportion of total male workers was 52.22 per cent, in case of females it was around 46 per cent. The total workers were nearly equally distributed between main and marginal workers. In comparison, there was a different pattern in the distribution of male and female workers. For example, while in case of male workers the proportion of marginal workers was around 12 per cent, in respect of female workers the distribution was more even with marginal female workers constituting around 21 per cent. More or less similar pattern in the distribution of total workers into main and marginal workers was noted for the state as a whole. Table 2.7 provides per cent distribution of total workers into main and marginal workers. It shows that out of the total workers, two-third were main workers and remaining one-third were marginal workers. Among male and female workers, main

workers accounted for more than three-fourth in case of the former and a little more than fifty per cent in respect of the latter. The pattern was broadly similar for the state as a whole with the notable exception that the per cent share of marginal workers for the district was slightly higher than their main worker counterparts in the state.

The distribution of main and marginal workers into different occupational categories has been brought out in Table 2.8. The table indicates that among main workers, cultivators accounted for three-fifths of the total workers; among the males and females, the share of cultivators was a little more than two-fifths in case of the former and as high as 87 per cent in case of the latter. The per cent share of workers in two occupational categories viz. agricultural labour and household industry was low; it was less than one per cent in case of agricultural labour and less than two per cent in case of household industry. The workers in other occupations which included construction, transport and communication, services, etc accounted for 37 per cent of the total main workers. It was, however, important to mention that the proportion of female workers employed in other

Table 2.6 Proportion of Workers to Total Population, 2001

Particular	Person	Male	Female
Bilaspur			
Population	340885	171262	169222
Total Workers	166708 (48.90)	89425 (52.22)	77283 (45.67)
Main Workers	110652 (32.46)	69356 (40.50)	41296 (24.49)
Marginal Workers	56056 (16.44)	20069 (11.72)	35987 (21.27)
Himachal Pradesh			
Population	6077900	3087940	2989960
Total Workers	2992461 (49.23)	1686658 (54.62)	1305803 (43.67)
Main Workers	1963882 (32.31)	1333361 (43.17)	630521 (21.09)
Marginal Workers	1028579	353297	675282

Note: Figures in parentheses are percentages

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

Table 2.7 Percent of Main and Marginal Workers, 2001

Particular	Persons	Male	Female
Bilaspur			
Main Workers	66.37	77.56	53.43
Marginal Workers	33.63	22.44	46.57
All	100.00	100.00	100
Himachal Pradesh			
Main Workers	65.62	79.05	48.29
Marginal Workers	34.38	20.95	51.71
All	100.00	100.00	100

Note: Figures in parentheses are percentages

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

occupations was around 11 per cent. In a similar vein, the distribution of marginal workers into different occupational categories shows that a preponderant majority of such workers in both the sexes was engaged in cultivation both at the district and state level. Nonetheless, nearly one-fourth of the male marginal workers in the district were also engaged in other occupations which included construction activities, transport and communication, hotel restaurant, and so on

Table 2.8 Occupational Composition of Main and Marginal Workers, 2001

Particular	Bilaspur			Himachal Pradesh		
	Persons	Male	Female	Persons	Male	Female
I Main Workers	110652 (100.00)	69356 (100.00)	41296 (100.00)	1963882 (110.00)	1333361 (100.00)	630521 (100.00)
i. Cultivators	66487 (60.09)	30262 (43.63)	36225 (87.72)	1089124 (55.46)	578807 (43.40)	510317 (80.93)
ii. Agricultural Labour	1014 (0.92)	735 (1.06)	279 (0.68)	36156 (1.84)	26499 (1.99)	9657 (1.53)
iii. Household Industry	2143 (1.94)	1800 (2.59)	343 (0.83)	34917 (1.74)	27671 (2.07)	7246 (1.15)
iv. Others	41008 (37.06)	36559 (52.71)	4449 (10.77)	803685 (40.92)	700384 (52.53)	103301 (16.38)
II Marginal Workers	56056 (100.00)	20068 (100.00)	35987 (100.00)	1028579 (100.00)	353297 (100.00)	675282 (100.00)
i. Cultivators	47757 (85.20)	13806 (68.79)	33951 (94.34)	865746 (84.16)	255505 (972.32)	610241 (90.36)
ii. Agricultural Labour	1909 (3.41)	1057 (7.66)	852 (2.37)	58015 (5.64)	29159 (8.25)	28856 (4.27)
iii. Household Industry	584 (1.04)	372 (2.69)	212 (0.59)	17602 (2.03)	6363 (1.80)	11239 (1.66)
iv. Others	5806 (12.16)	4834 (24.09)	972 (2.87)	87216 (8.48)	62270 (1.76)	24946 (3.69)

Note: Figures in parentheses are percentages

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

2.3 Land Utilization, Cropping Pattern and Crop Production

The changes in the land utilization pattern have been brought in Table 2. 9. The table suggests that the area under forests in the district increased from 9.93 per cent to 12.52 per cent between 1990-91 and 2004-05. Further, while there was a marginal decline in the proportions of barren land and area under pastures, the proportion of area put to non-agricultural uses, current fallow and other fallows registered an increase of varying degree. The net sown area, however, remained unchanged during the period except in the first half of the nineties when it decreased by nearly two percentage points. The pattern of change in land utilization for the state was, however, different. For example, the proportion of area under forests, culturable waste and net sown area declined by varying degree, especially between 1995-96 and 2004-05. The area put to non-agricultural uses, however, recorded a significant increase, particularly between 2000-01 and 2004-05. The changes in the cropping pattern, brought out in Table 2.10, indicate that among different foodgrain crops in the district, the area under maize and wheat recorded an increase of varying degrees but the area under rice and barley decreased. However, the area under all foodgrain crops increased marginally from around 96 per cent to around 97 per cent. On the other hand, at the state level, the area under foodgrain crops decreased from around 89 per cent in 1990-91 to 84 per cent 2005-06. In case of important crops like maize, rice and wheat, the per cent of area under these crops witnessed decrease of varying proportions. The changes in the production of different crops including total foodgrains have been given in Table 2. 11. The table shows that the production of foodgrains in the district nosedived from 94.01 thousand tonnes in 1990-91 to 54.18 thousand tonnes in 2006-07. Among different crops, ignoring the year 2000-01 which was a drought year, the maximum decline was noted in case of wheat production mainly because it depends upon winter rainfall followed by maize and rice. Similar pattern was discernible at the state level as well. For example, the production of foodgrains decreased from 1368.66 thousand tonnes in 1990-91 to 1079.15 thousand tonnes in 2005-06. Likewise, among different crops, while production of maize decreased from 669.2 thousand tonnes in 1990-91 to 543.06 thousand tonnes in 2005-06, that of rice plummeted from 945.32 thousand tonnes to as low as 112.14 thousand tonnes during the same period. More

importantly, however, the production of pulses nearly doubled during the period; it increased from

Table 2.9 Changes in Land Utilization Pattern (Per Cent)

Particular	Year	Forest land	Barren Land	Non-agri. uses	Culturable waste	Pasture	Misc. trees/groves	Current fallow	Other fallow	Net sown area
Bilaspur	1990-91	9.93	6.98	11.66	4.28	36.78	0.08	1.40	0.78	28.11
	1995-96	10.88	5.53	10.66	4.25	39.61	0.10	0.92	1.31	26.75
	2000-01	10.78	5.67	10.18	5.56	38.85	0.11	1.64	1.04	26.17
	2004-05	12.52	3.85	13.51	5.55	35.42	0.09	1.73	1.18	26.15
H.P.	1990-91	30.85	5.46	5.74	3.72	33.72	1.43	1.33	0.46	17.31
	1995-96	31.10	4.07	5.66	3.64	35.44	1.35	1.55	0.76	16.43
	2000-01	24.05	17.75	6.90	2.74	33.63	1.25	1.19	0.30	12.20
	2004-05	24.22	14.78	10.08	2.80	33.02	1.51	1.32	0.31	11.94

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

Table 2.10 Changes in Cropping Pattern (Per Cent)

Particular	Year	Maize	Rice	Wheat	Barley	Pulses	Foodgrains	Cropped area (000 ha)
Bilaspur	1990-91	42.86	4.80	44.81	0.77	2.01	96.08	59.74
	1995-96	44.93	3.97	45.56	0.51	1.33	96.31	59.59
	2000-01	45.84	3.21	47.59	0.09	0.65	97.37	57.97
	2005-06	44.37	2.49	46.30	0.36	0.78	94.31	56.70
H.P.	1990-91	32.44	8.63	38.26	2.98	3.69	88.59	983.60
	1995-96	32.58	8.74	38.04	2.84	3.80	87.43	949.89
	2000-01	31.46	8.65	38.27	2.71	3.28	85.98	947.54
	2005-06	30.98	8.32	37.59	2.65	2.88	83.66	953.60

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

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

Table 2.11 Changes in Production of Major Crops and Total Foodgrains Production, 1990-91 to 2002-03 (000 tonnes)

Particular	Year	Maize	Rice	Wheat	Barley	Pulses	Foodgrains
Bilaspur	1990-91	44.73	4.48	43.29	0.68	0.83	94.01
	1995-96	44.17	2.95	34.62	0.39	0.31	82.44
	2000-01	58.99	2.79	7.90	0.04	0.14	69.86
	2005-06	37.90	1.94	13.98	0.24	0.12	54.18
H.P.	1990-91	669.20	945.32	543.69	3.71	10.87	1368.66
	1995-96	663.44	111.76	502.01	3.42	18.61	1336.29
	2000-01	683.64	124.98	251.32	21.41	20.46	1108.41
	2005-06	543.06	112.14	365.89	29.36	19.63	1079.15

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

about 11 thousand tonnes to 19.63 thousand tonnes. The yield levels of main crops, including foodgrains, have been shown in Table 2.12. As may be seen from the table, the yield levels of all crops have recorded decrease of varying degree between 1990-91 and 2005-06, both at the district and state level. The data on area and production of different vegetable crops both in the district and state during the year 2005-06 have been brought out in Table 2.13. The table reveals that in the district, tomato, onion & garlic, okra, cucurbits, cauliflower and peas were important vegetable crops both in terms of area and production. The other vegetable crops also covered 360 hectares of land and contributed 50,195 tonnes of vegetable production. The yield levels of most of the crops in the district were, however, higher as compared to state level yields except capsicum and chillies and other vegetables; these varied from as low as 90.53 quintal per hectare in case of capsicum and chillies to as high as 350 quintals per hectare for tomato. Likewise, at the state level, pea was the most important crop that covered 15,348 hectares of area followed by tomato with an area of 9,211 hectares. Onion & garlic, cabbage and cauliflower were other important crops both in terms of area and production. The state level average yield of different crops ranged from 104.61 quintals per hectare in case of beans to 327.05 quintals per hectare for tomato.

The changes in area and production of total fruit crops in district Bilaspur and the state as a whole have been presented in Table 2.14. The table reveals that in district Bilaspur both the area under fruit crops and fruit production fluctuated widely between 1990-91 and 2005-06. However, taking a long period view, both the area and production decreased; while during the period (1990-91 and 2005-06) the area under fruit crops declined from 7,628 hectares to 6,232 hectares and the production decreased from 4,820 tonnes to 4,297 tonnes. At the state level, both the area and production increased significantly; the area under fruit increased from 1,63,330 hectares to 1,91,668 hectares and fruit production rose from 3,86,314 tonnes to 6,95,520 tonnes. Among different fruit crops, most of the area in the district was under other fruit crops, of which mango was the most important one (Table 2.15). The per cent share of different fruit crops in area and production (Table 2.16) shows that around 84 per cent of area and 90 per cent of the total fruit production was contributed by other fruit crops of which, as mentioned above, mango was the most important crop. Citrus was also an important fruit crop accounting for 14 per cent of the

total area and nearly one-tenth of the total fruit production. At the state level, apple was important fruit crop accounting for around 46 per cent of the total area under fruits and more than three-fourth of the total fruit production. Other fruit crops ranked second contributing more than one-third of the total area under fruits and nearly 18 per cent of the total fruit production.

Table 2.12 Changes in Yields of Major Foodgrain Crops, 1990-91 to 2002-03 (Q/ha)

Particular	Year	Maize	Rice	Wheat	Barley	Pulses	Foodgrains
Bilaspur	1990-91	17.47	15.63	16.17	14.71	3.33	16.53
	1995-96	16.50	12.47	12.75	12.68	3.90	14.37
	2000-01	22.20	15.01	12.86	8.40	3.69	12.38
	2005-06	15.07	13.68	5.32	11.63	2.69	10.13
H.P.	1990-91	18.76	9.87	15.99	14.70	2.31	16.54
	1995-96	19.90	13.46	13.89	12.69	5.16	16.09
	2000-01	22.94	15.24	7.21	8.33	6.58	14.59
	2005-06	18.39	14.13	10.21	11.64	7.14	13.52

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

Table 2.13 Area, Production and Yield of Different Vegetables, 2005-06

Crop	Bilaspur			H.P.		
	Area (Ha)	Production (T)	Yield (Q/ha)	Area (Ha)	Production (T)	Yield (Q/ha)
Peas (Green)	80	1680	210.00	15348	177036	115.35
Tomato	765	26775	350.00	9211	301249	327.05
Beans	50	605	120.10	2674	27973	104.61
Onion & Garlic	175	2580	140.74	3735	49622	132.86
Cabbage	30	840	280.00	3677	115920	315.26
Cauliflower	90	2380	260.44	2263	53103	234.66
Radish, Turnip & Carrot	75	1650	220.00	1571	32675	207.99
Bhindi	170	2210	130.00	1728	19659	113.77
Cucurbits	160	4160	260.00	2082	43845	210.59
Capsicum & Chillies	75	715	90.53	2081	30876	148.37
Brinjal	40	920	230.00	772	14267	184.81
Other Vegetables	360	5680	150.78	3715	63817	171.78
Total	2050	50195	240.48	49858	929706	186.47

Source: Directorate of Land Records, Government of Himachal Pradesh, Shimla

Table 2.14 Area, Production and Yield of Fruits; 1990-91 to 2005-06

Particular	Year	Area (Ha)	Production (T)
Bilaspur	1990-91	7628	4820
	1995-96	9063	3150
	1999-00	6263	5161
	2005-06	6232	4297
H.P.	1990-91	163330	386314
	1995-96	195684	311889
	1999-00	217319	428049
	2005-06	191668	695520

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

Table 2.15 Area and Production of Different Fruits, 2005-06

Fruit crop	Bilaspur		H.P.	
	Area(Ha)	Production (T)	Area(Ha)	Production (T)
Apple	4	3.5	88560	540360
Citrus	884	436.5	20729	29160
Dry Fruits	84	7.69	11210	3920
Other Fruits	5260	4024.80	71169	122080
Total Fruits	6232	4472.49	191668	695520

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

Table 2.16 Per Cent Area and Production of Different Fruits, 2005-06

Fruit crop	Bilaspur		H.P.	
	Area	Production	Area	Production
Apple	0.06	0.09	46.20	77.69
Citrus	14.19	9.75	10.82	4.19
Dry Fruits	1.35	0.17	5.85	0.57
Other Fruit	84.40	89.99	37.13	17.55
Total Fruits	100.00	100.00	100.00	100.00

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

2.4 Distribution of Landholdings

Table 2.17 brings out the changing distribution of landholdings in terms of proportion of different categories of holdings and area accounted for by them. The table shows that consistent with overall pattern noted at the All-India level and other states, the process of marginalization of holdings was evident both for the district and state. For example, between 1980-81 and 2000-01, the proportion of marginal holdings increased from nearly 52 per cent to more than 60 per cent while that of small holdings remained nearly unchanged at one-fourth level. The proportion of remaining two categories of holdings i.e. medium and large, however, recorded a continuous decline. On the other hand, the proportion of operated area accounted for by these holdings brings out highly un-equal distribution pattern. It was evident from the fact that more than tree-fifth of the marginal holdings accounted for around one-fourth of the total operated area in comparison to large and medium size holdings whose numerical proportion was around 15 per cent accounting for nearly 42 per cent of the total operated area. More or less similar pattern was in evidence for the state as a whole. While the proportion of marginal holdings increased from around 55 per cent in 1980-81 to more than two-third of the total holdings, the extent of small holdings decreased from 22.03 per cent to around 19 per

cent. The large and medium holdings also recorded a continuous decrease. Insofar as distribution of operated area was concerned, the category of medium holdings and

Table 2.17 Changing Pattern of Land Holdings, 1980-81 to 2000-01 (Per Cent)

Particular	Census year	Marginal <1 ha		Small 1-2 ha		Medium 2-4 ha		Large >4 ha		Total	
		No.	Area	No.	Area	No.	Area	No.	Area	No.	Area
Bilaspur	1980-81	52.28	17.90	25.32	26.43	17.02	33.48	5.37	22.19	37792	52182
	1985-86	55.19	21.87	26.27	30.12	14.64	30.95	3.90	17.06	41266	54881
	1990-91	57.66	23.23	26.26	31.59	13.16	30.15	2.92	15.03	45738	54028
	1995-96	59.18	25.09	25.26	32.20	12.93	29.51	2.63	13.21	48656	52620
	2000-01	65.83	30.12	22.55	31.56	9.66	26.59	1.96	11.71	54609	50953
H. P.	1980-81	55.30	14.92	22.03	20.43	15.16	27.08	7.51	37.57	637081	980425
	1985-86	61.55	20.46	20.63	22.71	12.24	25.97	5.58	30.86	752882	980240
	1990-91	63.82	21.26	19.96	23.29	11.26	25.51	4.96	29.94	833793	1009766
	1995-96	62.85	23.05	19.61	24.07	10.74	25.54	6.80	27.34	884492	999099
	2000-01	67.30	25.70	19.10	25.00	9.80	24.80	3.80	24.50	913914	978756

Source: Agricultural Census, Directorate of Land Records, Government of Himachal Pradesh, Shimla

Table 2.18 Changes in Average Size of Holdings, 1980-81 to 1995-96 (Hectares)

Particular	Year	Marginal (<1 ha)	Small (1-2 ha)	Medium (2-4 ha)	Large (>4 ha)	Overall
Bilaspur	1980-81	0.47	1.44	2.72	5.70	1.38
	1985-86	0.53	1.52	2.81	5.82	1.33
	1990-91	0.48	1.42	2.71	6.09	1.18
	1995-96	0.46	1.38	2.47	5.44	1.08
	2000-01	0.43	1.31	2.57	5.57	0.93
H. P.	1980-81	0.42	1.43	2.75	7.70	1.54
	1985-86	0.43	1.43	2.76	7.20	1.30
	1990-91	0.40	1.41	2.74	7.31	1.21
	1995-96	0.41	1.39	2.69	7.03	1.13
	2000-01	0.41	1.40	2.71	6.85	1.07

Note: Medium includes semi-medium holdings also

Source: Agricultural Census, Directorate of Land Records, Government of Himachal Pradesh, Shimla

large holdings each accounted for around one-fourth of the total operated area. The proliferation of holdings due to sub-division coupled with lack of alternative employment opportunities in non-farm sector resulted in persistent decrease in the average size of holdings of all size categories both at the district and state level (Table 2.18).

2.5 Irrigation and Use of Inputs

The proportion of area under irrigation in main crops like maize, wheat and paddy is given in Table 2.19. The table shows that per cent irrigated area to net sown area in the district has remained practically constant at around 10 per cent. In respect of different

crops, only around 7 per cent of the total area under maize was irrigated while this proportion was as high as around 69 per cent in case of paddy. In case of wheat, the proportion of irrigated area was around 10 per cent. Insofar as proportion of irrigated area under these crops at the state level was concerned, the table reveals that the irrigated area remained constant at around 19 per cent. In case of main crops, less than one-tenth of the area under maize was irrigated whereas this proportion in case of paddy was nearly 6 per cent. The proportion of irrigated area under wheat was 20 per cent. Table 2.20 presents the proportion of area under high yielding varieties for three major crops, namely, maize, paddy and wheat both at the district and state level. The table shows that during the twenty years period since 1980-81, the area under high yielding varieties of maize increased from 23.19 per cent to as high as 94 per cent. The respective figures for wheat were 50 per cent and 100 per cent. At the state level, while the proportion of irrigated area under maize increased from around 15 per cent in 1980-81 to nearly 62 per cent during 1999-00, the respective figures for wheat were 33.85 per cent and 61.05 per cent. The changes in fertiliser consumption, given in Table 2.21, show that while the consumption of all fertilisers in the district increased from 979 metric tonnes in 1980-81 to 2,383 metric tonnes in 2005-06, at the state level during the period, it increased from 13,950 metric tonnes to 47,973 metric tonnes. In terms of fertiliser consumption per hectare, it increased from 16.43 kilogram per hectare in 1980-81 to 41.60 kilogram per hectare in 2005-06 in the district and from 14.74 kilogram per hectare to 50.78 kilogram per hectare at the state level. The use of machinery is yet another important mechanical input for both production and productivity of different crops inasmuch as it helps completing different agricultural operations in time thereby boosting the production and productivity levels. The extent of use of different farm machinery in the district and state has been presented in Table 2. 22. As may be seen from the table, there was a huge increase in the number of electric pumps from 84 in 1992 to 898 in 2003. Likewise, the number of oil engines during the period increased nearly three times, from 108 to 314. The number of tractors increased during the first period but remained constant subsequently. The number of cane crushers also declined initially but stagnated thereafter primarily because of replacement of sugarcane with other crops. The pattern is broadly similar at the state level; the number of ploughs decreased over the period suggesting the

replacement of plough with tractors whose use recorded significant increase in recent times because of increased practice of custom hiring. Furthermore, the number of cane crushers and carts declined while that of tractors nearly doubled and oil engines tripled during the ten years' period between 1992 and 2003. The maximum increase was, however, noticed in the number of electric pumps which increased from 1,222 in 1992 to 7,325 in 2003. These changes in the number of electric and oil engines are consistent with the ongoing process of crop diversification towards vegetable, horticulture and floriculture in the state.

Table 2.19 Area under Irrigation, Major Crops; 1990-91 to 2002-03 (Per Cent)

Particular	Triennium	Maize	Paddy	Wheat	% Irrigated area to net sown area
Bilaspur	1990-91	5.75	40.18	8.88	-
	1995-96	6.09	45.10	9.35	10.25
	2000-01	6.47	53.09	9.41	10.47
	2002-03	6.75	68.87	10.34	10.60
H P	1990-91	6.78	57.79	17.31	17.00
	1995-96	7.77	60.41	18.90	18.79
	2000-01	8.28	63.21	18.46	19.13
	2002-03	9.43	60.39	20.33	18.80

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

Table 2.20 Area under High Yielding Varieties of Major Crops (Per Cent)

Particular	Year	Maize	Paddy	Wheat
Bilaspur	1980-81	23.19	NA	49.96
	1999-2000	94.06	90.83	100
H P	1980-81	14.83	NA	33.85
	1999-2000	61.63	41.61	61.05

Note: NA = Area not available for 1980-81

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

Table 2.21 Fertilizer Consumption, 1980-81 to 2006-07

Particular	Year	NPK (Metric Tonnes)			NPK (Kg/ha)		
		Kharif	Rabi	Total	Kharif	Rabi	Overall
Bilaspur	1980-81	760	219	979	24.21	7.77	16.43
	1991-92	1244	842	2086	37.78	29.47	33.91
	1998-99	1230	954	2164	40.38	33.02	36.80
	2005-06	1322	1061	2383	45.29	37.76	41.60
H. P.	1980-81	8155	5795	13950	15.93	13.33	14.74
	1991-92	15599	15006	30605	29.12	34.36	31.47
	1998-99	15318	19534	34852	28.88	42.85	35.33
	2005-06	19197	28776	47973	37.28	66.69	50.78

Source: Statistical Outlines, Directorate of Economics and Statistics, Government of Himachal Pradesh, Shimla

Table 2.22 Extent of Mechanization (N0.)

Type of implement	Bilaspur			H. P.		
	1992	1997	2003	1992	1997	2003
Ploughs	44005	26040	44469	710349	462439	631470
Carts	4	4	4	1128	1807	240
Cane crushers	141	120	120	1878	1213	1135
Tractors	116	416	415	3466	4205	6966
Oil engines	108	124	314	1299	1295	3664
Electric pumps	84	100	898	1222	2530	7325
Threshers	-	-	-	19221	14048	19458

Source: Statistical Outlines, Directorate of Economics and Statistics, Government of Himachal Pradesh, Shimla

2.6 Livestock and Fisheries

The livestock is an integral part of agriculture, especially in hill and mountain agriculture. It is, therefore, important to examine important issues related to livestock. To begin with, we have discussed the changes in livestock population. Table 2.23 reveals that the total livestock population in district increased from 2, 21, 887 in 1977 to 2, 08,935 in 2003 recording a decrease of about 6 per cent. The maximum decrease was noted in cattle population whose number declined from 60,657 to 53,946. The number of buffaloes, however, increased from 67,912 to 97,668. The sheep population registered an unbelievable decrease from 24,615 in 1992 to 2,994 in 2003. At the state level, the livestock population increased between 1977 and 1992 but declined marginally during the subsequent period from around 51 lakh to 50 lakh. Further, there was an increase in the population of both cattle and buffalo but a huge decrease in the population of sheep. There was also a more than five times increase in poultry birds between 1977 and 2003. Table 2.24 presents the changes in livestock production. The table reveals that in district Bilaspur, milk production increased from 26.119 thousand metric tonnes in 1990-91 to 47.217 thousand metric tonnes in 2006-07. In the total milk production, the share of buffalo milk was more than 80 per cent. Coming to the milk production at the state level, the data show that it increased from 572.605 thousand tonnes to 872.0114 thousand tonnes. However, in the beginning the share of cow and buffalo milk in the total milk production was around 45 per cent and 53 per cent, respectively which changed to 53 per cent and 39 per cent in 2003. This huge change in the relative contribution of cow and buffalo milk could be explained in terms of ongoing process of replacing indigenous cows with improved ones and the spread of artificial insemination facilities in the rural

areas. Insofar as changes in wool production were concerned, while the wool production in the district increased from 25.23 metric tonnes in 1977 to 93.03 metric tonnes in 2003, at state level it increased from 1,452.10 metric tonnes to 1,605.33 metric tonnes. The production of meat in the district from increased from 88.04 metric tonnes to 122.28 metric tonnes in the district whereas at the state level it decreased from 4,049.00 metric tonnes to 2,934.23 metric tonnes. The production of eggs also increased both at the district and the state level. While in the former case, it increased from 36.24 lakh to 135.96 lakh, in the latter the increase was from 531.70 lakh to 771.98 lakh. The changes in fishery production in the district and state are given in Table 2.25. The table shows that the number of registered fishermen in the district increased from 946 in 1990-91 to 2,070 in 2006-07 whereas the number of fishermen declined from 12,109 to 10,536 in the state as a whole. The fish production in the district declined from 1,011 metric tonnes in 1990-91 to 767 metric tonnes in 2006-07 whereas for the state as a whole, the production increased from 5,132 metric tonnes to 6886 metric tonnes.

Table 2.23 Changes in Livestock Population, 1977 to 2003 (No.)

Particular	Census	Cattle	Buffaloes	Sheep	Goats	Total livestock	Poultry	Bovine density (No./Ha)	
								Geog. area	Operational holdings
Bilaspur	1977	60657	67912	33024	59764	221887	18275	1.90	4.25
	1992	60461	86858	24615	63472	237338	58844	2.03	4.42
	2003	53946	97668	2994	52819	208935	106499	1.79	3.82
H. P.	1977	2106229	560006	1055005	1035337	4795226	329561	0.86	4.75
	1992	2151616	700923	1074345	1115591	5116933	664039	0.92	5.04
	2003	2196538	773229	906027	1115587	5046044	763820	0.91	5.52

Source: Livestock Censuses 1977, 1992 and 2003

Table 2.24 Changes in Livestock Production, 1990-91 to 2006-07

Year	Milk (000 MT)				Wool (MT)	Meat (MT)				Eggs (Lac)
	Cow	Buffalo	Goat	Total		Goat	Sheep	Pig	Total	
Bilaspur										
1990-91	2.533	22.505	1.081	26.119	25.23	50.37	37.47	0.20	88.04	36.24
1995-96	4.187	31.432	1.795	37.414	15.29	47.10	32.11	1.10	80.31	69.93
2000-01	4.080	33.499	1.831	39.410	37.35	79.82	20.61	6.41	106.84	68.14
2006-07	9.210	36.451	1.556	47.217	93.03	76.34	40.26	5.68	122.28	135.96

Himachal Pradesh										
1990-91	257.563	300.843	14.199	572.605	1452.10	2332.00	1432.00	285.00	4049.00	531.70
1995-96	302.842	344.635	28.795	676.272	1548.13	2283.07	1159.39	150.82	3593.28	720.81
2000-01	349.620	377.032	33.759	760.411	1586.11	2248.61	955.19	221.61	3425.41	815.68
2006-07	500.005	345.186	27.204	872.014	1605.33	1869.60	799.85	264.77	2934.23	771.98

Source: Directorate of Animal Husbandry, Government of Himachal Pradesh, Shimla

Table 2.25 Trends in Fishery Production, 1990-91 to 2006-07

Year	Registered Fishermen (No.)	Production (MT)
Bilaspur		
1990-91	946	1011.00
1995-96	1215	1056.50
1999-00	1382	865.60
2006-07	2070	767.50
Himachal Pradesh		
1990-91	12109	5132
1995-96	8162	6002
1999-00	9698	6995
2006-07	10536	6886

Source: Summary Statistics for District Bilaspur 2006-07, District Statistical Office, Bilaspur

2.7 Infrastructural Facilities

The availability of basic infrastructural facilities in district Bilaspur has been given in Table 2. 26. Going by the number of basic social and physical infrastructural facilities, the district appear to have good availability of these facilities. For example, it had 101 veterinary hospitals and veterinary dispensaries, 181 cooperative societies, 839 schools of different standards, 2 degree colleges, 2 industrial training institutes, 147 health institutions and 1.09 beds per one thousand of population. Likewise, there were 45 branches of commercial banks and 27 cooperative banks in the district. The length of motorable road in the district was 1,309 kilometres and road length per hundred square kilometres was 112.17 kilometres. However, these facilities in comparison to population served were quite inadequate. For example, the number of hospital beds per thousand of population was just one; the motorable road length per one thousand square kilometres was 112.17. Thus there is an urgent need to increase these facilities, in particular the health facilities.

Table 2.26 Infrastructural Facilities in District Bilaspur as on March 2007

Sr. No.	Particular	No.
1	Veterinary hospitals	18
2	Veterinary dispensaries	83
3	Artificial insemination centres	18
4	Central veterinary hospitals	2
5	Cooperative societies	181
6	Primary schools	596
7	Middle schools	126
8	High schools	42
9	Senior secondary schools	75
10	Colleges	2
11	Industrial training institutes	2
12	Hospitals	2
13	Community health centres	27
14	Civil dispensaries	2
15	Health sub- centres	116
16	Hospital beds	373
17	Hospital beds per '000' of population	1.09
18	Ayurvedic dispensaries	65
19	Ayurvedic hospitals	2
20	Beds in ayurvedic hospitals	89
21	Beds per '000' population	0.26
22	Homeopathic dispensaries	2
23	Fair price shops	189
24	Commercial banks	45
25	Co-operative banks	27
26	Himachal gramian banks	3
27	Motorable roads (Km)	1309
28	Motorable road per 00 sq kilometres (km)	112.17
29	Post office	146
30	Telegraph office	1
31	Telephone office	47

Source: Summary Statistics for District Bilaspur 2006-07, District Statistical Office, Bilaspur

Chapter-III

SWOT ANALYSIS OF THE DISTRICT

Bilaspur district is one of the twelve districts of Himachal Pradesh. Agro-climatically, most of the area of the district lies in sub-tropical zone. The soils are shallow, light textured, low in fertility and neutral in reaction. While the mean temperature in the district varies from as low as 0.3°C to 37°C, it gets mean precipitation of around 1,100 to 1,200 millimetres. The district is agrarian like other districts of the state wherein a preponderant majority of the population seeks its livelihood from agriculture. Out of the total geographical area, net sown area accounts for nearly one-fourth. The agriculture mainly depends on rainfall inasmuch as only 10 per cent of the gross cropped area is under irrigation as compared to state average of 18.8 per cent. The cropping pattern is dominated by foodgrain crops which account for more than 95 per cent of the gross cropped area. Given the physical, institutional and human resources of the district, the main strengths, weaknesses, opportunities and threats (SWOT) for future growth of agriculture and allied sectors are described below.

3.1 SWOT Analysis for Improving Agriculture and Allied Sectors

3.1.1 Strengths

- The district has suitable climatic conditions to grow high value cash crops like fruit, off-season vegetables, medicinal plants, cut flower, etc due to its elevation which varies from 290 meters to 1980 meters from the mean sea level.
- The location of the district near to markets in the neighbouring states of Punjab, Haryana and Delhi as compared to other districts of the state gives it an added advantage.
- The availability of basic infrastructural facilities like rural roads, banks, R & D institutions like Krishi Vigyan Kendra (KVK) etc. Two national highways pass through the district. These offer avenues for commercial agriculture and agro-based industries.
- The price responsive, hard working and risk bearing farming communities willing to experiment and switch over to the cultivation of high value cash crops if

technical know how to adopt these new promising enterprises and right kind of infrastructure is put in place.

- Nearly one-third of the total geographical area of the district is under permanent pastures and grazing land suggesting huge potential for dairy enterprises.
- Good potential for irrigation facilities both through rain water harvesting and developing perennial sources of water.

3.1.2 Weaknesses

- Low proportion of cultivated land which is around one-fourth of the total geographical area.
- The low proportion of irrigated land which is 10 per cent as compared to state average of 18.8 per cent.
- A very high proportion of marginal, small, fragmented and scattered holdings
- Low and dwindling crop yields of most of the crops and pleauting of crop yields in some others
- Pastures and grazing lands infested with weeds and poor quality grasses
- Low water holding capacity of the soils.
- Lack of adequate marketing infrastructure in the district.
- Weak extension and back-up support system as a result of which farmers are handicapped in adopting improved technologies. The highly imbalanced use of fertilisers is an apt example of lack of extension facilities to the farmers

3.1.3 Opportunities

- Given agro-climatic conditions, the district has a potential to grow high value cash crops including medicinal plants. The agriculture in all the three development blocks of the district is undergoing a rapid transformation from cereals to vegetable crops and floriculture. A huge revolution of protected cultivation is underway, and farmers are earning fairly high returns from off-season vegetable crops and floriculture which have large market in the neighbouring cities and towns.

- The district also has suitable climate and potential for expanding area under horticultural crops like mango.
- Potential for commercial dairy development. The district has surplus fodder during the rainy season which can be stored for winter months when fodder is scarce.
- The district has a huge potential to increase fish production in Gobind Sagar water reservoir.
- The rising demand for fruit and vegetables due to increase in income, changing demand and consumption patterns, ongoing process of globalisation and rapid development of technologies offer huge opportunities for the expansion of the cultivation of high value cash crops for which district has suitable agro-climatic conditions.
- There is a huge potential to increase crop yields of different crops, particularly maize, as is evident from very large difference in the average yields of different crops of the average farmers and those of progressive farmers. Given the potential to increase maize yield, the district has a potential to emerge as a leading producer of maize thus affording an opportunity to establish maize based agro industries. Likewise, there is also a huge potential to increase production of milk and milk products.
- The district is a leading producer of silk and silk worm rearing which has a huge potential for further expansion and export.

3.1.4 Threats

- The frequent frost occurrence during winter season poses an imminent threat to mango crop which is a niche crop in the district.
- The rapid spread of obnoxious weeds in crops. Weeds like *Commelina benghalensis*, *Echinochloa colona*, *Ageratum conyzoides*, *Cyperus rotundus*, *Dactyloctenium aegyptium*, *Echinochloa crus-galli*, *Cyperus iria*, *Commelina communis*, *Panicum dichotomiflorum*, *Fimbristylis sp*, *Medicago denticulate*, *Anagallis arvensis*, *Poa annua*, *Stellaria media*, *Phalaris minor*, *Avena leudoviciana*, *Juncus bufonius* are posing threat to pastures and cultivable lands.

- The support lands and grazing lands are also getting infested with weeds like *Lantana camara*, *Parthenium hysterophorus*, *Ageratum hostonianum*, *Bidens pilosa*, *Zizyphus rotundifolia*, *Cirsium arvense*
- Burgeoning population of monkeys and stray cattle is a major threat to crop and fruit production in large parts of the district. In fact, many farmers have abandoned cultivation of crops due to monkey menace.
- Rapidly increasing silt in Gobind Sagar reservoir is endangering fish production
- Reckless mining of streams (*khads*) is leading to lowering of water table and depleting gravity/lift irrigation schemes.
- The ongoing process of crop diversification in the district may be thwarted by the availability of infrastructure facilities like rural roads, markets and extension back-up which needs further strengthening and major expansion.
- The rising incidence of diseases like wilt, rhizome rots and blight nematode is a threat to the cultivation of high value cash crops;
- Low prices of agricultural produce coupled with rising input costs are other threats to agricultural sector. As a result of falling profitability, the farmers are fast losing interest in agriculture.
- The degradation of natural resource base, in particular soils and water, poses an imminent threat to the sustainability of agriculture
- The climate change manifested in terms of erratic and untimely rainfall and rising temperatures is yet another threat that looms large in sustaining agricultural production.
- The threat of price crash as a result of too much supply of some of the high value cash crops grown in polyhouses would adversely affect the cultivation of these crops
- The threat of competition in the market both from ongoing process of crop diversification in other states and also from cheaper imports under new economic dispensations.

- The threat of erosion of micro-climatic niches/comparative advantages due to fast technological developments outside the producing regions has posed threat unheard a few years ago.

3.2 Issues Arising from SWOT Analysis

The SWOT analysis given above shows that while district has a potential not only to increase the yield of existing crops but also to grow several high value cash crops owing to favourable agro-climatic conditions. However, lack of basic infrastructural facilities including irrigation and extension facilities are emerging as major constraints in switching over to the cultivation of these crops. The ongoing process of rapid spread of protected cultivation in the district requires adequate extension and technological back-up which at present is weak and needs strengthening. The single crop cultivation in polyhouses is fast depleting fertility of soils. The farmers, therefore, need to be educated about crop rotations in polyhouses. Not only that, the emerging nematode problem in polyhouses calls for concerted research efforts to evolve suitable technologies to control these diseases. The monkey and stray cattle menace and spread of obnoxious weeds are other major problems that loom large and need to be looked into on priority. The efficiency of irrigation water through micro irrigation like sprinklers requires to be enhanced on a large scale.

3.3 Sectoral Growth Drivers

The above analysis shows that among different crops, protected vegetable cultivation and maize among the agricultural crops, mango among the horticultural crops and milk production in livestock sectors are important potential sectoral growth pullers of overall agricultural development of the district. The availability of suitable agro-climatic conditions to grow high value cash crops, particularly the cultivation of high value cash crops including fruits, vegetable, medicinal plants, etc especially in the wake of their rising demand for these crops coupled with huge market for them in the neighbouring states including Azadpur fruit and vegetables market New Delhi offer great scope to

evolve as the most important growth drivers of the crop sector. The huge local demand for dairy products, especially milk, in the district is a very important potential growth driver for the development of commercial small scale household dairy. The availability of basic infrastructural facilities like assured irrigation, rural roads, markets, etc is an important growth driver for different sectors. The provision of rapidly evolving technologies in terms of hybrid seeds through adequate extension back up to the farmers is a *sine qua non* ensuring sustainability and economic viability of agricultural sector in the district. The responsive farming communities willing to experiment, innovate and bearing risks is yet another important growth driver in the district.

Chapter–IV

DEVELOPMENT OF AGRICULTUE SECTOR

The agricultural development of the district is circumscribed, *inter alia*, by a host of factors like availability of physical, natural and human resources including the development of basic infrastructural facilities. The availability of these resources including infrastructural aspects along with the temporal changes and present status of agricultural development in terms of cropping pattern, crop production, crop yields, input use, and so on have been discussed in chapter-II. Likewise, chapter III presented an analysis of strengths, weaknesses, opportunities and threats (SWOT) that followed both from the description of the district and also from our understanding, interactions and discussions with different stakeholders like officials of agricultural department, grassroot level functionaries, scientists working in the districts, civil society organisations, progressive farmers, and so on. The present chapter, based upon the data collected from all blocks and sample panchayats, describes some of the important aspects of agricultural development of the district such as land utilisation pattern, cropping pattern, input gap, yield gap, varietal and technological problems, interventions required to solve these problems, researchable issues, and so on.

4.1 Land Use Pattern

Land use classification is the systematic arrangement of land on the basis of certain well-defined characteristics to identify and understand its potential use. The land resource has undergone perceptible changes both in quantity and quality because of, among other things, increase in human population and the consequent increase in the infrastructural facilities like road and process of urbanization. The total geographical area of the district is 1,11,776 hectares out of which 12.53 per cent is under forests (Table 4.1). Nearly one-fourth of the geographical area is available for cultivation which sets frontier for agricultural development of the district. One of the salient features of land use pattern is that more than one-third of the total geographical areas is under permanent pastures and other grazing lands which is indicative of a huge scope for the development of

commercial dairy. Among three development blocks, while Bilaspur Sadar is the biggest accounting for around 46 per cent of the total geographical area of the district, Ghumarwin is the smallest with nearly one-fifth of the total area. The land under different classifications of land use has its own set of specific problems affecting its productivity. Table 4.2 presents different problems and the severity of these problems in terms of number of panchayats reporting them. As may be seen from the table, obnoxious weeds, stray cattle, monkey menace, lack of knowledge about weed eradication and poor yielding grass varieties are the important problems reported for practically all categories of land. The incidence of these problems was more pronounced in Bilaspur Sadar compared to remaining two blocks as was evident from the per cent of panchayats reporting these problems. The interventions needed to solve these problems, given in Table 4.3, include plantation of productive tree species, eradication of weeds, tree plantation on degraded lands, contour bunding, introduction of improved grasses and fodder trees. The estimates of land requiring different interventions in terms of levelling, contour bunding, fencing and check dams have been provided in Table 4.4. The table shows that for the district as a whole 6,706 hectares of land need levelling and 3,042 hectares contour bunding and terracing. The total amount required for land improvement in the district has been estimated at Rs. 504 lakhs (Table 4.5).

4.2 Soil and Soil Health

An effort has been made to compile the soil survey information available from different sources for its best use for the preparation of soil profile for the district. Bilaspur district is dominated with Brown Earths (Eutrochrepts and Hapludalfs) in gently sloping lands of Shiwaliks. The soils of side slope of Shiwalik hills are shallow to medium, excessively drained, loamy skeletal (gravelly), coarse to fine loamy in texture with moderate to severe erosion. These are slightly acidic to slightly alkaline with low to medium AWC. The soils are classified as Ustorthents and Eutrochrepts. The soils on ridge tops are medium to deep, well to excessively drained, loamy skeletal with severe to very severe erosion. The soils are slightly acidic to slightly alkaline soils with low AWC. These have also been classified as Ustorthents and Eutrochrepts. The soils of very gently to gently

sloping piedmont plains are medium to deep, well drained, coarse loamy to fine loamy with slight to moderate erosion. They are non-calcareous to calcareous and neutral to moderately alkaline with medium to high AWC. These soils are mostly classified as Eutrochrepts and Udifluvents. The nearly level to very gently active flood plains have deep, well to excessively drained, mostly stratified, coarse loamy to fine loamy soils with slight erosion and stoniness. These soils are mostly prone to slight to moderate flooding. The soils have been classified as Ustifluvents and Psamments. The soils of district Bilaspur are low to medium in available N, P and K. In Jukhala area of Sadar Block, deficiency of Zn has been observed. The soils of the district are prone to water erosion. The soils are having low to medium status of organic carbon.

4.3 Water Resources and Management

Water is an extremely important and a scarce resource whose proper and efficient use is a *sine qua non* for not only promoting agricultural development but sustaining life as well. The water situation in the district in terms of surface and underground water is discussed below;

Sutlej: It is the only river that passes through the district and enters the district at village Kasol located in north east of the district. It is deep and rapidly flowing river which runs at the rate of about eight kilometres per hour. The river divides the district in almost two equal parts. It flow ninety kilometres within the district leaving it at a village Neila in the south west and enters the Punjab territory. The gigantic multipurpose dam is located over this river. The tremendous increase in the volume of water during the rainy season causes floods.

Ali Stream: Ali is one of the notable streams of the district which rises in Arki tehsil of district Solan. It enters district Bilaspur at village Kothi Harrar and Manothi. It is perennial stream but as its source lies in snowless mountains, the volume of water is very small during summers. After flowing for about thirty five kilometres in the district, it joins Sutlej river in between villages Kherian and Talwar. During its course, its water is utilised for irrigation purpose in low lying areas and also for running water mills.

Ghamber Khad: This Khad originates in Shimla hills and enters the district territory at Village Neri of Ratanpur finally joining Sutlej at village Dagra and Nerli at a distance of about 13 kilometers. Its bed is very deep and hence a small area is only irrigated by its water.

Seer Khad: It is large stream and a largest tributary of Sutlej. It originates in district Mandi and drains a large part of Ghumarwin and Jhandutta blocks. Two other khads, Suka and Saryali which rise in Hamirpur district join this khad at village Balgar after draining the western portion of the district. Few water mills are run by the water of this Khad. This is a rich source of perennial water which could be utilised for augmenting irrigation facilities in the district.

Lakes, Tanks, Springs and Spring Heads

There are no natural lakes though the district has one of the biggest lakes in the country, Gobind Sagar. The lake has huge importance for the agricultural economy of the district in terms of availability of water for irrigation and potential for fish production. The district has six large water tanks at Jagat Khana, Swarghat, Naina Devi, Jamthal, Kasol and Snghwana. In addition, there are about 40 small tanks. There are two springs, namely, Luhund Spring and Bassi Spring.

Ground Water Resources

The exact quantum of utilisable ground water resources and stage of ground water resources in the district has yet not been estimated. The map of the ground resources in district, given below, however, shows soft rock aquifers where tube-well and dug-well are feasible and hard rock aquifers where bore well, dug well and spring development are possible. The information provided in the legend however shows that regional geology is characterised by alluvium, shivaliks and metamorphics rocks. Ground water quality is assessed to be good and check dams, check dam cum ground water dam and recharge shaft have been reported to be suitable recharge structure. Further, the data provided in the accompanying legend to the ground water resources map also reveals the depth of bore-well and dug-well feasible in the soft rock aquifers varies between 100-150 meters

and 10-20 meters with discharge of 1200-2500 litres per minute in case of the former type of wells and 300-500 litres per minute in respect of the latter. Likewise, in hard rock aquifers, the depth of bore well, dug well has been estimated between 100 to 200 metres and 10 to 20 meters respectively.

4.4 Cropping Systems and Cropping Pattern

The major cropping systems/sequences (Table 4.6) in different blocks of the district include maize-wheat, maize+pulse-wheat, maize-barley, maize-pea, maize-potato, maize-toria-wheat, vegetable based, oilseeds based, pulse based both in the un-irrigated and irrigated areas. The cropping pattern in terms of area under different crops, presented in Table 4.6, shows that maize was the most important crop in Bilaspur Sadar and Ghumarwin while wheat was a leading crop in Jhandutta. The crops like sesame, sarson and toria in oilseeds and mash and gram in pulse were other important crops. The most important feature of the cropping pattern was the area under vegetable crops; for the district as a whole 1,323.64 hectares of land was under vegetable crops; tomato was the most important crop followed by cauliflower, capsicum, bhindi and peas (Table 4.7). Among three blocks, the maximum area under these crops was in Bilaspur Sadar closely followed by Ghumarwin. The area under vegetable crops was comparatively lower in Jhandutta. Mango and citrus were important fruit crops grown on 882 and 717 hectares of land, respectively (Table 4.7).

4.5 Inputs Use and Gaps

The agricultural development of any region depends on extent of use of different inputs like seeds and fertilisers. The use of these inputs, however, is conditioned by their timely and adequate availability. It is in this context that we estimated the actual use of seeds and fertilisers, their requirements and gaps for three blocks and for the district as a whole. The requisite information has been provided in Table 4.8 to Table 4.10. To begin with, Table 4.8 and Table 4.9 show that farmers were using higher amount of seeds than recommended in all the crops including vegetable and spice crops. The pattern was

broadly similar in all three blocks. The higher use of seeds could primarily be attributed to lack of technical know-how among farmers. However, our interaction with the farmers reveals that they use high rate of seed to overcome the risk in germination. The higher seed use could also be attributed to the sowing method which in the event of increasing use of tractors is done through broadcasting and the practice of thinning the crop later and use the same for fodder. The use, requirement and gap of different fertilisers in different blocks have been shown in Table 4.10. The table shows that there was a huge gap between the actual use and required amount of different fertilisers in all the three blocks. The gap was, however, higher in respect of Urea and IFFCO. The gap is likely to increase further as the process of crop diversification further deepens.

4.6 Yield Gap Analysis

The yield gaps measured in terms of difference in the yield of average farmers and those of the progressive farmers for different crops have been presented in Table 4.11. We have measured the gap between the average yield and the yield of progressive farmers. This gap is more likely to be filled in as compared to the one measured as difference between average yields and those of experimental yields. The table shows that there existed significant yield gaps in almost all the crops including cereals, pulses, oilseeds, vegetable and spices. Among different crops, the gaps were much higher in respect of wheat and maize among cereals and gram among pulses and sarson among oilseeds. The pattern was broadly similar in different blocks. These gaps are indicative of the potential to increase the production of different crops in the district. Table 4.12 shows that among vegetable crops, the gap between the yield of the average farmer and that of progressive farmer was the highest in tomato followed by cauliflower, bhindi and brinjal in all three development blocks.

Other Information on Ground Water Resources

Major drainage	Satluj
Rainfall	2191 mm
Temperature	4° C to 29° C
Regional geology	Alluvium, Siwaliks, Metamorphics
Ground Water quality	Good, EC <750 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

Source: Central Ground Water Board (NHR), Dharamshala

4.7 Reasons for Gap

As alluded to above, there is a significant gap between the yields of an average farmer and that of progressive farmers practically in all the crops. A number of reasons were cited by the respondents which depress the yield levels of average farmers in comparison to their progressive brethren. Most important reasons, among others, were low use of inputs like fertilisers, non-availability of inputs in time, non-availability of seeds, lack of technical know-how about varieties and agronomic practices of different crops and lack of irrigation facilities (Table 4.13 and Table 4.14). The more important fact is that both the categories of farmers reside in the area and face similar infrastructural facilities/constraints. This makes it easy to bridge this gap provided concerted efforts are made to upgrade the technical know-how of the farmers through organising trainings and camps. As mentioned above, another important reason is the lack of availability of different inputs at proper times and in adequate quantities at the doorsteps of the average farmers. While the progressive farmers procure these inputs from anywhere in the state or even from outside the state, an average farmer lacks adequate wherewithal to procure them from far away places. Likewise, rising input costs coupled with low prices of agricultural produce also dissuade an average farmer to work hard and take agriculture

more seriously to get high yields. The emerging problems of monkey menace and stray cattle have further added to the woes of the farmers.

4.8 Farm Mechanisation

The use of farm machinery in terms of per cent of households using different types of farm machinery in different blocks has been brought out in Table 4.15. The table shows that among different types of farm machinery, the use of threshers followed by tractors and iron plough was more common; the proportion of households using these machines was significantly higher in all the three blocks. The spray pump was also being used by a significant proportion of households thanks to the rapid spread of the cultivation of high value cash crops including vegetables. The table further shows that maximum gap between the existing number of farm machinery and their required number was in case of chaff cutter and iron plough.

4.9. Ongoing Schemes for Agricultural Development

The status of the existing schemes for agricultural development like watershed development, soil conservation and irrigation in terms of number of schemes, villages covered, population covered, area covered and number of beneficiaries for agricultural development has been presented in Tables 4.16 to 4.21. Out of these schemes while some have been completed, others remain to be completed. The salient feature of all these tables reveals that total area being covered under watershed development and soil conservation schemes was more in Bilaspur Sadar and Jhandutta compared to Ghumarwin. Likewise, in case of irrigation schemes, the actual area irrigated through lift irrigation schemes was higher in Bilaspur Sadar and Jhandutta blocks while from kuhls the area irrigated was higher in Bilaspur Sadar followed by Ghumarwin. Most of the irrigation schemes were functional. The number of all non-functional schemes was higher in Ghumarwin as compared to other two blocks; two lift irrigation schemes were non-functional each in Bilaspur Sadar and Ghumarwin. In ongoing schemes, Ghumarwin remained at the top whereas no ongoing scheme was reported in Jhandutta. The total

amount required for repair and maintenance of different irrigation schemes in two blocks has been worked out to be Rs 2,234 lakhs (Table 4.21).

4.10 Varietal and Technological Problems

The incidence of varietal and technological problems in different crop groups along with the incidence of these problems in terms of the per cent of panchayats reporting them and technological interventions required to overcome these problems have been presented in Tables 4.22 to 4.27. The major problems in all crop groups were crop specific diseases, poor quality of seeds, obnoxious weeds, insect and pest attack, lack of technical know-how, etc. In addition, monkey menace and stray cattle are posing serious problems in a large proportion of panchayats. The interventions required to solve these problems include organising training camps to educate the farmers about the latest technical know-how about varieties, application of different inputs and eradication of weeds, development of disease resistant varieties and ensuring timely availability of seeds, etc.

4.11 Extension Gaps

The extension gaps have been defined in two ways. First, the difference in yields obtained at the experimental farms of the Himachal Pradesh Agricultural University and the actual average yields of the average farmers in different blocks (Gap I). Second, the difference in yields which have been obtained by the progressive farmers and those obtained by the average farmers (Gap II). The extension gaps in different crop groups have been presented in Tables 4.28 to 4.30. These tables show significant gap between the average yields of progressive farmers and those obtained at University experimental farms and the actual yields of average farmers. It may, however, be mentioned that in case of some crops like gram, toria, peas, cabbage, brinjal, and cauliflower, the yields of progressive farmers were higher compared with those obtained at the experimental farms. These gaps bring out a huge potential to increase production of different crops in all the three blocks of the district provided concerted efforts are made to bridge extension gaps by strengthening the existing extension infrastructure. It may also be underlined that

even if we ignore difference in yields between the University experimental farms and that of average farmers by arguing that it is difficult for an average farmer to apply inputs with the scientific precision as is done at the experimental farms, there is still a significant difference in yields obtained by the average farmers and those obtained by the progressive farmers in their neighbouring villages or may be in the same village.

4.12 Extension Interventions

The following extension interventions have been suggested by different panchayats to bridge the yield gaps between the yields of average farmers and that of progressive farmers.

- Provision of quality inputs like improved seeds, fertilizers, plant protection material by improving and strengthening delivery system to ensure timely availability of these inputs.
- Supply of hybrid seeds of different crops
- Soil testing facilities and improvement of physical, chemical and biological parameters on the basis of nutrients available in the soil as well as required for different crops
- Promotion of integrated nutrient management through vermi-composting, popularization of bio-fertilisers, and other ameliorants in addition to use judicious and balanced nutrients to crops. Strengthening and improvement of quality control infrastructure (seed, pesticides and fertilizer testing laboratories)
- Promotion of micro-irrigation for efficient management and delivery of required quantities of water as per crop needs.
- Promotion of mechanization conducive to hill farming and development of equipments & implements to reduce labour and to provide relief to the women folk.
- Promotion of protected cultivation along with supporting infrastructure for quality production of high-value cash crops.
- Strengthening the existing marketing infrastructure like construction of village link roads and constructing collection centres for a cluster of villages.

- Provision of assured irrigation to rain-fed areas and water harvesting to create water potential for irrigation and to augment ground water
- Organising frequent training camps for farmers, particularly for the cultivation of high value cash crops like vegetables, spices and floriculture.
- To take measures to tackle monkey menace and problem of stray cattle and wild boars.

4.13 Researchable Issues

In view of the prevailing diseases, problems and interventions suggested and ongoing climate change, the following set of researchable issues has been identified in crop production. The research agenda of the R & D institutions of the state should, therefore, include research on these issues. The funds for undertaking research on these issues have been provided in the plan under research and extension head.

- Characterization and classification of soils of different districts of Himachal Pradesh
- Delineation of the Acid Soil Regions (ASR)
- Integrated Nutrient Management Technology demonstration on farm fields.
- Issues in solid waste management for organic farming in major cash crops of respective region
- Evaluation of resource conservation technologies (like conservation tillage, deficit water management, pressurized irrigation systems, nutrient-water interaction studies, recycling of waste organic residues etc.) for irrigated and rain fed areas
- Issues related to increasing water productivity of stored water through crop diversification and soil and water management practices
- 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
- Development of improved varieties of various niche based crops, for example, scented basmati rice, special purpose corn e.g. baby corn, sweet corn and pop corn and hybrids of maize and rice to raise overall productivity of these two important crops.

- Concerted efforts on ensuring effective selection, conservation evaluation, documentation and utilization of genetic resources
- Formulation of bio-intensive IPM strategies for the management of *Helicoverpa armigera* (tomato and gram), fruit flies (cucurbits and tomatoes);, white grubs (potato, maize, peas, ginger, cabbage etc);,cut worms (cereals and vegetables); fruit borer (brinjal and okra);,leaf miner and pod borer (peas);, hairy caterpillar (mash, til, soybean);stem borer and aphids (maize),mites (pulses and vegetables):and 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*;, *leucinodes orbonalis*: and *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:
- Germplasm screening for resistance against major insect pests (cereals, pulses, oilseeds and vegetables).
- Survey and surveillance for identification of new invasion of insect pests and of major diseases in the district.
- Safe management alternatives for the stored grain pests.
- Disease and pest management in honey bees; management of bee colonies for pollination in different crops for higher productivity; management practices for migratory beekeeping for better economic returns; quality analysis of honey from different sources for value addition:
- Identification and management of insect-pests of medicinal, aromatic and ornamental plants
- Development/Identification of bacterial wilt resistant hybrids/varieties of *solanaceous* vegetables
- Development/Identification of hybrids and varieties of potential vegetable crops for protected cultivation and identification of vegetable based ptomosing cropping sequences
- Standardization of agro-technology for organic vegetable production

- Development/Refinement of production technology in ginger
- Standardization of production technology of hybrids
- Standardization of production technology for rain fed cultivation of potential vegetable crops
- Survey and surveillance of major diseases in vegetable crops
- Identification of resistant sources and study of genetics of resistance
- Marker assisted selection of resistance genes using molecular markers and their use in gene pyramiding for resistance in commercial varieties
- Development of integrated disease management modules suitable for organic and protected agricultural conditions
- Development of detection techniques for pathogens of quarantine importance and certification purposes
- Development of IDM module
- Analysing trends and patterns of prices and markets of emerging crops and enterprises in the context of ongoing process of globalisation
- Understanding economic implications of climate change towards cropping systems, cropping patterns and livelihoods of the farmers
- Assessing impact of the ongoing process of crop diversification on natural resource base (soil, water and environment) and its implications towards livelihoods of the farmers
- Studies on impact assessment and policy implications of various developmental programmes/schemes

Table 4.1 Land Utilization Pattern (Ha)

Sr. No	Particular	Bilaspur Sadar	Ghumarwin	Jhandutta	District
1	Total geographical area	52437	23023	36316	111776
2	Forests	5468	2975	5570	14013
	Productive	4952	1190	3342	9484
	Degraded	516	1785	2228	4529
3	Barren and uncultivable land	1946	1087	1348	4381
	Rocky	389.2	218	404.4	1996
	Stony	583.8	326	269.6	1179.4
	Sloppy	973	543	674	2190
4	Land put to non-agricultural uses	5669	1996	7245	14910
	Buildings	3401.4	1198	1811	6410.4
	Roads/paths/channels	2267.6	798	5434	8500
5	Culturable waste	2787	1379	1889	6055
	Weed/bush infested	1347	276	944.5	2567.3
	Area prone to animal menace	1440	1103	944.5	3487.7
6	Permanent pastures and other grazing lands	24043	5150	10400	39593
	Productive	12021.5	3862.5	6240	22124
	Degraded	12021.5	1287.5	4160	17469
7	Land under miscellaneous tree crops and groves	17	51	30	98
8	Fallow land	1651	554	646	2851
	Current fallow	953	299	356	1608
	Other fallow	698	255	290	1243
9	Cultivated land	10856	9831	9188	29875

Source: Field Survey, 2007-08

Table 4.2 Problems in Land Development (Per Cent of Panchayats)

Sr. No.	Problem	Bilaspur Sadar	Ghumarwin	Jhandutta	District
Forest					
Productive					
1	Hilly terrain covered with abnoxious weeds and large trees	20.00	83.33	57.14	47.83
2	Maximum area rainfed	60.00	100.00	71.43	73.91
3	Existence of bushes, cactus and other unwanted plants	90.00	50.00	14.29	56.52
4	Mostly fuel wood tree	40.00	33.33	28.57	34.78
Degraded					
1	Woody plants	100.00	50.00	57.14	73.91
Barren and uncultivable land					
Rocky					
1	Land covered with rocks and big boulders	40.00	33.33	28.57	34.78
2	Steep slopes	70.00	83.33	28.57	60.87
3	Maximum area rain-fed	40.00	33.33	42.86	39.13
4	Difficult to manage	20.00	33.33	28.57	26.09
Land put to non-agricultural uses					
Roads/paths/channels					
1	Cannot be put under agriculture	30.00	33.33	14.29	26.09
2	Infested with weeds	100.00	66.67	42.86	73.91
Culturable waste					
Weed/bush infested					
1	Area under obnoxious weeds	70.00	50.00	57.14	60.87
2	Weed problem	50.00	33.33	28.57	39.13
3	Lack of knowledge about weed eradication	10.00	33.33	28.57	26.09
Area prone to animal menace					
1	Stray animal	80.00	66.67	57.14	69.57
2	Monkey menace	70.00	50.00	85.71	69.57
3	Wild boars problem	40.00	33.33	14.29	26.09

Area difficult to manage					
1	Technology not known	20.00	66.67	14.29	30.43
Permanent pastures and other grazing lands					
Productive					
1	Poor yielding grass varieties	60.00	100.00	57.14	69.57
2	Local grasses	50.00	16.67	57.14	43.48
3	Infestation with lantana and other weeds	10.00	66.67	42.86	34.78
Degraded					
1	Government land and public property	50.00	66.67	14.29	43.48
2	Weed infestation	100.00	83.33	28.57	73.91

Source: Field Survey, 2007-08

Table 4.3 Interventions for Land Development (Per Cent of Panchayats)

Sr. No.	Intervention	Bilaspur Sadar	Ghumarwin	Jhandutta	District
Forest					
Productive					
1	Plantation of productive tree sp.	90.00	83.33	85.71	86.96
2	Land development and eradication of weeds	70.00	50.00	42.86	56.52
3	Training to go for other enterprise	20.00	33.33	28.57	26.09
4	Quality forest planting material	80.00	83.33	85.71	82.61
Degraded					
1	Plantation on degraded area	100.00	83.33	85.71	91.30
Barren and uncultivable land					
Rocky					
1	Levelling required	80.00	83.33	85.71	82.61
2	Contour bunding	50.00	66.67	42.86	52.17
3	Irrigation facility	40.00	66.67	85.71	60.87
Land put to non-agricultural uses					
Roads/paths/channels					
1	Provision for funds for repair and maintenance	100.00	66.67	85.71	86.96

Culturable waste					
Weed/bush infested					
1	Eradication of weeds	30.00	50.00	14.29	30.43
2	Awareness programme and introduction of grasses replacing weeds	50.00	50.00	57.14	52.17
3	Plantation of fodder trees and fruit trees	30.00	33.33	28.57	30.43
4	Knowledge of weedicide for eradication	40.00	50.00	42.86	43.48
Area prone to animal menace					
1	Permission to export monkeys	90.00	66.67	71.43	78.26
2	Fencing to stop stray animals	70.00	50.00	14.29	47.83
Area difficult to manage					
1	Provision for funds	20.00	66.67	14.29	30.43
Permanent pastures and other grazing lands					
Productive					
1	Introduction of improved grass cuttings	60.00	100.00	57.14	69.57
2	Weeds eradication programme	70.00	83.33	85.71	78.26
Degraded					
1	Introduction of fodder-trees and grasses	60.00	66.67	42.86	56.52
2	Weeds eradication programme	70.00	83.33	85.71	78.26

Source: Field Survey, 2007-08

Table 4.4 Improvement Needed to Increase the Productivity of Land (Ha)

Particular	Bilaspur Sadar	Ghumarwin	Jhandutta	District
Land levelling	5032	1328	346	6706
Contour bunding and terracing	1256	1167	619	3042
Fencing (length in km)	2668	111	66	2845
Check dam (Length in m)	6020	3690	5150	14860

Source: Field Survey, 2007-08

Table 4.5 Financial Estimates for Land Development (Rs. Lakh)

Sr. No	Particular	Bilaspur Sadar	Ghumarwin	Jhandutta	District
1	Barren and uncultivable land	70	23	45	138
	Rocky	20	5	8	33
	Stony	20	8	12	40
	Sloppy	30	10	25	65
2	Culturable waste	62	59	80	201
	Weed/bush infested	12	7	20	39
	Area prone to animal menace	50	52	60	162
3	Permanent pastures and other grazing lands	50	45	35	130
	Productive	15	15	10	40
	Degraded	35	30	25	90
4	Land under miscellaneous tree crops and groves	5	10	20	35
5	Fallow land	0	0	0	0
	Current fallow	0	0	0	0
	Other fallow	0	0	0	0
	Total	187	137	180	504

Table 4.6 Major Cropping Systems

Cropping sequence	Bilaspur Sadar	Ghumarwin	Jhandutta
Unirrigated			
Maize-wheat	√	√	√
Maize+pulses-wheat	√	√	√
Maize-barley	√	√	√
Maize-pea	√	√	√
Maize-potato	√	√	√
Potato-fallow-wheat (biennial)	√		
Maize-toria-wheat	√	√	√
Chari-berseem	√	√	√
Paddy-wheat	√	√	√
Paddy-barley	√		
Pulses based	√	√	√
Oilseed based	√	√	√
Vegetable based	√	√	√
Sugarcane based	√		
Ginger-Fallow	√		
Zimikand	√		
Irrigated			
Maize-wheat	√	√	√
Maize-pea	√	√	√
Maize-potato	√	√	√
Maize-toria-wheat	√	√	√
Paddy-wheat	√	√	√
Pulses based	√	√	√
Oilseed based	√	√	√
Vegetable based	√	√	√
Ginger- Fallow	√	√	√
Tomato- Fallow	√	√	√

Source: Field Survey, 2007-08

Table 4.7 Cropping Pattern (Ha)

Crop	Bilaspur Sadar	Ghumarwin	Jhandutta	District
Cereal				
Maize	12318	9769	4969	27056
Paddy	414.98	942.80	60.00	1417.78
Wheat	10335.78	9144.80	5691.36	25171.94
Barley	193.51	5.68	10.00	209.19
Pulses				
Mash	253.26	25.00	47.40	534.85
Gram	232.30	21.00	51.52	304.82
Oilseeds				
Sesame	150.00	58.00	46.72	254.72
Sarson	117.18	9.20	10.00	136.38
Toria	214.83	46.00	161.76	558.97
Gobhi Sarson	4.00	2.50	4.16	10.66
Vegetables				
Potato	10.00	5.00	9.00	24.00
Peas	43.00	20.00	17.00	80.00
Tomato	320.00	312.00	133.00	765.00
Cabbage	12.84	9.80	7.36	30.00
Cauliflower	42.84	23.40	23.76	90.00
Beans	20.00	10.00	10.00	50.00
Capsicum	26.00	17.80	31.20	75.00
Bhindi	26.00	63.20	10.44	99.64
Brinjal	20.00	10.00	10.00	40.00
Cucurbits	10.00	5.00	5.00	20.00
Onion	21.00	16.00	13.00	50.00
Fruit plants				
Apple	-	-	5.30	5.30
Citrus	401.77	170.80	145.12	717.69
Mango	148.68	250.00	483.36	882.04
Amla	12.00	2.00	1.00	15.00
Spices				
Ginger	107.00	18.00	10.00	135.00
Garlic	10.00	5.00	5.00	20.00
Flower cuts/ bulbs	2.00	1.00	1.40	4.40

Source: Field Survey, 2007-08

Table 4.8 Seed Use, Requirement and Gaps in Cereals, Pulses and Oilseeds (Kg/ha)

Particular	Bilaspur Sadar			Chumarwin			Jhandutta		
	U	R	G	U	R	G	U	R	G
Cereals									
Maize	57.57	20.00	-37.57	39.98	20.00	-19.98	52.71	20.00	-32.71
Paddy (Broadcast)	105.15	90.00	-15.15	112.04	90.00	-22.04	107.12	90.00	-17.12
Wheat	143.75	125.00	-18.75	111.29	125.00	13.71	174.29	125.00	-49.29
Barley	149.76	120.00	-29.76	136.52	120.00	-16.52	138.40	120.00	-18.40
Pulses									
Mash	37.32	20.00	-17.32	42.53	20.00	-22.53	57.73	20.00	-37.73
Gram	71.45	40.00	-31.45	72.61	40.00	-32.61	76.75	40.00	-36.75
Lentil	26.25	18.00	-8.25	28.52	18.00	-10.52	28.02	18.00	-10.02
Oilseeds									
Sesame	7.35	5.00	-2.35	6.25	5.00	-1.25	15.63	5.00	-10.63
Sarson	13.56	6.00	-7.56	10.23	6.00	-4.23	12.50	6.00	-6.50
Toria	10.00	6.00	-4	10.00	6.00	-4	10.16	6.00	-4.16
Gobhi sarson	10.00	6.00	-4	9.53	6.00	-3.53	9.57	6.00	-3.57

Note : U: use, R: requirement, G: gap in physical values
Source: Field Survey, 2007-08

Table 4.9 Seed Use, Requirement and Gaps in Vegetable and Spices (Kg/ha)

Particular	Bilaspur Sadar			Ghumarwin			Jhandutta		
	U	R	G	U	R	G	U	R	G
Vegetables									
Potato	2453.05	2600.00	146.95	2710.00	2600.00	-110	2567.36	2600.00	32.64
Peas	48.30	40.00	-8.3	48.08	40.00	-8.08	42.5	40.00	-2.5
Tomato	0.46	0.50	0.04	0.52	0.50	-0.02	0.60	0.50	-0.1
Cabbage	1.00	0.80	-0.2	1.10	0.80	-0.3	1.05	0.80	-0.25
Cauliflower	1.00	0.75	-0.25	0.86	0.75	-0.11	0.84	0.75	-0.09
French beans	80.00	75.00	-5	84.26	75.00	-9.26	82.14	75.00	-7.14
Capsicum	0.95	0.80	-0.15	0.81	0.80	-0.01	0.92	0.80	-0.12
Bhindi	21.33	17.00	-4.33	24.46	17.00	-7.46	21.90	17.00	-4.9
Brinjal	0.70	0.60	-0.1	0.75	0.60	-0.15	0.73	0.60	-0.13
Cucurbits	3.75	3.50	-0.25	3.74	3.50	-0.24	3.60	3.50	-0.1
Onion	12.43	9.00	-3.43	11.72	9.00	-2.72	10.60	9.00	-1.6
Zimikand	2187.50	2000.00	-187.5	2200.36	2000.00	-200.36	2105.39	2000.00	-105.39
Spices									
Ginger	2234.14	2000.00	-234.14	1862.64	2000.00	137.36	1976.02	2000.00	23.98
Garlic	600.00	550.00	-50	675.00	550.00	-125	666.12	550.00	-116.12

Note : U: use, R: requirement, G: gap in physical values
Source: Field Survey, 2007-08

Table 4.10 Fertilizer Use, Requirement and Gaps (Tonnes)

Particular	Bilaspur Sadar			Ghumarwin			Jhandutta			District		
	U	R	G	U	R	G	U	R	G	U	R	G
Urea (46% N)	975	1640	665	840	1380	540	795	1140	345	2910	4160	1250
CAN(25%N)	00	35	35	00	30	30	00	30	30	00	95	95
IFFCO (12:32:16)	925	1275	350	814	975	161	805	880	75	2544	3130	586
MOP (60%)	10	300	290	8	275	267	8	250	242	26	775	749
SSP (16%)	16	350	334	12	225	213	9.5	250	240.5	37.5	825	787.5
FYM (000*Tonnes)	158.22	217.12	58.9	125.99	196.62	70.63	103.16	183.76	80.6	387.37	597.5	210.13

On the basis of actual use and requirement of Panchayats

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

Source: Field Survey, 2007-08

Table 4.11 Yield Gaps in Important Cereal, Pulse and Oilseed Crops (Q/ha)

Crop	Bilaspur Sadar			Ghumarwin			Jhanduttia		
	A	P	G	A	P	G	A	P	G
Cereals									
Maize	20.13	35.00	14.87	25.34	36.50	11.16	22.25	34.38	12.13
Paddy	18.50	26.25	7.75	19.43	28.00	8.57	15.63	24.56	8.93
Wheat	20.42	34.36	13.94	21.20	35.00	13.80	15.10	32.13	17.03
Barley	12.76	18.00	5.24	11.69	20.50	8.81	10.63	16.05	5.42
Pulses									
Mash	6.07	8.50	243	5.13	7.80	2.67	5.79	6.72	0.93
Gram	9.00	12.50	3.5	8.52	10.16	1.64	6.44	11.00	4.56
Lentil	3.75	5.00	1.25	3.52	4.83	1.31	3.76	4.90	1.14
Oilseeds									
Sesame	1.50	3.30	1.80	1.60	3.25	1.65	1.75	3.5	1.75
Sarson	5.00	7.5	2.50	6.15	10.00	3.85	5.00	7.50	2.50
Toria	6.50	10.50	4.0	4.17	7.50	3.33	3.82	6.00	2.18
Gobhi Sarson	6.00	9.50	3.50	8.15	12.00	3.85	7.00	9.50	2.50

Source: Field Survey, 2007-08

Table 4.12 Yield Gaps in Important Vegetable and Spice Crops (Q/ha)

Crop	Bilaspur Sadar			Ghumarwin			Jhandutta		
	A	P	G	A	P	G	A	P	G
Vegetables									
Potato	120.00	175.00	55.00	114.45	158.00	43.55	113.13	150.00	36.87
Peas	116.76	151.50	34.74	90.00	125.00	35.00	86.00	110.00	24.00
Tomato	326.85	406.25	79.40	200.00	375.00	175.00	225.00	350.00	125.00
Cabbage	215.50	262.50	47.00	183.88	205.00	21.12	145.00	180.00	35.00
Cauliflower	150.00	200.00	50.00	140.00	200.00	60.00	83.63	146.00	62.37
Beans	72.62	110.00	37.38	62.50	100.00	37.50	56.23	80.00	23.77
Capsicum	133.78	145.00	11.22	123.24	130.00	6.76	110.15	122.00	11.85
Bhindi	114.08	125.00	10.92	98.23	120.00	21.77	99.43	120.00	20.57
Brinjal	205.36	260.00	54.64	187.50	250.00	62.50	195.66	240.00	44.34
Cucurbits	135.26	220	84.74	116.30	200.00	83.70	124.34	200.00	75.66
Onion	153.21	225.00	71.79	100.72	160.00	59.28	118.28	140.00	21.72
Zimikand	400.00	700.00	300.00	350.00	650.00	300.00	185.00	400.00	215.00
Spices									
Ginger	94.21	132.50	38.29	80.08	112.50	32.42	87.08	120.00	32.92
Garlic	78.36	110.00	31.64	75.00	100.00	25.00	83.30	105.00	21.70

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

Table 4.13 Reasons for Yield Gaps in Cereal, Pulse and Oil Seed Crops (Per Cent of Panchayats)

Crop		Bilaspur Sadar	Ghumarwin	Jhandutta	District
Cereals					
Maize					
	Lack of knowledge about package of practices	60.00	66.67	71.43	65.22
	Non availability of inputs in time	90.00	100.00	85.71	91.30
	No irrigation at sowing time and water logging	40.00	33.33	57.14	43.48
	Quality seeds are not available	60.00	66.67	85.71	69.57
Paddy					
	No improved varieties are available	40.00	50.00	57.14	47.83
	Lack of irrigation	50.00	66.67	71.43	60.87
Wheat					
	Termites problem	40.00	66.67	57.14	52.17
	Irrigation and fertilizer problem	50.00	66.67	71.43	60.87
	Non availability of inputs in time	40.00	100.00	71.43	65.22
	Lack of technical knowledge	50.00	66.67	57.14	56.52
	Weeds problem	60.00	66.67	71.43	65.22
Barley					
	Lack of knowledge about package of practices	50.00	66.67	57.14	56.52
Pulses					
Mash					
	Lack of knowledge about package of practices	60.00	66.67	71.43	65.22
	Non availability of inputs in time	40.00	100.00	71.43	65.22
	Imbalance use of fertiliser	70.00	83.33	85.71	78.26
	Cultivated on poor land	80.00	100.00	85.71	86.96
Gram					
	Lack of knowledge about package of practices	50.00	66.67	57.14	56.52
	Non availability of inputs in time	40.00	100.00	71.43	65.22
	Poor yield due to imbalance use of fertilisers	40.00	50.00	42.86	43.48
	Cultivated on poor and un-irrigated land	80.00	100.00	85.71	86.96
Lentil					
	Lack of knowledge about package of practices	50.00	66.67	57.14	56.52
	Non availability of inputs in time	40.00	100.00	71.43	65.22
Oilseeds					
Sesame					
	Imbalance use of fertiliser	70.00	83.33	85.71	78.26

	Cultivated on poor land	80.00	100.00	85.71	86.96
Sarson					
	Lack of knowledge about package of practices	50.00	66.67	57.14	56.52
	Non availability of inputs in time	40.00	100.00	71.43	65.22
	Poor yield due to imbalance use of fertilisers	40.00	50.00	42.86	43.48
	Cultivated on poor and un-irrigated land	80.00	100.00	85.71	86.96
	Lack of irrigation facility	40.00	50.00	57.14	47.83
Toria					
	Lack of knowledge about package of practices	50.00	66.67	57.14	56.52
	Non availability of inputs in time	40.00	100.00	71.43	65.22
	Poor yield due to imbalance use of fertilisers	40.00	50.00	42.86	43.48
	Lack of irrigation facility	40.00	50.00	57.14	47.83
Gobhi sarson					
	Lack of knowledge about package of practices	50.00	66.67	57.14	56.52
	Non availability of inputs in time	40.00	83.33	71.43	60.87
	Poor yield due to imbalance use of fertilisers	40.00	50.00	42.86	43.48
	Cultivated on poor and un-irrigated land	60.00	83.33	85.71	73.91
	Lack of irrigation facility	40.00	50.00	57.14	47.83

Source: Field Survey, 2007-08

Table 4.14 Reasons for Yield Gaps in Vegetable and Spice Crops (Per Cent of Panchayats)

Crop	Reason for gap	Bilaspur Sadar	Ghumarwin	Jhandutta	District
Vegetable					
Potato					
	Lack of knowledge about package of practices	50.00	66.67	57.14	56.52
	Non availability of inputs in time	40.00	83.33	71.43	60.87
	Diseases	40.00	50.00	42.86	43.48
Peas					
	Lack of knowledge about package of practices	50.00	66.67	57.14	56.52
	Non availability of inputs in time	40.00	83.33	71.43	60.87
	Lack of irrigation	40.00	50.00	57.14	47.83
	Diseases	30.00	50.00	42.86	39.13

Tomato					
	Lack of knowledge about package of practices	50.00	66.67	57.14	56.52
	Non availability of inputs in time	40.00	83.33	71.43	60.87
	Lack of irrigation	40.00	50.00	57.14	47.83
	Disease	30.00	50.00	42.86	39.13
	Insect pest attack	30.00	33.33	42.86	34.78
Cabbage					
	Lack of knowledge about package of practices	50.00	66.67	57.14	56.52
	Non availability of inputs in time	40.00	83.33	71.43	60.87
	Lack of irrigation	40.00	50.00	57.14	47.83
	Poor management of insect and pest	30.00	66.67	28.57	39.13
Cauliflower					
	Lack of knowledge about package of practices	50.00	66.67	57.14	56.52
	Non availability of inputs in time	40.00	83.33	71.43	60.87
	Lack of irrigation	40.00	50.00	57.14	47.83
	Poor management of insect and pest	30.00	66.67	28.57	39.13
Beans					
	Lack of knowledge about package of practices	50.00	66.67	57.14	56.52
	Non availability of inputs in time	40.00	83.33	71.43	60.87
Capsicum					
	Lack of knowledge about package of practices	50.00	66.67	57.14	56.52
	Non availability of inputs in time	40.00	83.33	71.43	60.87
	Soils related problems (wilt etc.)	50.00	66.67	57.14	56.52
	Inefficient use of technology	30.00	50.00	42.86	39.13
Bhindi					
	Lack of knowledge about package of practices	50.00	66.67	57.14	56.52
	Non availability of inputs in time	40.00	83.33	71.43	60.87
Brinjal					
	Lack of knowledge about package of practices	50.00	66.67	57.14	56.52
	Non availability of inputs in time	40.00	83.33	71.43	60.87
Cucurbits					
	Lack of knowledge about package of practices	50.00	66.67	57.14	56.52
	Non availability of inputs in time	40.00	83.33	71.43	60.87

Onion					
	Lack of knowledge about package of practices	50.00	66.67	57.14	56.52
	Non availability of inputs in time	40.00	83.33	71.43	60.87
	Lack of irrigation	30.00	66.67	57.14	47.83
Spices					
Ginger					
	Lack of knowledge about package of practices	50.00	66.67	57.14	56.52
	Non availability of micro-nutrients	40.00	33.33	28.57	34.78
	Diseases	60.00	50.00	57.14	56.52
	Lack of irrigation facilities	30.00	33.33	28.57	30.43
	Weeds problem	20.00	33.33	28.57	26.09
Garlic					
	Lack of irrigation facilities	40.00	50.00	42.86	43.48
	Weeds problem	30.00	33.33	28.57	30.43

Source: Field Survey, 2007-08

Table 4.15 Farm Machinery Use & Gap

Sr. No	Machinery	Bilaspur Sadar			Ghumarwin			Jhandutta				
		% users	Number		% users	Number		% users	Number			
		E	R	G		E	R	G		E	R	G
1	Maize sheller	15.91	749	908	159	633	760	127	14.03	540	648	108
2	Thresher	99.67	918	964	46	933	980	47	93.20	597	627	30
3	Tractor	59.91	174	183	9	194	204	10	50.62	74	78	4
4	Iron plough	47.69	7646	9175	1529	2349	2819	470	38.92	4616	5539	923
5	Spray pump/ power sprayer	47.39	2267	2834	567	333	416	83	16.55	364	455	91
6	Chaff cutter	52.79	5909	7386	1477	4338	5423	1085	34.13	7730	9663	1933
7	Power tiller	0.05	3	15	12	11	44	33	0.08	4	18	14
8	Water lifting devices	23.18	499	649	150	400	520	120	6.98	554	720	166

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

Table 4.16 Existing Schemes for Agriculture Development

Block	No. of schemes	Village covered (No.)	Population covered (No.)	Area covered (Ha)	Beneficiary families (No)	Status		Total budget (Rs. Lakh)	Additional funds required (Rs. Lakh)
						Complete (No.)	Incomplete (No.)		
Water Harvesting									
Bilaspur Sadar	6	6	9000	3000	1800	0	6	20.20	12.00
Ghumarwin	105	30	3000	46	650	6	0	31.00	0.00
Jhandhutta	2	15	4050	1071	800	0	2	9.90	5.00
Total	113	51	16050	4117	3250	6	8	61.10	17.00
Soil/ Land Conservation									
Bilaspur Sadar	4	4	4500	1200	70	2	2	8.70	8.00
Ghumarwin	6	6	300	25	50	6	0	8.00	4.00
Jhandhutta	3	4	1080	100	100	1	2	5.80	5.00
Total	13	14	5880	1325	220	9	4	22.50	17.00
Other Agricultural Schemes									
Bilaspur Sadar	15	454	124725	0	20450	0	15	36.00	0.00
Ghumarwin	6	284	92171	0	600	0	6	25.00	0.00
Jhandhutta	10	326	88020	0	14380	2	8	15.00	0.00
Total	31	1064	304916	0	35430	2	29	76.00	0.00

Source: Field Survey, 2007-08

Table 4.17 Status of Completed Irrigation Schemes

Particular	Bilaspur Sadar	Ghumarwin	Jhandutta	District
1. Lift irrigation				
Number	13	10	20	43
Amount spent (Rs. Lakh)	325.00	800.00	800.00	1925.00
Villages covered	55	23	30	108
Beneficiaries (No.)	4400	230	1301	5931
Command area (Ha)	1060.18	370	980	2410.18
Actual irrigated area (Ha)	750	250	690	1690
2. Ground Water Use				
Number	0	0	3	3
Amount spent (Rs. Lakh)	0.00	0.00	6.00	6.00
Villages covered	0	0	6	6
Beneficiaries (No.)	0	0	6	6
Command area (Ha)	0	0	6	6
Actual irrigated area (Ha)	0	0	0	0
3. Kuhl				
Number	12	10	6	28
Amount spent (Rs. Lakh)	80.00	39.00	50.00	169.00
Villages covered	35	11	6	52
Beneficiaries (No.)	2800	128	80	3008
Command area (Ha)	733.6	248	64	1045.6
Actual irrigated area (Ha)	500	220	40	760
4. Tank irrigation				
Number	0	14	10	24
Amount spent (Rs. Lakh)	0.0	10.00	10.00	20.00
Villages covered	0	14	10	24
Beneficiaries (No.)	0	90	50	140
Command area (Ha)	0	42	10	52
Actual irrigated area (Ha)	0	15	8	23

Source: Field Survey, 2007-08

Table 4.18 Status of Functional Irrigation Schemes

Particular	Bilaspur Sadar	Ghumarwin	Jhandutta	District
1. Lift irrigation				
Number	11	8	20	39
Amount spent (Rs. Lakh)	260.00	650.00	800.00	1710.00
Villages covered	46	19	30	95
Beneficiaries (No.)	3300	193	1301	4794
Command area (Ha)	900	325	980	2205
Actual irrigated area (Ha)	750	205	690	1645
2. Ground water use				
Number	0	0	3	3
Amount spent (Rs. Lakh)	0.00	0.00	6.00	6.00
Villages covered	0	0	6	6
Beneficiaries (No.)	0	0	6	6
Command area (Ha)	0	0	6	6
Actual irrigated area (Ha)	0	0	0	0
3. Kuhl				
Number	10	5	6	21
Amount spent (Rs. Lakh)	68.00	11.50	50.00	129.50
Villages covered	28	8	6	42
Beneficiaries (No.)	2100	92	80	2272
Command area (Ha)	600	220	64	884
Actual irrigated area (Ha)	500	220	40	760
4. Tank irrigation				
Number	0	10	10	20
Amount spent (Rs. Lakh)	0.00	7.90	10.00	17.90
Villages covered	0	10	10	20
Beneficiaries (No.)	0	66	50	116
Command area (Ha)	0	30	10	40
Actual irrigated area (Ha)	0	15	8	23

Source: Field Survey, 2007-08

Table 4.19 Status of Non-Functional Irrigation Schemes

Particular	Bilaspur Sadar	Ghumarwin	Jhandutta	District
1. Lift irrigation				
Number	2	2	0	4
Amount spent (Rs. Lakh)	70.00	150.00	0.00	220.00
Villages covered	9	4	0	13
Beneficiaries (No.)	1100	37	0	1137
Command area (Ha)	160.18	45.00	0	205.18
Actual irrigated area (Ha)	0	0	0	0
2. Kuhl				
Number	2	5	0	7
Amount spent (Rs. Lakh)	35.00	2.10	0	37.10
Villages covered	7	3	0	10
Beneficiaries (No.)	0	36	0	36
Command area (Ha)	0	28	0	28
Actual irrigated area (Ha)	0	0	0	0
3. Tank irrigation				
Number	0	4	0	4
Amount spent (Rs. Lakh)	0.00	2.10	0.00	2.10
Villages covered	0	4	0	4
Beneficiaries (No.)	0	24	0	24
Command area (Ha)	0	12	0	12
Actual irrigated area (Ha)	0	0	0	0

Source: Field Survey, 2007-08

Table 4.20 Status of Ongoing Irrigation Schemes

Particular	Bilaspur Sadar	Ghumarwin	Jhandutta	District
1. Lift irrigation				
Number	2	4	0	6
Amount spent (Rs. Lakh)	59.01	101.00	0.00	160.01
Villages covered	4	5	0	9
Beneficiaries (No.)	125	66	0	191
Command area (Ha)	74.92	45	0	119.92
2. Kuhl				
Number	0	1	0	1
Amount spent (Rs. Lakh)	0.00	6.00	0.00	6.00
Villages covered	0	1	0	1
Beneficiaries (No)	0	11	0	11
Command area (Ha)	0	6.6	0	6.6
3. Tank irrigation				
Number	0	1	0	1
Amount spent (Rs. Lakh)	0.00	0.70	0.00	0.70
Villages covered	0	1	0	1
Beneficiaries (No.)	0	7	0	7
Command area (Ha)	0	3.5	0	3.5
4. Bassi (changer area scheme)				
Number	1	0	0	1
Amount spent (Rs. Lakh)	8000.00	0.00	0.00	8000.00
Villages covered	45	0	0	45
Beneficiaries (No.)	135	0	0	135
Command area (Ha)	2240	0	0	2240

Source: Field Survey, 2007-08

Table 4.21 Irrigation Schemes: Funds for Repair and Maintenance (Rs. Lakh)

Scheme	Bilaspur Sadar	Ghumarwin	Jhandutta	District
Functional				
1. Lift irrigation				
Number	13	8	0	21
Annual maintenance	175.00	6.00	0.00	181.00
Replacement/overhauling in 5 yrs	750.00	80.00	0.00	830.00
2. Kuhl				
Number	12	7	0	19
Annual maintenance	65.00	2.20	0.00	67.20
Replacement/overhauling in 5 yrs	300.00	0.00	0.00	300.00
Non-functional				
1. Lift irrigation				
Number	2	2	0	4
Annual maintenance	1.00	1.50	0.00	2.50
Replacement/overhauling in 5 yrs	100.00	1000.00	0	1100.00
2. Kuhl				
Number	2	3	0	5
Annual maintenance	0.00	1.00	0.00	1.00
Replacement/overhauling in 5 yrs	0.00	14.00	0.00	14.00
3. Groundwater use				
Number	0	4	0	4
Annual maintenance	0.00	0.00	0.00	0.00
Replacement/overhauling in 5 yrs	0.00	3.50	0.00	3.50

Source: Field Survey, 2007-08

**Table 4.22 Varietal and Technological Problems of Cereal, Pulse and Oilseed Crops
(Per Cent of Panchayats)**

Crop	Problem	Bilaspur Sadar	Ghumarwin	Jhandutta	District
Cereals					
Maize					
1	Poor quality seed	90.00	50.00	14.29	56.52
2	Emergence of weeds (<i>Commelina benghalensis</i> , <i>Echinochloa colona</i> , <i>Ageratum conyzoides</i> , <i>Cyperus rotundus</i> , <i>Dactyloctenium aegyptium</i>)	20.00	50.00	14.29	26.09
3	Imbalance use of fertilisers	10.00	50.00	42.86	30.43
4	Monkey problem	30.00	33.33	28.57	30.43
5	Lack of proper technology	10.00	83.33	57.14	43.48
6	Rainfed areas and water logging in rainy season	20.00	50.00	14.29	26.09
7	Lodging due to more height	40.00	33.33	42.86	39.13
8	High seed rate	30.00	33.33	28.57	30.43
9	Bacterial stalk rot	100	100	100	100
10	Turcicum and maydis leaf blights	100	100	100	100
11	Banded leaf and sheath blight	100	100	100	100
	Cutworms, termites white grubs, stem borer	30.00	33.33	28.57	30.43
Paddy					
1	White grubs. Leaf folder, grasshopper	10.00	33.33	28.57	21.74
2	Lodging	10.00	16.67	14.29	13.04
3	Emergence of weeds (<i>Echinochloa crus-galli</i> , <i>Cyperus iria</i> , <i>Commelina communis</i> , <i>Panicum dichotomiflorum</i> , <i>Fimbristylis sp</i>)	10.00	16.67	14.29	13.04
4	Lack of irrigation	10.00	50.00	42.86	30.43
5	Inadequate supply of improved variety seeds	20.00	50.00	28.57	30.43
6	Sowing by broadcast method	70.00	50.00	71.43	65.22
7	Brown spot	100	100	100	100
8	Grain discolouration	100	100	100	100
9	False smut	100	100	100	100

Wheat					
1	Weed problem (<i>Medicago denticulate</i> , <i>Anagallis arvensis</i> , <i>Poa annua</i> , <i>Stellaria media</i> , <i>Phalaris minor</i> <i>Avena leudoviciana</i> , <i>Juncus bufonius</i>)	50.00	33.33	42.86	43.48
2	Rusts (yellow & leaf rusts)	30.00	33.33	28.57	30.43
3	Non-availability of irrigation	20.00	33.33	28.57	26.09
4	Lack of technical know how	20.00	16.67	14.29	17.39
5	HYV's not available	10.00	16.67	14.29	13.04
6	Imbalance use of fertilisers	80.00	83.33	71.43	78.26
7	Low yields	30.00	33.33	28.57	30.43
8	Traditional varieties	10.00	16.67	14.29	13.04
9	Loose smut	100	100	100	100
10	Karnal bunt	100	100	100	100
11	Termite and grasshopper	30.00	33.33	28.57	30.43
Barley					
1	Less popular among farmers	30.00	16.67	28.57	26.09
2	Grown for animal feed	90.00	83.33	85.71	86.96
3	Non availability of market	10.00	0.00	14.29	8.70
Pulses					
Mash					
1	Local variety	20.00	33.33	42.86	30.43
2	Cultivated on marginal land	70.00	66.67	71.43	69.57
3	Leaf spots	10.00	16.67	14.29	13.04
Gram					
1	Local variety	20.00	33.33	28.57	26.09
2	Root rot and stem rot	30.00	33.33	28.57	30.43
3	Gram pod borer insect attack on large scale	30.00	33.33	28.57	30.43
Lentil					
1	Local variety	40.00	50.00	42.86	43.48
2	Cultivated on marginal land	30.00	33.33	28.57	30.43
Oilseeds					
Sarson					
1	Traditional varieties and imbalanced fertilization	20.00	16.67	28.57	21.74
2	Lack of HYV's of the oilseeds	20.00	16.67	28.57	21.74
3	Insect-pest attack (aphid complex, painted bug, cabbage caterpillar)	50.00	33.33	14.29	34.78

4	Lack of technical knowledge	30.00	16.67	42.86	30.43
5	Lack of irrigation	40.00	66.67	42.86	47.83
6	Imbalance use of fertilisers	10.00	16.67	14.29	13.04
7	White rust	20.00	33.33	28.57	26.09
8.	Weeds (<i>Ranunculus arvensis</i> , <i>Phalaris minor</i> , <i>Polypogon monspensis</i> , <i>Melilotus alba</i> , <i>Anagallis arvensis</i>)	50.00	33.33	42.86	43.48
9.	Downy mildew	100	100	100	100
Toria					
1	Traditional varieties	20.00	16.67	28.57	21.74
2	Lack of HYV's of the oilseeds	20.00	16.67	28.57	21.74
3	Insect-pest attack ((aphid complex, painted bug, cabbage caterpillar)	50.00	33.33	14.29	34.78
4	Lack of technical knowledge	30.00	16.67	42.86	30.43
5	Lack of irrigation	40.00	66.67	42.86	47.83
6	Imbalance use of fertilisers	10.00	16.67	14.29	13.04
7	White rust	20.00	33.33	28.57	26.09
8	Downy mildew	100	100	100	100

Source: Field Survey, 2007-08

Table 4.23 Technological Interventions of Cereal, Pulse and Oilseed Crops (Per Cent of Panchayats)

Crop	Intervention	Bilaspur Sadar	Ghumarwin	Jhandutta	District
Cereals					
Maize					
1	Introduction of improved varieties	90.00	83.33	85.71	86.96
2	Provision of weedicides	20.00	33.33	28.57	26.09
3	INM	10.00	16.67	14.29	13.04
4	Zimikand cultivation in monkey prone maize fields	10.00	16.67	14.29	13.04
5	Awareness programme	70.00	100.00	71.43	78.26
6	Provision of irrigation facility	40.00	50.00	28.57	39.13
7	Provision of extension services	50.00	50.00	57.14	56.52
Paddy					
1	Provision of extension services	20.00	50.00	28.57	30.43
2	Irrigation facilities needed	50.00	16.67	14.29	30.43

3	Training programmes	50.00	33.33	28.57	39.13
Wheat					
1	Isoproturon availability	40.00	50.00	42.86	43.48
2	Adequate supply of HYV's and recommended fertilizers	30.00	33.33	28.57	30.43
3	Irrigation facilities needed	40.00	83.33	85.71	65.22
4	Awareness programmes	10.00	83.33	57.14	43.48
5	Provision of extension services	50.00	50.00	57.14	56.52
Barley					
1	Provision of market for produce	10.00	16.67	28.57	17.39
Pulses					
Mash					
1	Supply of good quality seed	20.00	33.33	28.57	26.09
2	Training and demonstration programmes	50.00	33.33	28.57	39.13
Gram					
1	Supply of good quality seed	20.00	33.33	28.57	26.09
2	Training and demonstration programmes	50.00	33.33	28.57	39.13
Lentil					
1	Supply of good quality seed	20.00	33.33	28.57	26.09
Oilseeds					
Sarson					
1	Supply of good quality seed	20.00	33.33	28.57	26.09
2	Training and demonstration programmes	50.00	33.33	28.57	39.13
Toria					
1	Training and demonstration programmes	50.00	33.33	28.57	39.13

Source: Field Survey, 2007-08

Table 4.24 Varietal and Technological Problems of Vegetable and Spice Crops (Per Cent of Panchayats)

Crop	Problem	Bilaspur Sadar	Ghumarwin	Jhandutta	District
Vegetable					
Potato					
1	Poor quality seed	50.00	50.00	28.57	30.43
2	Unknown varieties are used	10.00	16.67	28.57	17.39
3	Disease attack	30.00	16.67	14.29	21.74
4	Lack of technical know-how	30.00	16.67	28.57	26.09
5	Rat problem	50.00	50.00	42.86	47.83
6	Insect-pest attack (hadda beetle, aphids, wire worms,	30.00	33.33	28.57	30.43
7	Imbalanced use of fertilizers	30.00	33.33	28.57	30.43
8	Weed problem (<i>Poa annua</i> , <i>Stellaria media</i> , <i>Oxalis latifolia</i>)	10.00	16.67	14.29	13.04
9	Lack of marketing facilities	30.00	33.33	28.57	30.43
Tomato					
1	Disease attack	30.00	50.00	42.86	39.13
2	Insect-pest attack (tomato fruit borer, Nematodes, cutworm, Hadda beetle, fruit fly)	30.00	33.33	28.57	30.43
3	Poor quality seed	30.00	33.33	28.57	30.43
4	Local cultivars and imbalanced fertilizers application	10.00	16.67	14.29	13.04
5	Improper spacing	50.00	66.67	42.86	52.17
6	Poor fruit set	10.00	16.67	14.29	13.04
7	Costly seed	40.00	33.33	42.86	39.13
Peas					
1	Poor pod set	60.00	50.00	42.86	52.17
2	Imbalanced use of fertilizers and lack of irrigation facilities	50.00	50.00	42.86	47.83
3	Root rot and stem rot	30.00	66.67	42.86	43.48
4	Poor management of diseases and pest	20.00	50.00	85.71	56.52
5	Use of traditional varieties	10.00	16.67	14.29	13.04
6	Bird attack	10.00	16.67	14.29	13.04

7	Poor cultural practices	20.00	33.33	28.57	26.09
8	Frost problem	60.00	66.67	57.14	60.87
9	White rot	100	100	100	100
10	Insect pest (bean bug, pod borer, pea leaf miner)	50.00	50.00	50.00	50.00
Cabbage					
1	Poor pest (caterpillar complex, aphid complex, cut worms, flea beetle)	20.00	50.00	85.71	56.52
2	Head compactness	20.00	16.67	14.29	17.39
3	Prevalence of traditional varieties	40.00	50.00	42.86	43.48
4	Imbalanced use of fertilizers	20.00	33.33	28.57	26.09
5	Cultivation on small scale	10.00	16.67	14.29	13.04
6	Disease attack	10.00	16.67	14.29	13.04
7	Insect-pest attack	10.00	16.67	14.29	13.04
Cauliflower					
1	Insect-pest attack(caterpillar complex, aphid complex, cut worms, flea beetle)	20.00	16.67	14.29	17.39
2	Poor pest and disease management	20.00	50.00	85.71	56.52
3	Use of traditional varieties	10.00	16.67	14.29	13.04
4	Imbalanced use of fertilizers	20.00	33.33	28.57	26.09
5	Cultivation on small scale	10.00	16.67	14.29	13.04
6	Disease problems	20.00	16.67	14.29	17.39
Capsicum					
1	Flower drop	10.00	16.67	14.29	13.04
2	Disease problems	10.00	16.67	14.29	13.04
3	Insect-pest (aphids, mite, thrips, fruit bud borer, tobacco caterpillar)	10.00	16.67	14.29	13.04
Zimikand					
1	Nutrient requirement not known	50.00	50.00	42.86	47.83
2	Non availability of inputs	10.00	16.67	14.29	13.04
Colocassia					
	Disease in rainy season (leaf rot)	100.00	100.00	85.71	95.65
Spices					
Garlic					
1	Low yield and non	30.00	33.33	28.57	30.43

	availability of HYVs				
2	Imbalanced use of fertilizers	20.00	33.33	28.57	26.09
3	Local cultivars	30.00	33.33	42.86	34.78
4	Disease problem	30.00	33.33	28.57	30.43
Ginger					
1	Rhizome rot	90.00	50.00	28.57	60.87
2	Quality seed not available	30.00	50.00	42.86	39.13
3	Imbalanced fertilizer application	20.00	33.33	28.57	26.09
4	No seed treatment	80.00	66.67	57.14	69.57

Source: Field Survey, 2007-08

Table 4.25 Technological Interventions of Vegetable and Spice Crops (Per Cent of Panchayats)

Crop	Intervention	Bilaspur Sadar	Ghumarwin	Jhandutta	District
Vegetable					
Potato					
1	Supply of good quality seed	60.00	66.67	57.14	60.86
2	Awareness programmes	40.00	50.00	100.00	60.86
3	Supply of suitable weedicide	20.00	16.67	28.57	21.74
4	Effective extension services	10.00	16.67	28.57	17.39
5	Supply of plant protection materials	20.00	16.67	28.57	21.74
6	Marketing facilities	30.00	33.33	28.57	30.43
Tomato					
1	Irrigation facility	30.00	50.00	57.14	43.48
2	Effective extension services	30.00	50.00	85.71	52.17
3	Supply of hybrid seed like Naveen	30.00	33.33	42.86	34.78
4	Awareness programmes	60.00	66.67	71.43	65.21
Peas					
1	Supply of quality seed like Azad P-1, Lincoln	40.00	33.33	42.86	39.13
2	Awareness programmes	60.00	66.67	71.43	65.22
3	Provision of irrigation	30.00	50.00	57.14	43.48
4	Effective extension services	30.00	50.00	85.71	52.17
Cabbage					
1	Awareness programmes	60.00	66.67	71.43	65.22
2	Irrigation facility	30.00	50.00	57.14	43.48

3	Effective extension services	30.00	50.00	85.71	52.17
Cauliflower					
1	Awareness programmes	60.00	66.67	71.43	65.22
2	Irrigation facility	30.00	50.00	57.14	43.48
3	Effective extension services	30.00	50.00	85.71	52.17
Zimikand					
1	Supply of seed and provision of market	40.00	33.33	42.86	39.13
2	Vocational trials for training	40.00	33.33	42.86	39.13
Colocassia					
1	Vocational training	40.00	33.33	42.86	39.13
Spices					
Garlic					
1	Awareness programmes	40.00	33.33	85.71	52.17
2	Availability of seed	30.00	33.33	42.86	34.78
Ginger					
1	Diseases free seed	90.00	66.67	85.71	82.61
2	Quality seed availability	60.00	66.67	85.71	69.56
3	Awareness programmes	60.00	66.67	71.43	65.22
4	Demonstration	30.00	50.00	14.29	30.43

Source: Field Survey, 2007-08

Table 4.26 Varietal and Technological Problems of Other Crops (Per Cent of Panchayats)

Crop	Problem	Bilaspur Sadar	Ghumarwin	Jhandutta	District
Sugarcane					
1	Poor yield	10.00	0.00	0.00	4.35
Floriculture					
1	Poly-house is not available	50.00	33.33	28.57	39.13
2	Non-availability of proper storage schedule	70.00	66.67	71.43	69.57
3	Non-availability of proper package of practices	30.00	33.33	28.57	30.43
4	Diseases in poly-house	30.00	33.33	14.29	26.09
5	Problems under protected cultivation	30.00	33.33	28.57	30.43
6	Lack of technical knowledge	30.00	33.33	42.86	34.78
7	Insect pest and disease attack	10.00	16.67	42.86	21.74
8	Lack of marketing facilities	70.00	66.67	71.43	69.57

Source: Field Survey, 2007-08

Table 4.27 Technological Interventions of Other Crops (Per Cent of Panchayats)

Crop	Intervention	Bilaspur Sadar	Ghumarwin	Jhandutta	District
Sugarcane					
	Improved variety	30.00	0.00	0.00	13.04
Floriculture					
	Awareness programmes	70.00	16.67	71.43	56.52

Source: Field Survey, 2007-08

Table 4.28 Extension Gaps in Cereal Crops (Q/ha)

Particular		Bilaspur Sadar	Ghumarwin	Jhandutta	District
Cereal					
Maize					
1	Experiment station yield	57.00	57.00	57.00	57.00
2	Progressive farmer's yield	35.00	36.50	34.38	40.63
3	Actual/average yield	20.13	25.34	22.25	23.97
4	Gaps				
	Gap I (1-3)	33.87	29.66	34.75	33.03
	Gap II (2-3)	17.50	10.16	12.13	16.66
Paddy					
1	Experiment station yield	40.00	40.00	40.00	40.00
2	Progressive farmer's yield	26.25	28.00	24.56	26.25
3	Actual/average yield	18.50	19.43	15.63	13.11
4	Gaps				
	Gap I (1-3)	27.50	26.57	26.37	26.89
	Gap II (2-3)	13.75	10.07	10.93	13.14
Wheat					
1	Experiment station yield	35.00	35.00	35.00	35.00
2	Progressive farmer's yield	34.36	35.00	32.13	35.00
3	Actual/average yield	20.42	21.20	15.10	18.94
4	Gaps				
	Gap I (1-3)	14.58	13.80	19.90	16.06
	Gap II (2-3)	13.94	13.80	17.03	16.06
Barley					
1	Experiment station yield	25.00	25.00	25.00	25.00
2	Progressive farmer's yield	18.00	20.50	16.05	22.50
3	Actual/average yield	12.76	11.69	10.63	14.00
4	Gaps				
	Gap I (1-3)	9.24	13.31	11.37	11.00
	Gap II (2-3)	3.24	10.81	6.42	8.50

Source: (i) Package and Practices for Kharif, Rabi and Vegetable Crops, Directorate of Extension Education, CSK HPKV, Palampur

(ii) Field Survey, 2007-08

Table 4.29 Extension Gaps in Pulses and Oilseed Crops (Q/ha)

Particular		Bilaspur Sadar	Ghumarwin	Jhandutta	District
Pulses					
Mash					
1	Experiment station yield	12.00	12.00	12.00	12.00
2	Progressive farmer's yield	8.50	7.80	6.72	8.50
3	Actual/average yield	6.07	5.13	5.79	5.73
4	Gaps				
	Gap I (1-3)	5.93	6.87	6.21	6.27
	Gap II (2-3)	2.43	2.67	0.93	2.77
Gram					
1	Experiment station yield	10.00	10.00	10.00	10.00
2	Progressive farmer's yield	12.50	10.16	11.00	12.50
3	Actual/average yield	9.00	8.52	6.44	8.06
4	Gaps				
	Gap I (1-3)	1.00	1.48	3.56	1.94
	Gap II (2-3)	3.50	1.64	4.56	4.44
Lentil					
1	Experiment station yield	14.00	14.00	14.00	14.00
2	Progressive farmer's yield	5.00	4.83	4.90	5.00
3	Actual/average yield	3.75	3.52	3.76	3.69
4	Gaps				
	Gap I (1-3)	10.25	10.48	10.24	10.31
	Gap II (2-3)	1.25	1.31	1.14	1.31
Oil seed					
Sesame					
1	Experiment station yield	8.00	8.00	8.00	8.00
2	Progressive farmer's yield	3.30	3.25	3.50	3.50
3	Actual/average yield	1.50	1.60	1.75	1.61
4	Gaps				
	Gap I (1-3)	6.50	6.40	6.25	6.39
	Gap II (2-3)	1.80	1.65	1.75	1.89
Sarson					
1	Experiment station yield	10.00	10.00	10.00	10.00
2	Progressive farmer's yield	7.50	10.00	7.50	10.00
3	Actual/average yield	5.00	6.15	5.00	5.30
4	Gaps				
	Gap I (1-3)	5.00	3.85	5.00	4.70
	Gap II (2-3)	2.50	3.85	2.50	4.70
Toria					
1	Experiment station yield	8.00	8.00	8.00	8.00
2	Progressive farmer's yield	10.50	7.50	6.00	10.50
3	Actual/average yield	6.50	4.17	3.82	5.03

4	Gaps				
	Gap I (1-3)	1.50	3.83	4.18	2.97
	Gap II (2-3)	4.00	3.33	2.18	5.47
Gobhi sarson					
1	Experiment station yield	15.00	15.00	15.00	15.00
2	Progressive farmer's yield	9.50	12.00	9.50	12.00
3	Actual/average yield	6.00	8.15	7.00	6.89
4	Gaps				
	Gap I (1-3)	9.00	6.85	8.00	8.11
	Gap II (2-3)	3.50	3.85	2.50	5.11

Source: (i) Package and Practices for Kharif, Rabi and Vegetable Crops, Directorate of Extension Education, CSK HPKV, Palampur
(ii) Field Survey, 2007-08

Table 4.30 Extension Gaps in Vegetable and Spice Crops (Q/ha)

Particular		Bilaspur Sadar	Ghumarwin	Jhandutta	District
Vegetable					
Potato					
1	Experiment station yield	175.00	175.00	175.00	175.00
2	Progressive farmer's yield	175.00	158.00	150.00	175.00
3	Actual/average yield	120.00	114.45	113.13	116.35
4	Gaps				
	Gap I (1-3)	55.00	60.55	61.87	58.65
	Gap II (2-3)	55.00	43.55	36.87	58.65
Peas					
1	Experiment station yield	125.00	125.00	125.00	125.00
2	Progressive farmer's yield	151.50	125.00	110.00	151.50
3	Actual/average yield	116.76	90.00	86.00	99.89
4	Gaps				
	Gap I (1-3)	8.24	35.00	39.00	25.11
	Gap II (2-3)	34.74	35.00	24.00	51.61
Tomato					
1	Experiment station yield	500.00	500.00	500.00	500.00
2	Progressive farmer's yield	406.25	375.00	350.00	406.25
3	Actual/average yield	326.85	200.00	225.00	260.87
4	Gaps				
	Gap I (1-3)	173.15	300.00	275.00	239.13
	Gap II (2-3)	79.40	175.00	125.00	145.38
Cabbage					
1	Experiment station yield	250.00	250.00	250.00	250.00
2	Progressive farmer's yield	262.50	205.00	180.00	262.50
3	Actual/average yield	215.50	183.88	145.00	184.71
4	Gaps				
	Gap I (1-3)	34.50	66.12	105.00	65.29
	Gap II (2-3)	47.00	21.12	35.00	77.79

Cauliflower					
1	Experiment station yield	150.00	150.00	150.00	150.00
2	Progressive farmer's yield	200.00	200.00	146.00	200.00
3	Actual/average yield	150.00	140.00	83.63	126.25
4	Gaps				
	Gap I (1-3)	0.00	10.00	66.37	23.75
	Gap II (2-3)	50.00	60.00	62.37	73.75
Beans					
1	Experiment station yield	125.00	125.00	125.00	125.00
2	Progressive farmer's yield	110.00	100.00	80.00	110.00
3	Actual/average yield	72.62	62.50	56.23	64.73
4	Gaps				
	Gap I (1-3)	52.38	62.50	68.77	60.27
	Gap II (2-3)	37.38	37.50	23.77	45.27
Capsicum					
1	Experiment station yield	135.00	135.00	135.00	135.00
2	Progressive farmer's yield	145.00	130.00	122.00	145.00
3	Actual/average yield	133.78	123.24	110.15	123.48
4	Gaps				
	Gap I (1-3)	1.22	11.76	24.85	11.52
	Gap II (2-3)	11.22	6.76	11.85	21.52
Bhindi					
1	Experiment station yield	140.00	140.00	140.00	140.00
2	Progressive farmer's yield	125.00	120.00	120.00	125.00
3	Actual/average yield	114.08	98.23	99.43	105.22
4	Gaps				
	Gap I (1-3)	25.92	41.77	40.57	34.78
	Gap II (2-3)	10.92	21.77	20.57	19.78
Brinjal					
1	Experiment station yield	250.00	250.00	250.00	250.00
2	Progressive farmer's yield	260.00	250.00	240.00	260.00
3	Actual/average yield	205.36	187.50	195.66	197.55
4	Gaps				
	Gap I (1-3)	44.64	62.50	54.34	52.45
	Gap II (2-3)	54.64	62.50	44.34	62.45
Cucumber					
1	Experiment station yield	190.00	190.00	190.00	190.00
2	Progressive farmer's yield	220.00	200.00	200.00	220.00
3	Actual/average yield	135.26	116.30	124.34	126.77
4	Gaps				
	Gap I (1-3)	54.74	73.70	65.66	63.23
	Gap II (2-3)	84.74	83.70	75.66	93.23
Onion					
1	Experiment station yield	250.00	250.00	250.00	250.00
2	Progressive farmer's yield	225.00	160.00	140.00	225.00

3	Actual/average yield	153.21	100.72	118.28	128.20
4	Gaps				
	Gap I (1-3)	96.79	149.28	131.72	121.80
	Gap II (2-3)	71.79	59.28	21.72	96.80
Elephant foot yam (Zimikand)					
1	Experiment station yield	750.00	750.00	750.00	750.00
2	Progressive farmer's yield	700.00	650.00	400.00	700.00
3	Actual/average yield	400.00	350.00	185.00	318.41
4	Gaps				
	Gap I (1-3)	350.00	400.00	565.00	431.59
	Gap II (2-3)	300.00	300.00	215.00	381.59
Spices					
Ginger					
1	Experiment station yield	150.00	150.00	150.00	150.00
2	Progressive farmer's yield	132.50	112.50	120.00	132.50
3	Actual/average yield	94.21	80.08	87.08	88.20
4	Gaps				
	Gap I (1-3)	55.79	69.92	62.92	61.80
	Gap II (2-3)	38.29	32.42	32.92	44.30
Garlic					
1	Experiment station yield	150.00	150.00	150.00	150.00
2	Progressive farmer's yield	110.00	100.00	105.00	110.00
3	Actual/average yield	78.36	75.00	83.30	79.04
4	Gaps				
	Gap I (1-3)	71.64	75.00	66.70	70.96
	Gap II (2-3)	31.64	25.00	21.70	30.96

Source: (i) Package and Practices for Kharif, Rabi and Vegetable Crops, Directorate of Extension Education, CSK HPKV, Palampur
(ii) Field Survey, 2007-08

Chapter-V

ALLIED AGRICULTURAL SECTORS

Agricultural sector broadly defined encompasses allied sectors like horticulture, animal husbandry, sericulture and fisheries. For accomplishing required agricultural growth rate of 4 per cent, it is essential that besides crop production, these allied agricultural sectors also register a reasonable rate of growth. The development of these sectors also assumes significance because of recent rise in demand for fruit, vegetables and animal products coupled with huge export potential of these crops. The importance of these sectors in sustaining the high growth rate of net state domestic product originating from agricultural sector becomes evident from the fact that while during 1999-00 and 2006-07, the horticultural production and livestock registered a compound growth rate of 13.7 per cent and 6.70 per cent per annum respectively as compared to crop production which registered growth rate as low as 1.04 per cent per annum. Therefore, a high growth rate of 7.18 per cent in net state domestic product originating from agricultural sector was largely contributed by the horticulture and livestock sectors. It is against this background that the present chapter discusses different aspects such as existing status, potential, problems, constraints and interventions, and so on that impinge on the potential growth of these sectors in different blocks of the district.

5.1 Horticulture

Given the agro-climatic conditions, district has a potential to grow fruit crops like mango, citrus, pears, plum, and so on. A number of schemes are being implemented to exploit the potential for horticultural development in the district under the umbrella project of National Horticulture Mission. The details regarding these schemes in terms of number of villages covered, population covered, area under these schemes, total budget and status of implementation in all the three blocks of the district has been brought out in Table 5.1. The table shows that there are 10 horticultural schemes with a total budget of Rs. 1.67 crores that are being implemented in the district. Out of these schemes, four each are being implemented in Ghumarwin and Jhandutta and two schemes are under

implementation in Bilaspur Sadar with the respective budget of Rs. 0.2, 1.10 and 0.55 crores. The details on existing status and potential in terms of area, production and number of households growing different horticultural crops in different blocks have been provided in Table 5.2. The table shows that among different horticultural crops all blocks have the highest potential to grow mango. In fact, district has a potential of emerging as a leading producer of mango provided some problems like susceptibility of exiting varieties to frost and alternate bearing are resolved on priority. The other important horticultural crops which can be grown in all the three blocks are citrus fruits, plum, litchi, peach, pear and amla.

5.2 Animal Husbandry

The details of the existing schemes for livestock improvement have been presented in Table 5.3. The table shows that there are 13 livestock improvement schemes in the district with a total budget provision of Rs. 27 lakhs. Across blocks, five schemes are being implemented in Ghumarwin followed by four each in Bilaspur Sadar and Jhandutta. Table 5.4 shows that livestock population in the year 2003 was 2.089 lakh out of which the share of buffalo was as high as 44.22 per cent. Goat was another important animal which accounted for one-fourth of the total livestock population in the district. The share of crossbred cattle was very small (3.14 per cent). Among three blocks, Bilaspur Sadar accounted for 42.39 per cent of the livestock population followed by Ghumarwin (31.37 per cent) and Jhandutta (26.24 per cent).

5.3 Fisheries

Bilaspur is the leading producer of fishery accounting for more than one-tenth of the total fish production in the state. As seen in Chapter III, the fish production in the state has been increasing steadily though the number of registered fishermen has exhibited a fluctuating trend. And more importantly, the district has a potential to raise fish production thanks to the water reservoir in Gobind Sagar lake. The details of the existing schemes that are being implemented to boost fish production both in respect of ponds and

reservoir fisheries are given in Table 5.5. The table shows that while 10 schemes in Bilaspur Sadar and 2 schemes in Ghumarwin are being implemented for the development of pond fishery, one scheme is being executed for reservoir fish production in Jhandutta with a total budget of Rs 8.01 lakhs. Table 5.6 provides data on the existing status, potential, fish species and diseases in of cultured fisheries in different blocks. The information provided in the table reveals that cultured fisheries in terms of households involved and the potential number of households willing to adopt cultured fisheries is more popular in Ghumarwin as compared with the remaining two blocks. The popular species include rohu, calta, mrigal and silver carp. The fingerlings rot and fungal diseases were affecting the cultured fish production. The constraints/interventions for the development culture fisheries have been summarised in Table 5.7. The major constraints in the development of cultured fisheries include lack of availability of quality fingerlings, fish feed, quality and quantity of water, lack of technical know-how, perishability, lack of remunerative prices, and so on. The interventions are, therefore, required to be made to remove these constraints and boost fish production in the district.

5.4 Marketing of Agriculture Produce

The details regarding marketing of agricultural produce in terms of total production, marketed surplus, locale of sale and post harvest losses are provided in Table 5.8. The table reveals that nearly one-third of the total cereal production was marketed out of which around seventy per cent was sold in the distant markets. The proportion of the cereal production sold was nearly the same in all the three blocks. It, however, needs to be mentioned here that marketed surplus was available only in maize production. The post-harvest losses were negligible, accounting for around 1.6 per cent of the total production. In case of pulses, marketed surplus was around one-fifth of the total production whole of which was sold in the local markets. There was no surplus in oilseed production. The vegetables are primarily grown as commercial crops. Naturally therefore more than four-fifths of the total vegetable production was sold in the market. Interestingly, a very large proportion of vegetable production was sold within the state. The post-harvest losses accounted for around 13 per cent of the total production. The

marketing of horticultural produce has been shown in Table 5.9. Since these crops are also grown for the market, the proportion of marketed surplus was 88 per cent, of which more than seventy per cent was being sold within the state. The post-harvest losses accounted for 12 per cent of the total produce. Table 5.10 gives the details on the marketing of livestock and their products. The data on the marketing of livestock products show that nearly one-fifth of total milk production and half of the wool were being sold in market. Likewise, in case of livestock products, sheep and goat meat, eggs and, poultry birds were being marketed. The animals like sheep, goat, cattle and buffaloes were also being sold in the market.

5.5 Marketing Infrastructure

The availability of marketing infrastructural facilities like collection centres, market yards, co-operative marketing societies, co-operative input societies, etc and the actual requirement have been given in Table 5.11. The table reveals the inadequacy/non-availability of marketing infrastructure in blocks. For example, there are no collection centres in any of the blocks while the actual requirement in view of the ongoing process of crop diversification is of five centres in Bilaspur Sadar and four each in Ghumarwin and Jhandutta. More or less similar situation prevails in respect of actual and required infrastructural facilities. Table 5.12 presents the financial estimates amounting to Rs. 56.50 lakhs for providing required infrastructure like cold storage, chilling plants, refrigerated vans and packaging machines for marketing of livestock products. The information on the existing physical infrastructural facilities like rural markets, rural roads and bridges has been presented in Table 5.13. There were four markets, three in Bilaspur Sadar and one in Jhandutta, in the district. The length of rural roads was 1,154 kilometres and the number of bridges was 350. Most of these schemes for infrastructural facilities have been completed except the completion of the market in Jhandutta block for which an additional amount of rupees 10 lakhs is required.

5.6 Human Resource Development

The efficient and timely implementation of ongoing and proposed schemes for agricultural development requires adequate availability of technically trained human resources. The current position on the availability and required technical manpower in different sub-sectors like crop production, horticulture and animal husbandry has been brought out in Table 5.14. The table shows that for the district as a whole additional twenty one personnel are required in different sectors. Among blocks, while 14 personnel are required in Bilaspur Sadar, the remaining seven are required in Jhandutta. The financial estimates at the given rates required to fill this gap amounted to Rs. 345.6 lakhs (Table 5.15).

5.7 Unemployment and Enterprises for Livelihood

The estimates on the extent of unemployment by levels of education derived from survey of different panchayats have been presented in Table 5.16. As may be seen from the table, the total number of educated unemployed in the district was 65,087 out of which 58.05 per cent were males and 41.95 were females. According to levels of education, more than three-fifths of the un-employed were educated up to plus two levels; more precisely 31.98 per cent of the educated un-employed were matriculate and 31.57 per cent possessed education up to plus two level. The graduate unemployed accounted for 18.21 per cent followed by 9.40 per cent with post graduate qualification. Among three blocks, while the extent of unemployment was significantly higher in Jhandutta, it was much lower in Bilaspur Sadar. There are number of farm and non-farm enterprises where these un-employed could get absorbed themselves provided right kind of support in terms of credit and training were provided to them. The inventory of enterprises along with the persons employed and the potential to increase the employment has been given in Table 5.17. The table shows a number of micro enterprises that are providing employment to the local population. There is a long list of enterprises, namely, small scale flour mills, oil expeller, bakery, vermi-compost, mushroom compost, rural craft, nursery raising, flower nursery, seed production, pottery, feed mill, fruit and vegetable processing, and so on

which are providing source of livelihood to the rural workforce. The important feature thrown by the table is that practically all of these enterprises can be further expanded to absorb significant number of educated unemployed, given in the earlier table. This gets corroborated from the data presented in Table 5.18. The table shows different potential sources of livelihood like apiculture, mushroom growing and sericulture in the farm sector while own business, jobs in the private sector and agro-tourism are in the non-farm sector . The number of employment days that these enterprises are expected to generate in all the three blocks of the district varies from 60 to as high as 365. However, as mentioned above, training and credit facilities need to be provided on priority to enable educated un-employed to take up these enterprises.

5.8 Agri-Business Establishments

The status of agri-business establishments like agro-sale centres, primary agricultural co-operative societies, rural handicraft centres, co-operatives and farmers co-operatives in terms of existing and required is brought out in Table 5.19. The availability of agro-centres and primary agricultural co-operative societies facilitate availability of inputs like seeds and credit where as formation of farmers' co-operatives especially in marketing help the disposal of agricultural produce at remunerative prices. As may be seen from the table, four additional agro-sale centres are required (three in Ghumarwin and one in Bilaspur Sadar). The number of existing primary agricultural societies was, however, more than required. The farmers' co-operative societies were found in Bilaspur Sadar and Ghumarwin.

5.9 Drudgery of Women

As is well known, most of the agricultural operations in hill regions are carried out by women folk because of the well known phenomenon of money order economy. Thus, the completion of different operations either manually or using traditional implements entail lot of time and energy impinging adversely on the health of women folk. Against this background, the extent of drudgery of women is measured in terms of per cent of women

folk performing different operations manually and using modern tools and equipments. The required information is provided in Table 5.20. The table informs that a preponderant majority of the women performs different agricultural operation manually barring wheat threshing and winnowing. More or less similar pattern was in evidence in case of livestock rearing operations. For example, hundred per cent of women in all the three blocks use traditional tools/practices for fodder cutting, fodder chaffing, animal waste disposal and cleaning of animals.

5.10 Livestock Feed and Fodder

The data on livestock feed and fodder for different types of animals like crossbred cows, local cows, buffaloes, poultry, broilers and bullocks has been presented in Table 5.21. The table reveals that among different types of animals, the amount of green fodder per animal per day was high in case of buffalo which was around 19 kg compared with around 16 kg per day in case of crossbred cows. The green fodder consumption was, however, much lower in respect of local cows which was 9 to 10 kg per animal per day. More or less similar pattern was discernible in the consumption of dry fodder for these animals. Further, the consumption of minerals was very high in case of crossbred cows in comparison to other animals. The amount of concentrate fed to a poultry bird was around 90 to 100 gram per day.

5.11 Yield Gaps in Livestock Production

The yield gaps in the livestock production have been given in able 5.22. The table shows that there is a huge gap between per animal per day yield of different livestock products like milk yields of crossbred cow, local cow and buffalo obtained by an average farmer compared with those obtained by the progressive farmers. These gaps are indicative of the huge potential available to increase the production of milk and other products like eggs, wool, broilers, etc provided right kind of interventions are made. The reasons for the gap between the yield of livestock products on average farm and progressive farm are delineated in Table 5.23. A perusal of the table reveals that improper feeding practices,

poor management and imbalanced diet were the main reasons for difference between two levels of yields.

5.12 Incidence of Livestock Diseases

The information on the incidence of livestock diseases and interventions required to mitigate these diseases for different types of animals has been provided in Table 5.24 to 5.28. The table shows that among different diseases, the incidence of endoparasites and ectoparasites was much higher compared with other diseases like foot and mouth, tympany and pneumonia among all the categories of animals. The interventions suggested to mitigate these diseases include vaccination, dipping and dusting affected animals, organising ectoparasite camps, balanced nutrition, etc.

5.13 Yield Gaps in Fruit Crops

The gap yield gaps in important fruit crops have been brought out in Table 5.29. The table shows that there is a huge potential to increase the fruit production in all the three blocks. It is evident from the difference in the yield levels obtained by progressive farmers compared to average yields of average farmer. These gaps have been attributed to two important factors, namely, poor orchard management and frost (Table 5.30). The varietal and technological problems in important fruit crops pointed out by the respondents have been summarised in Table 5.31. The table shows that frost, alternative bearing, glum blotch, improper spacing and local cultivars flower drop and non-availability of irrigation facilities were the most important varietal and technological problems in main fruit crops which include mango, citrus, litchi, papaya and guava. To tackle these problems, interventions like launching awareness programmes, developing suitable plant varieties which are not susceptible to frost and give regular bearings are suggested (Table 5.32). In case of floriculture, non-availability of polyhouses, non-availability of proper storage schedule and package facilities are important problems and the proposed interventions include launching of awareness programmes and providing incentives and subsidies for the construction of polyhouse facilities (Table 5.33).

5.14 Sericulture

Sericulture is one of the important production activities in all the three blocks of the district. The existing status of sericulture development is brought out in Table 5.35. The table shows that there are eleven schemes which are currently implemented in the district covering as many as 566 villages and four thousand families. The total budget for implementing these schemes is Rs.171.11 lakhs.

5.15 Researchable Issues

In view of above mentioned problems and interventions that are required for developing animal husbandry and horticultural sectors, the following set of researchable issues has been identified. The research agenda of the R & D institutions of the state, therefore, should include research on these issues. The funds for undertaking research on these issues have been provided in the plan under research and extension head.

Animal Husbandry

- Issues related to animal health problems faced by livestock farmers on migratory routes used in Bilaspur district.
- Documentation of the prevailing ethno-veterinary practices among migratory shepherds (*Gaddis*); their scientific validation and subsequent mass dissemination.
- Issues related to appropriateness of the recommended animal husbandry technologies / practices for mid-hill region of the district.
- Development of a profitable dairy husbandry package for mid-Hill livestock farmers in the face of the in-coming 'LIVESTOCK REVOLUTION 2020'
- Development of an integrated livestock (cattle, fish and poultry) production model (ILPM) for farmers of district Bilaspur.
- To develop endocrinological tools to augment production and reproduction in dairy animals.

- Surveillance, monitoring and control of the diseases of animals and birds including wild fauna
- Issues related to pharmacokinetic behaviour of the drugs on local breeds of animals and pharmacokinetic interaction of herbal bio-enhancers.
- Development of herbal nutraceuticals for health and production of farm animals
- Pharmacological and toxicological studies on the poisonous plants and characterization of their toxic principles and anti nutritional factors.
- Investigation on the etiological agents of infectious infertility among bovine, ovine and caprine including male animals with special emphasis on *Brucella*, *Chlamydia*, *Mycobacterium* and fungal agents including their molecular diagnosis
- Preparation and testing of multiserotype vaccine against haemorrhagic septicaemia
- Serosurveillance of some important infectious diseases in livestock
- Investigations on the epidemiology and serodiagnosis of *mycobacterium bovis* infection in bovines in the district.
- Molecular diagnosis and genetic diversity analysis of important pathogens responsible for major animal diseases and zoonoses.
- Identification of the indigenous livestock health practices among livestock farmers in the district.
- To generate database for various surgical disorders in small and large animals of the district.
- Diagnostic imaging for early and accurate management of surgical afflictions in animals.
- Evaluation of medicinal plants/herbs utilized in soft and hard tissue healing in animals.
- Development of safe and suitable balanced anaesthetic techniques for ponies and wild animals of the district.
- Standardization of various orthopedics (external and internal) techniques in large, small and companion animals.
- Standardization and further application of endoscopic and laproscopic techniques in clinical cases of abdominal disorders in small and large animals.

- Application of various diagnostic and operative ophthalmic procedures in surgical cases of small and large animals.
- Evaluation of various prosthetics and biomaterials in the management of abdominal trauma/fracture/muscular skeletal disorders in animals.
- Diagnostic and surgical approaches to neoplasm in small and large animals.
- To develop state of art in diagnostic and operative facilities including intensive care unit for small and large animals.
- Survey of prevalence of acarine fauna of veterinary importance involved in tick typhus in mid-and low-hill areas of the district.
- Potential of phytotherapy as an alternative to conventional anthelmintic medication for parasite control.
- Studies on routine and immunodiagnosis of parasitic aetiopathogen causing neonatal diarrhea and mortality in calves.

Horticulture

- The development of technology for frost management
- Management of mango mealy bug with emphasis on bio-rational methods
- Development of management strategies for mango malformation and diseases of ornamental crops like gladiolus, carnation, lilium, etc.
- Research on controlling fruit in cracking and fruit drops in litchi.
- Development of efficient propagation for litchi, mango, amla, etc.
- Generation of data base of pollinator diversity in different horticultural crops
- Identification of potential bee keeping belts in different districts
- Safe waiting periods of pesticides on horticultural crops
- The development of varieties which give regular fruits
- Expansion of area under fruits through varietal testing of low chill apples and pears
- Identification of niche area and remapping of different fruit growing belts

- Diversification of fruits and their varieties with under utilised fruits
- To develop technology for improving water use efficiency fertiliser in different fruit crops
- Integrated pest/disease management
- Integrated nutrient management

Table 5.1 Existing Schemes for Horticulture Development

Block	No. of schemes	Village covered (No.)	Population covered (No.)	Area covered (Ha)	Beneficiary families (No)	Status		Total budget (Rs. Lakh)	Additional funds required (Rs. Lakh)
						Complete (No.)	Incomplete (No.)		
Bilaspur Sadar	2	454	62500	42	70	0	2	2.00	0.00
Ghumarwin	4	30	3750	813	375	0	4	110.00	400.00
Jhandhutta	4	248	45000	0	10000	0	4	55.00	500.00
Total	10	732	111250	855	10445	0	10	167.00	900.00

Source: Field Survey, 2007-08

**Table 5.2 Existing Status and Potential for Horticulture Development
(Area in Ha; Production in Tonne)**

Crop	Status	Parameter	Bilaspur Sadar	Ghumarwin	Jhandutta	District
Mango	Existing	Area	2064	1154	737	3955
		Production	1393	779	498	2670
		No. of Households	21945	12507	13920	48372
	Potential	Area	125	125	107	357
		Production	132	131	112	375
		No of Households	12653	13800	15840	42293
Citrus	Existing	Area	335	194	431	960
		Production	197	110	129	436
		No. of Households	3465	1927	1835	7227
	Potential	Area	15	71	37	123
		Production	27.55	60.35	16.65	104.55
		No. of Households	1443	960	2000	4403
Peach	Existing	Area	50	70	48	168
		Production	9.72	16.07	4.21	30.00
		No of Households	540	735	509	1784
	Potential	Area	4	5	3	12
		Production	1.83	2.70	0.50	4.78
		No. of Households	378	409	312	1099
Plum	Existing	Area	42	58	40	147
		Production	4.53	7.5	1.97	14.00
		No of Households	470	665	439	1574
	Potential	Area	3.20	2.60	1.20	7.00
		Production	0.82	1.12	0.24	2.18
		No. of Households	278	309	212	799
Litchi	Existing	Area	60	45	32	137
		Production	15	9	4	28
		Households	1388	400	640	2428
	Potential	Area	3	4	5	12
		Production	6.38	3.19	3.26	12.83
		New Households	405	197	336	938
Pear	Existing	Area	543.76	239.33	98.18	881.27

		Production	560.62	287.20	98.18	946
		Households	1218	900	624	2742
	Potential	Area	20	25	33	78
		Production	105.14	198.50	140.70	444.34
		New Households	1015	800	1632	3447
Amla	Existing	Area	26	14	13	53
		Production	15.75	6.95	5.86	28.56
		Households	252	265	185	702
	Potential	Area	10	13	8	31
		Production	22.50	5.70	4.67	32.87
		New Households	392	187	226	805

Source: Field Survey, 2007-08

Table 5.3 Existing Schemes for Livestock Improvement

Block	No. of schemes	Village covered (No.)	Population covered (No.)	Area covered (Ha)	Beneficiary families (No.)	Status		Total budget (Rs. Lakh)	Additional funds required (Rs. Lakh)
						Complete (No.)	Incomplete (No.)		
Bilaspur Sadar	4	454	124725	0	20450	0	4	10.00	10.00
Ghumarwin	5	284	12500	0	5500	0	5	7.00	5.00
Jhandhutta	4	326	14384	0	14384	0	4	10.00	10.00
Total	13	1064	151609	0	40334	0	13	27.00	25.00

Source: Field Survey, 2007-08

Table 5.4 Livestock Population (No.)

Sr. No.	Particular	Status	Bilaspur Sadar	Ghumarwin	Jandutta	District
1	Crossbred Cattle	Male	3147	1370	2043	6560
		Female	7287	3364	3890	14541
2	Indigenous Cattle	Male	15117	7773	5986	28876
		Female	3027	317	625	3969
3	Total Cattle		28578	12824	12544	53946
4	Buffaloes	Male	1478	2074	1719	5271
		Female	31871	34413	26113	92397
5	Sheep	Crossbred	581	193	46	820
		Indigenous	611	895	668	2174
6	Goats		24677	14623	13519	52819
7	Pack animals (Horses, ponies, mules, donkeys)		267	79	59	405
8	Total Livestock		88576	65537	54822	208935
9	Poultry		50776	34585	21237	106598

Source: 17th Livestock Census 2003, Himachal Pradesh

Table 5.5 Existing Schemes for Fisheries

Scheme	No. of schemes	Area (Sq metres)	Beneficiary families (No.)	Status		Total Budget (Rs. Lakh)	Additional fund required (Rs. Lakh)
				Complete(No.)	Incomplete(No.)		
Bilaspur Sadar							
I. Pond							
1. Community Pond	3	3	3	3	-	3.00	-
2. Rural Pond Culture	4	4	4	4	-	0.20	-
3. Renovation/ Construction of Fish Pond	3	3	3	3	-	0.90	-
II. Reservoir							
Close Season Assistance	1	8000	400		-	4.10	-
Ghumarwin							
I. Pond							
1. Community Pond	-	-	-	-	-	-	-
2. Rural Pond Culture	-	-	-	-	-	-	-
3. Renovation/ Construction of Fish Pond	2	2	2	2		0.32	
II. Reservoir							
Close Season Assistance	-	-	-	-	-	-	-
Jhandutta							
I. Reservoir							
Close Season Assistance	1	7500	350		-	3.59	-

Source: Field Survey, 2007-08

Table 5.6 Cultured Fisheries: Existing Status, Potential and Diseases

Particular	House-holds (No.)	Fish production (Q)	Ponds (No.)	Ponds Area (Ha)	Fish Species				Disease	
					Common Carp	Rohu	Catla	Mrigal	Grass Carp	Silver Carp
Bilaspur Sadar										
Existing	42	1815	75	12	√	√	√	√		√
Potential	110	2500	113	22.5				√	√	
Gap	68	685	38	10.5						
Ghumarwin										
Existing	210	1500	10	4	√					√
Potential	500	3000	25	12		√	√			
Gap	290	1500	15	8						
Jhandutta										
Existing	9	1250	14	0.34	√	√	√	√		√
Potential	45	6250	45	1.8						
Gap	36	5000	31	1.46						
District										
Existing	261	4565	99	16.34	√	√	√	√		√
Potential	655	11750	183	36.3				√	√	
Gap	394	7185	84	19.96						

Source: Field Survey, 2007-08

Table 5.7. Constraints/Interventions in Cultured Fisheries: Response

Constraint	Bilaspur Sadar	Ghumarwin	Jhandutta	District
Quality/quantity of fingerlings	√	√	√	√
Fish feed	√	√	√	√
Quality and quantity of water supply	√	√	√	√
Training	√		√	√
Technical know how	√		√	√
Pond structure	√		√	√
Perishability	√	√	√	√
Remunerative price			√	√
Market			√	√
Nets, medicines etc.	√	√	√	√

Source: Field Survey, 2007-08

Table 5.8 Marketing of Agricultural Produce (Tonnes)

Particular	Bilaspur Sadar	Ghumarwin	Jhandutta	District
Cereals				
Total production	27768	32998	16134	76900
Consumption	18202	21630	10576	50408
Marketed surplus	9,088*	10,913*	5,280*	25,281*
Markets where sold				
Local (within area)	20.00	16.00	19.00	18.33
Distant (within state)	10.00	12.00	10.00	10.67
Distant (outside state)	70.00	72.00	71.00	71.00
Post harvest losses	478	455	278	1211
Pulses				
Total production	181	29	100	310
Consumption	145	23	80	250
Marketed surplus	36	6	20	60
Markets where sold				
Local (within area)	100.00	100.00	100.00	100.00
Distant (within state)	-	-	-	-
Distant (outside state)	-	-	-	-
Post harvest losses	-	-	-	-
Oilseeds				
Total production	155	41	44	240
Consumption	155	41	44	240
Marketed surplus	0.00	0.00	0.00	0.00
Markets where sold				
Local (within area)	-	-	-	-
Distant (within state)	-	-	-	-
Distant (outside state)	-	-	-	-
Post harvest losses	0.00	0.00	0.00	0.00
Vegetables				
Total production	22480	20072	11448	54000
Consumption	280	367	238	885
Marketed surplus	19090	17326	9425	45841
Markets where sold				
Local (within area)	2.00	2.40	1.90	2.17
Distant (within state)	85.40	82.60	89.28	85.76
Distant (outside state)	12.60	15.00	8.82	12.07
Post harvest losses	3110	2379	1785	7274

*Surplus in maize

Source: Field Survey, 2007-08

Table 5.9 Marketing of Horticultural Produce (Tonnes)

Particular	Bilaspur Sadar	Ghumarwin	Jhandutta	District
Total production	1623	1221	1836	4680
Consumption	182	148	209	539
Marketed surplus	1266	933	1364	3563
Markets where sold				
Local (within area)	25.05	28.42	23.60	25.69
Distant (within state)	73.14	69.43	75.00	72.52
Distant (outside state)	1.81	2.15	1.40	1.79
Post harvest losses	175	140	263	578

Source: Field Survey, 2007-08

Table 5.10 Marketing of Livestock and their Products

Particular	Bilaspur Sadar	Ghumarwin	Jhandutta	District
Milk (000' Lt/day)				
Total production	71.35	66.77	44.04	182.16
Consumption	57.08	54.75	36.99	148.82
Marketed surplus	14.27	12.02	7.05	33.34
Wool (Q/yr)				
Total production	157.5	134.07	77.38	368.95
Consumption	78.75	93.85	50.29	222.89
Marketed surplus	78.75	40.22	27.09	146.06
Sheep & goat meat (Q/yr.)				
Total production	47.63	27.43	26.94	102
Consumption	-	-	-	-
Marketed surplus	47.63	27.43	26.94	102
Eggs (Lakh)				
Total production	75.43	5.22	7.05	87.7
Consumption	3.77	0.26	0.35	4.38
Marketed surplus	71.66	4.96	6.7	83.32
Poultry bird sold for chicken (No./yr)	91114	29994	15202	136310
Sheep/ goat sold (No./yr)	3374	1984	1840	7198
Cattle sold (No./yr)	15277	4080	5781	25138
Buffaloes sold (No./yr)	4442	4430	3500	12375

Source: Field Survey, 2007-08

Table 5.11 Marketing Infrastructure (No.)

Particular	Status	Bilaspur Sadar	Ghumarwin	Jhandhutta
Collection centres	E	0	0	0
	R	5	4	4
Market yard/sub yard	E	0	0	0
	R	3	1	1
Market information centre	E	1	0	0
	R	3	1	1
Co-operative marketing society	E	3	2	2
	R	15	10	10
Co-operative input society	E	29	46	43
	R	56	19	80
Banking and insurance facility	E	26	22	46
	R	68	36	49
Agri/Horti input supply centre including PACS	E	38	25	35
	R	45	10	0
Others (Transport Society)	E	1	0	0
	R	1	1	1

Note: E: Existing, R: Required

Source: Field Survey, 2007-08

Table 5.12 Financial Estimates for Marketing Infrastructure of Livestock Products (Rs. Lakh)

Particular	Bilaspur Sadar		Ghumarwin		Jhandutta		District	
	No.	Funds	No.	Funds	No.	Funds	No.	Funds
Cold Storage	-	-	-	-	-	-	-	-
Chilling plants	1	3.50	1	3.50	1	3.50	3	10.50
Refrigerated vans	1	10.00	1	10.00	2	20.00	4	40.00
Packaging machines	1	2.00	1	2.00	1	2.00	3	6.00
Total	-	15.50	-	15.50	-	25.50	-	56.50

Source: Field Survey, 2007-08

Table 5.13 Existing Infrastructural Schemes for Rural Development

Block	No. of schemes	Village covered (No.)	Population covered (No.)	Area covered (Ha)	Beneficiary families (No)	Status		Total budget (Rs. Lakh)	Additional funds required (Rs. Lakh)
						Complete (No.)	Incomplete (No.)		
Rural Markets									
Bilaspur Sadar	3	136	19259	-	7490	3	0	150.00	0.00
Ghumarwin	0	0	0	-	0	0	0	0.00	0.00
Jhandhutta	1	326	102038	-	15000	0	1	50.00	10.00
Total	4	462	121297	-	22490	3	1	200.00	10.00
Roads (Km)									
Bilaspur Sadar	630	454	124725	-	20450	630	0	630.00	0.00
Ghumarwin	274	184	50600	-	10120	273.98	0	693.55	0.00
Jhandhutta	250	125	90000	-	25000	250	0	262.00	0.00
Total	1154	763	265325	-	55570	1154	0	1585.60	0.00
Bridges(No.)									
Bilaspur Sadar	175	454	124725	-	-	165	10	175.00	0.00
Ghumarwin	105	160	18460	-	-	70	35	130.00	0.00
Jhandhutta	70	125	25000	-	-	50	20	87.50	0.00
Total	350	739	168185	-	-	285	65	392.50	0.00

Source: Field Survey, 2007-08

Table 5.14 Human Resource for Agricultural Development (No.)

Position	Bilaspur Sadar				Ghumarwin				Jhandutta				District			
	S	P	R	G	S	P	R	G	S	P	R	G	S	P	R	G
SMS (Agri)	1	1	1	0	1	1	1	0	1	1	1	0	1	1	1	0
ADOs	2	2	2	0	2	1	2	0	2	1	2	0	2	1	2	0
AEOs	8	7	8	0	9	7	9	0	10	5	10	0	27	19	27	0
SMS (Horti)	0	0	1	1	0	0	0	0	0	0	1	1	0	0	2	2
HDOs	2	1	2	0	1	1	1	0	1	1	1	0	4	3	4	0
HEOs	5	5	5	0	6	6	6	0	5	5	5	0	16	16	16	0
Sr. Veterinary officers	1	1	3	2	1	1	1	0	0	0	0	0	2	2	4	2
Veterinary doctors	8	8	12	4	11	11	11	0	6	6	6	0	25	25	29	4
Veterinary Pharmacist	35	30	35	0	47	44	47	0	0	0	0	0	82	74	82	0
Extension Specialists for:																
Bee keeping	0	0	2	2	0	0	0	0	0	0	2	2	0	0	4	4
Mushrooms	0	0	2	2	0	0	0	0	0	0	2	2	0	0	4	4
Floriculture	0	0	2	2	0	0	0	0	0	0	2	2	0	0	4	4
Fisheries	8	6	8	0	0	0	0	0	1	1	1	0	9	7	9	0
Sericulture	2	1	2	0	0	0	0	0	2	2	2	0	4	3	4	0
Protected cultivation	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1
Total	72	62	86	14	78	72	78	0	28	22	35	7	178	156	199	21

Note: S-Sanctioned; P- in Position, R- Required and G- Gap
Source: Field Survey, 2007-08

Table 5.15 Financial Estimates for Human Resources (Rs. Lakh)

Position	Bilaspur Sadar		Ghumarwin		Jhandutta		District	
	Gap	Funds	Gap	Funds	Gap	Funds	Gap	Funds
SMS (Agri)	1	18.0	0	0	0	0	1	18.0
SMS (Horti)	1	18.0	0	0	1	18.0	2	36.0
Sr. Veterinary officers	2	54.0	0	0	0	0	2	54.0
Veterinary doctors	4	33.6	0	0	0	0	4	33.6
Extension specialist for:								
Bee keeping	2	36.0	0	0	2	36.0	4	72.0
Mushrooms	2	36.0	0	0	2	36.0	4	72.0
Floriculture	2	24.0	0	0	2	24.0	4	48.0
Protected cultivation	1	12.0	0	0	0	0	1	12.0
Total	14	231.6	0	0	7	114.0	21	345.6

Source: Field Survey, 2007-08

Table 5.16 Unemployment Status (No.)

Education	Sex	Bilaspur Sadar	Ghumarwin	Jhandutta	District
Matriculate	M	3675	4040	4875	12590
	F	2646	2587	2990	8223
	T	6321	6627	7865	20813
Plus two	M	2063	4087	5541	11691
	F	1780	2760	4320	8860
	T	3843	6847	9861	20551
Graduate	M	1029	2780	3065	6874
	F	709	1780	2489	4978
	T	1738	4560	5554	11852
Post graduate	M	882	1727	1035	3644
	F	581	1093	802	2476
	T	1463	2820	1837	6120
Tech. Trained	M	592	1540	850	2982
	F	449	1552	768	2769
	T	1041	3092	1618	5751

Note: M – Male, F – Female, T – Total

Source: Field Survey, 2007-08

Table 5.17 Status of Enterprises

Block	Existing			Potential			Assistance (Credit)
	No of units	No. of person employed	Investment (Rs. Lakh))	No. of units	Employment (Days)	Investment (Rs. Lakh)	
	Atta chakki						
Bilaspur Sadar	103	210	42	30	90	22.5	√
Ghumarwin	113	237	45	40	100	28	√
Jhandutta	92	203	42	30	750	75	√
Total	308	650	129	100	940	125.5	
	Oil expeller						
Bilaspur Sadar	35	125	12	0	0	0	
Ghumarwin	17	20	5	10	15	14	√
Jhandutta	12	15	4	10	15	14	√
Total	64	160	21	20	30	28	
	Bakery						
Bilaspur Sadar	5	15	4.5	10	40	9	√
Ghumarwin	4	12	4	10	40	9	√
Jhandutta	5	15	5	8	35	7	√
Total	14	42	13.5	28	115	25	
	Vermi-compost						
Bilaspur Sadar	0	0	0	10	20	20	√
Ghumarwin	75	70	13.75	225	225	67.5	√
Jhandutta	400	400	24	200	200	120	√
Total	475	470	37.75	435	445	207.5	
	Mushroom compost						
Bilaspur Sadar	2	15	150	1	10	75	√
Ghumarwin	0	0	0	0	0	0	
Jhandutta	0	0	0	0	0	0	
Total	2	15	150	1	10	75	

		Rural craft					
Bilaspur Sadar	0	0	0	0	0	0	0
Ghumarwin	0	0	0	0	0	0	0
Jhandutta	100	300	3	50	150	0.5	√
Total	100	300	3	50	150	0.5	
Nursery raising							
Bilaspur Sadar	3	300	0.75	5	500	1.25	√
Ghumarwin	0	0	0	40	40	13.2	√
Jhandutta	10	20	0.5	10	20	2	√
Total	13	320	1.25	55	560	16.45	
Flower nursery							
Bilaspur Sadar	0	0	0	5	750	20	√
Ghumarwin	0	0	0	1	8	10	√
Jhandutta	0	0	0	1	20	5	√
Total	0	0	0	7	778	35	
Seed production							
Bilaspur Sadar	100	10000	5	100	10000	5	√
Ghumarwin	8	15	0.16	50	100	1	√
Jhandutta	3	120	10	2	200	7	√
Total	111	10135	15.16	152	10300	13	
Pottery							
Bilaspur Sadar	6	12	0.2	0	0	0	
Ghumarwin	60	120	5	20	40	2	√
Jhandutta	50	100	2.5	0	0	0	
Total	116	232	7.7	20	40	2	
Feed mill							
Bilaspur Sadar	1	6	10	2	20	20	√
Ghumarwin	0	0	0	0	0	0	
Jhandutta	0	0	0	0	0	0	
Total	1	6	10	2	20	20	

Fruit and vegetable processing									
Bilaspur Sadar	1	7	1.5	2	10	3	√		
Ghumarwin	0	0	0	0	0	0			
Jhandutta	1	10	10	2	20	100	√		
Total	2	17	11.5	4	30	103			
Pickles/squashes									
Bilaspur Sadar	1	7	1.5	1	10	1.5	√		
Ghumarwin	8	15	1.5	5	12	1	√		
Jhandutta	0	0	0	0	0	0			
Total	9	22	3	6	22	2.5			
Pulse processing									
Bilaspur Sadar	6	30	7	6	28	60	√		
Ghumarwin	8	30	9	6	28	7	√		
Jhandutta	0	0	0	0	0	0			
Total	14	60	16	12	56	67			
Wool carding									
Bilaspur Sadar	0	0	0	0	0	0			
Ghumarwin	40	40	6	20	20	3	√		
Jhandutta	0	0	0	0	0	0			
Total	40	40	6	20	20	3			
Cotton carding									
Bilaspur Sadar	3	6	0.18	0	0	0			
Ghumarwin	40	40	6	20	20	3	√		
Jhandutta	0	0	0	0	0	0			
Total	43	46	6.18	20	20	3			
Shawl, woollen garments									
Bilaspur Sadar	16	32	0.48	0	0	0			
Ghumarwin	60	125	21	30	70	11	√		

Jhandutta	0	0	0	0	0	0	0	0
Total	76	157	21.48	30	70	11		
Silk reeling								
Bilaspur Sadar	0	0	0	1	15	50	√	
Ghumarwin	0	0	0	0	0	0		
Jhandutta	0	0	0	0	0	0		
Total	0	0	0	1	15	50		
Weaving								
Bilaspur Sadar	0	0	0	1	15	50	√	
Ghumarwin	0	0	0	0	0	0		
Jhandutta	0	0	0	0	0	0		
Total	0	0	0	1	15	50		

Source: Field Survey, 2007-08

Table 5.18 Potential Enterprises for Unemployed

Sr No.	Enterprise	Mandays/year	Assistance		Credit
			Training	Credit	
1	Apiculture	100	√		√
2	Mushroom growing	130	√		√
3	Sericulture	90	√		√
4	Agro-tourism	60	√		√
5	Private jobs	365	-		-
6	Own business	320	√		√

Source: Field Survey, 2007-08

Table 5.19 Agri-Business Establishments (No.)

Block	Status	Agro sale centers	PACS	Rural handicraft		Cooperatives		Farmers co-operatives	Others
				Public	Private	Public	Private		
Bilaspur Sadar	E	1	38	0	0	0	1	0	37
	R	2	45	2	2	1	2	2	0
	G	1	7	2	2	1	1	2	0
Ghumarwin	E	3	25	0	50	0	3	25	0
	R	6	10	0	15	0	5	0	0
	G	3	0	0	0	0	2	0	0
Jhandutta	E	0	35	0	0	0	0	0	0
	R	0	0	0	0	0	0	0	0
	G	0	0	0	0	0	0	0	0
District	E	4	98	0	50	0	4	25	37
	R	8	55	2	17	1	7	2	0
	G	4	0	2	0	1	3	0	0

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

Source: Field Survey, 2007-08

Table 5.20 Drudgery of Women (Per Cent of Women)

Particulars	Mode of operation	Bilaspur Sadar	Ghumarwin	Jhandutta	District
Agricultural operations					
Clod breaking	Manually	77.17	72.29	88.58	79.50
	Power Iron clod breaker	22.83	27.71	11.42	20.50
Paddy transplanting	Manually	100.00	100.00	100.00	100.00
	Transplanted	0.00	0.00	0.00	0.00
Manuring & fertilization	Manually	100.00	100.00	100.00	100.00
	Power Machinery	0.00	0.00	0.00	0.00
Intercultural operations	Manually	100.00	100.00	100.00	100.00
	Power Machinery	0.00	0.00	0.00	0.00
Wheat threshing & winnowing	Manually	4.57	2.18	3.79	3.69
	Power machinery	95.43	97.82	96.21	96.31
Livestock rearing operations					
Fodder resources	Cultivated	3.57	4.97	3.84	4.03
	Ghasni	66.43	64.18	66.81	65.95
	Both	30.00	30.85	29.35	30.02
Fodder cutting	Traditional tools	100.00	100.00	100.00	100.00
	Improved tools	0.00	0.00	0.00	0.00
Fodder transportation	On head/backload	80.57	87.16	97.17	87.59
	Tractor-trolley	19.43	12.84	2.83	12.41
Fodder chaffing	Chaff cutter	13.20	17.61	15.39	15.06
	Without chaff cutter	86.80	82.39	84.61	84.94
Feeding system	Inside manger	14.65	12.67	12.94	13.58
	On floor	85.35	87.33	87.06	86.42
Feeding practices	Stall feeding	71.54	65.52	62.18	66.97
	Grazing	8.46	4.07	7.34	6.94
	Both	20.00	30.41	30.48	26.09
Animal waste disposal	Bio-gas plant	1.34	0.85	0.59	0.97
	Head/Back-load to field	3.70	1.80	8.09	4.59
	FYM	94.96	97.35	91.32	94.44

Cleaning of animals & sheds	Manually	94.37	65.96	95.70	87.27
	Water pressure tap pipe	5.63	34.04	4.30	12.73
Milking operation	Hand milking	100.00	100.00	100.00	100.00
	Machine milking	0.00	0.00	0.00	0.00
Selling of milk	Within village	89.13	87.15	90.15	88.93
	Distant market	10.87	12.85	9.85	11.07
Churning of milk	Manually	56.07	63.26	71.29	62.81
	Using machine	43.93	36.74	28.71	37.19
Breeding methods	Natural service	21.91	34.95	37.05	30.18
	A.I.	78.09	65.05	62.95	69.82
Animal house type	Single story	68.73	76.84	36.78	60.72
	Double story	31.27	23.16	63.22	39.28
Animal shed	Kachha	81.59	84.14	92.56	85.75
	Pucca	18.41	15.86	7.44	14.25
Light and ventilation	Sufficient	28.35	24.00	27.36	26.88
	Insufficient	71.65	76.00	72.64	73.12
Animal shed roof	Slated	94.01	95.60	97.28	95.47
	Asbestos sheets	4.17	4.02	2.48	3.59
	RCC lential	1.82	0.38	0.24	0.94
Animal shed floor	Kachha	59.60	63.81	64.15	62.16
	Pucca	40.40	36.19	35.85	37.84

Source: Survey, 2007-08

Table 5.21 Livestock Feed and Fodder for Milch Animals (Kg/animal/day)

Type of animal	Fodder/feed	Bilaspur Sadar	Ghumarwin	Jhandutta	District
Crossbred cows	Green Fodder	15.11	16.42	15.47	15.57
	Dry Fodder	6.95	6.70	5.77	6.51
	Concentrate	1.39	1.30	1.91	1.53
	Minerals (Gms)	15.22	17.76	16.03	16.15
Local cow	Green Fodder	8.91	9.90	9.98	9.51
	Dry Fodder	4.92	4.55	4.02	4.54
	Concentrate	0.11	0.05	0.00	0.06
	Minerals (Gms)	0.70	0.77	1.01	0.82

Buffaloes	Green Fodder	18.87	18.53	20.26	19.22
	Dry Fodder	6.30	6.86	7.71	6.9
	Concentrate	1.91	1.90	1.50	1.78
	Minerals (Gms)	14.36	13.80	15.06	14.43
Bullocks	Green Fodder	8.78	8.13	8.98	8.67
	Dry Fodder	3.97	4.00	3.50	3.83
	Concentrate	0..27	0..30	0.25	0.27
Poultry (Layer)	Concentrate (Gms)	90.00	100.00	100.00	95.83
Broilers	Concentrate (Gms)	65.00	75.00	60.00	66.06

Source: Field Survey, 2007-08

Table 5.22 Yield Gap in Livestock Production (Units/animal/day)

Product/type of animal	Bilaspur Sadar			Ghumarwin			Jhandutta			District		
	A	P	G	A	P	G	A	P	G	A	P	G
Milk (Lt./day)												
Crossbred cow	5.86	10.00	4.14	5.55	10.42	4.87	6.00	12.00	6.00	5.82	12.00	6.18
Local cow	1.52	3.00	1.48	2.00	3.50	1.50	3.00	5.50	2.50	2.12	5.50	3.38
Buffalo	3.31	11.00	7.69	3.00	10.00	7.00	3.57	10.00	6.43	3.31	11.00	7.69
Goats	0.54	1.50	0.96	0.33	0.61	0.28	0.48	0.80	0.32	0.47	1.50	1.03
Wool (Kg/yr)												
Sheep	0.60	0.80	0.20	0.65	0.80	0.15	0.60	0.78	0.18	0.61	0.80	0.19
Eggs/Meat												
Poultry (Eggs No./year/bird)	185	198	13.00	192	198	6.00	189	200	11.00	188.13	200.00	11.87
Broiler (Kg./bird)	2.00	2.50	0.50	1.95	2.50	0.55	2.00	2.50	0.50	1.99	2.50	0.51

Source: Survey, 2007-08

Table 5.23 Reasons for Yield Gaps in Livestock Production (Per Cent of Panchayats)

Type of Animal	Reason for gap	Bilaspur Sadar	Ghumarwin	Jhandutta	District
Crossbred cow					
	Improper feeding practices	90.00	83.33	85.71	86.96
	Imbalanced diet	70.00	66.67	71.43	69.57
	Poor management	50.00	66.67	57.14	56.52
Local cow					
	Improper feeding practices	90.00	83.33	85.71	86.96
	Imbalanced diet	70.00	66.67	71.43	69.57
	Poor management	50.00	66.67	57.14	56.52
Buffaloes					
	Improper feeding practices	90.00	83.33	85.71	86.96
	Imbalanced diet	70.00	66.67	71.43	69.57
	Poor management	50.00	66.67	57.14	56.52
Goats					
	Different grazing practices	60.00	66.67	57.14	60.87
	Imbalanced diet	80.00	83.33	85.71	82.61
	Poor management	80.00	66.67	57.14	69.57
Sheep wool (per year)					
	Imbalanced diet	80.00	83.33	85.71	82.61
	Poor feeding practices	50.00	50.00	42.86	47.83
Poultry (eggs/ year/ bird)					
	Imbalanced diet	40.00	50.00	57.14	47.83
	Poor feeding practices	40.00	50.00	57.14	47.83
Broilers(meat/bird)					
	Improper ventilation	70.00	83.33	85.71	78.26
	Poor feeding practices	40.00	50.00	57.14	47.83

Source: Survey, 2007-08

Table 5.24 Incidence of Diseases and Mortality of Livestock (Per Cent)

Type of animal/disease	Bilaspur Sadar		Ghumarwin		Jhandutta		District		Treat. Available
	Infected	Mortality	Infected	Mortality	Infected	Mortality	Infected	Mortality	
1. Cattle and Buffaloes									
a. FMD	1.50	0.50	5.00	2.00	2.00	0.00	2.83	0.83	√
b. Hemorrhagic Septicaemia	1.50	1.00	5.00	3.00	3.00	1.00	3.17	1.67	√
c. Tympy	5.00	2.00	40.00	10.00	4.50	1.00	16.50	4.33	√
d. Pneumonia	3.50	1.00	25.00	5.00	4.50	1.00	11.00	2.33	√
e. Diarrhoea/Dysentery	5.00	1.00	70.00	5.00	5.00	1.00	26.67	2.33	√
f. Calf scour	1.50	1.00	2.00	1.00	2.50	1.00	2.00	1.00	√
g. Endoparasites	2.50	1.50	75.00	0.00	7.50	1.00	28.33	0.83	√
h. Ectoparasites	22.50	1.50	68.00	2.00	7.50	1.00	32.67	1.50	√
i. Repeat Breeding	7.50	0.50	30.00	0.00	11.00	0.00	16.17	0.17	√
j. Mastites/rabies	2.50	0.50	20.00	15.00	0.00	0.00	7.50	5.17	√
2. Sheep & Goats									
a. PPR/CCPP	1.50	1.00	2.00	1.00	1.50	1.00	1.67	1.00	√
b. Mange	3.50	1.00	20.00	0.00	5.00	1.00	9.50	0.67	√
c. Lice and ticks	12.50	1.50	30.00	2.00	3.50	1.00	15.33	1.50	√
d. Endoparasites	7.50	1.50	30.00	2.00	3.50	1.00	13.67	1.50	√
e. Diarrhoea/Dysentery	3.00	1.00	65.00	2.00	3.50	1.00	23.83	1.33	√
f. Back quarter	1.50	0.50	0.00	0.00	0.00	0.00	0.50	0.17	√
2. Poultry									
a. Coccidiosis	3.50	1.00	15.00	10.00	3.50	1.00	7.33	4.00	√
b. Ranikhet disease	0.50	0.50	0.00	0.00	0.00	0.00	0.17	0.17	√
c. Fowlpox	0.50	0.50	0.00	0.00	0.00	0.00	0.17	0.17	√

d. Merek's disease	0.50	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.17	√
e. Endoparasites	3.50	1.50	0.00	0.00	0.00	0.00	0.00	0.00	1.17	0.50	√
3. Equine											
a. Respiratory distress	1.50	0.50	10.00	1.00	3.50	1.00	5.00	1.00	5.00	0.83	√
b. Colic	3.00	1.00	25.00	5.00	5.00	1.00	11.00	1.00	11.00	2.33	√
c. Internal parasites	7.50	1.00	40.00	0.00	7.50	1.00	18.33	1.00	18.33	0.67	√
d. Glanders	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	√
4. Rabbits											
a. Pncumonia	0.00	0.00	20.00	3.00	0.00	0.00	6.67	0.00	6.67	1.00	√
b. Diarrhoea	0.00	0.00	25.00	2.00	0.00	0.00	8.33	0.00	8.33	0.67	√
c. Ear cancker	0.00	0.00	15.00	0.00	0.00	0.00	5.00	0.00	5.00	0.00	√
d. Mange	0.00	0.00	20.00	0.00	0.00	0.00	6.67	0.00	6.67	0.00	√

Source: Field Survey, 2007-08

Table 5.25 Intervention for Diseases and their Management: Cattle and Buffalo

Intervention \disease	FMD	Hemorrhagic Septicaemia	Typany	Pneumonia	Diarrhoe/ Dysentery	Calf scour	Endoparasites	Ectoparasites	Repeat Breeding	Mastitis /rabies
Vaccination	√	√	√	√						√
Regular deworming						√	√			
Medication			√		√					
Dipping and dusting of affected animals								√		
Endoparasite camps							√			
Drenching								√		
Ecoparasite camps								√		
Sterility camps									√	
Clinical camps				√		√				
Treatment of affected animals/sheds/ premises								√		
Balance Nutrition									√	
Research	√									
Awareness camps	√	√	√	√	√	√	√	√	√	√

Source: Field Survey, 2007-08

Table 5.26 Intervention for Diseases and their Management: Sheep/Goat

Intervention\disease	PPR/CCPP	Mange	Lice and ticks	Endoparasites	Diarrhoea/ Dysentery	Black quarter
RP Vaccination	√					√
Regular deworming				√		
Medication					√	
Dipping and dusting of affected animals		√	√			
Endoparasite camps				√		
Ivermectics Injection			√			
Ecoparasite camps		√				
Treatment of affected animals/sheds/premises			√			
Awareness camps	√	√	√	√	√	

Source: Field Survey, 2007-08

Table 5.27 Intervention for Diseases and their Management: Poultry

Intervention\disease	Coccidiosis	Ranikhet disease	Fowl/pox	Merek's disease	Endoparasites	Ectoparasites
Vaccination				√		
Regular deworming	√					
Medication	√					
Medicinal sprays						√
Dusting with parasitidal drugs						√
Ecoparasite camps					√	
Awareness camps	√	√	√	√	√	√

Source: Field Survey, 2007-08

Table 5.28 Intervention for Diseases and their Management: Equine

Intervention\disease	Respiratory distress	Colic	Internal parasites
Proper housing	√		
Regular deworming			√
Medication	√	√	
Research	√		
Endoparasite camps			√
Diagnostic lab	√	√	√
Extension camps	√	√	√

Source: Field Survey, 2007-08

Table 5.29 Yield Gap in Important Fruit Crops (Q /ha)

Crop	Bilaspur Sadar			Ghumarwin			Jhandutta			District		
	A	P	G	A	P	G	A	P	G	A	P	G
Mango	6.75	9.67	2.92	6.75	10.50	3.75	6.76	8.50	1.74	6.75	10.50	3.75
Litchi	2.25	4.13	1.88	2.00	5.00	3.00	1.80	3.98	2.18	2.04	5.00	2.96
Citrus	5.00	7.40	2.40	5.67	8.50	2.83	2.99	4.50	1.51	4.54	8.50	3.96
Pear	10.31	21.00	10.69	12.00	25.00	13.00	10.00	17.00	7.00	10.66	25.00	14.34
Peach	2.03	2.75	0.72	2.40	4.00	1.60	0.94	1.75	0.81	1.78	4.00	2.22
Plum	1.08	1.75	0.67	1.29	2.00	0.71	0.49	1.40	0.91	0.95	2.00	1.05
Amla	6.06	7.00	0.94	5.00	8.25	3.25	5.00	5.40	0.40	5.44	8.25	2.81

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

Source: Field Survey, 2007-08

Table 5.30 Reasons for Yield Gaps in Fruit and Floriculture Crops (Per Cent of Panchayats)

Crop	Reason for gap	Bilaspur Sadar	Ghumarwin	Jhandutta	District
Citrus					
	Uneconomical size of orchard	70.00	66.67	57.14	65.22
	Self consumption	10.00	33.33	42.86	26.09
Mango	Poor orchard management	30.00	50.00	42.86	39.13
	Frost problem	80.00	83.33	85.71	82.61
	Flower drop	60.00	66.67	71.43	65.22
Amla	Difficulty in harvesting	20.00	33.33	28.57	26.09
	Poor orchard management	20.00	33.33	42.86	30.43
Flower cuttings/ bulbs					
	Non availability of local market	70.00	83.33	85.71	78.26

Table 5.31 Varietal and Technological Problems of Fruit Crops (Per Cent of Panchayats)

Crop	Problem	Bilaspur Sadar	Ghumarwin	Jhandutta	District
Mango					
1	Frost	90.00	66.67	57.14	73.91
2	Alternate bearing	50.00	50.00	42.86	47.83
3	Imbalanced use of fertilizers	40.00	50.00	42.86	43.48
4	Glum blotch	20.00	16.67	14.29	17.39
5	Improper spacing	50.00	66.67	71.43	60.87
6	Flower drop	60.00	50.00	42.86	52.17
7	Local cultivars	40.00	33.33	42.86	39.13
8	Lack of processing and marketing facilities	70.00	66.67	71.43	69.57
Citrus					
1	Cultivation for self consumption	40.00	66.67	42.86	47.83
2	Lack of technological guidance	10.00	16.67	14.29	13.04
3	Local cultivars grown	40.00	33.33	85.71	52.17
4	Citrus canker	10.00	16.67	28.57	17.39
5	Inadequate use of nutrients	10.00	16.67	42.86	21.74
6	Flower drop	20.00	33.33	28.57	26.09
7	Frost	90.00	66.67	57.14	73.91
8	Plants dried after few years	20.00	33.33	28.57	26.09
9	Draught and lack of irrigation facilities	30.00	66.67	71.43	52.17
Litchi					
1	Cultivation on small scale	20.00	33.33	28.57	26.09
2	Frost and red rust	90.00	66.67	57.14	73.91
3	Poor cultivation practices	60.00	50.00	42.86	52.17
4	Inadequate use of plant nutrients	20.00	33.33	28.57	26.09
5	Local cultivars	40.00	33.33	85.71	52.17
6	Fruit cracking	30.00	33.33	28.57	30.43

7	Fruit borers attack	30.00	33.33	28.57	30.43
Papaya, Pomegranate, Amla					
1	Frost	90.00	66.67	57.14	73.91
Guava					
1	Fruit fly attack	30.00	33.33	28.57	30.43

Source: Field Survey, 2007-08

Table 5.32 Technological Interventions for Fruit Crops (Per Cent of Panchayats)

Crop	Intervention	Bilaspur Sadar	Ghumarwin	Jhandutta	District
Mango					
1	Awareness programmes	30.00	66.67	100.00	60.87
2	Suitable variety	100.00	66.67	71.43	82.61
3	Development of regular bearing variety	70.00	66.67	71.43	69.57
Citrus					
1	Awareness programme	20.00	33.33	100.00	47.83
2	Suitable varieties	100.00	66.67	71.43	82.61
Litchi					
1	Awareness programmes	30.00	66.67	100.00	60.87

Source: Field Survey, 2007-08

Table 5.33 Varietal and Technological Problems of Other Crops (Per Cent of Panchayats)

Crop	Problem	Bilaspur Sadar	Ghumarwin	Jhandutta	District
Sugarcane	Poor yield	10.00	0.00	0.00	4.35
Floriculture					
1	Poly-house is not available	50.00	33.33	28.57	39.13
2	Non-availability of proper storage schedule	70.00	66.67	71.43	69.57
3	Non-availability of proper package of practices	30.00	33.33	28.57	30.43
4	Diseases in poly-house	30.00	33.33	14.29	26.09
5	Lack of technical knowledge	30.00	33.33	42.86	34.78
6	Insect pest and disease attack	10.00	16.67	42.86	21.74
7	Lack of marketing facilities	70.00	66.67	71.43	69.57

Source: Field Survey, 2007-08

Table 5.34 Technological Interventions for other Crops (Per Cent of Panchayats)

Crop	Intervention	Bilaspur Sadar	Ghumarwin	Jhandutta	District
Sugarcane					
	Improved variety	30.00	0.00	0.00	13.04
Floriculture					
	Awareness programmes	70.00	16.67	71.43	56.52

Field Survey, 2007-08

Table 5.35 Existing Schemes for Sericulture Development

Block	No. of schemes	Village covered (No.)	Population covered (No.)	Area covered (Ha)	Beneficiary families (No)	Status		Total budget (Rs. Lakh)	Additional funds required (Rs. Lakh)
						Complete (No.)	Incomplete (No.)		
Bilaspur Sadar	4	190	0	0	1300	0	4	95.36	0.00
Ghumarwin	3	186	0	0	1500	0	3	31.25	0.00
Jhandhutta	4	180	0	0	1200	0	4	44.50	0.00
Total	11	556	0	0	4000	0	11	171.11	0.00

Source: Field Survey, 2007-08

Chapter-VI

DISTRICT PLAN

The detailed description of the district in terms of different parameters like rainfall, temperature, location, population, literacy, soils, 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, sericulture, and so on have thrown up numerous valuable insights about the existing status in terms of yield gaps and constraints and interventions to realise the potential of agricultural development in the district. Likewise, the physical targets in critical areas like potential for irrigation development, water harvesting and requirement for infrastructural facilities like rural roads and rural markets to accelerate rate of growth in agriculture and allied sectors have been earmarked to be accomplished in the next five years. The present chapter gives financial estimates of the plan along with their sectoral and yearly allocations, new schemes/works that are proposed in the plan, projected growth rates of production of foodgrain, vegetables, fruit and milk, projected input requirement, growth drivers and vision for the next plan.

6.1 Plan Estimates

The details about the total plan outlay and its sectoral allocation and yearly distribution are given in Table 6.1. The total plan outlay is 335.97 crores out of which around 8.93 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 65 per cent of the total plan outlay is earmarked for irrigation development both through developing major, medium and minor irrigation schemes and water harvesting through water shed development programme. Our understanding of the grass root realities and interactions with farmers in different parts of the state reveal that lack of availability of irrigation and rural connectivity are the two formidable constraints in the ongoing process of agricultural transformation towards high value cash crops. The

development of irrigation potential is expected to give a big fillip to the overall development of agricultural sector including livestock and horticulture. Around 6 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 New/Innovative Schemes

Given the resource potential in the district, emerging demand and markets and available technologies, a number of new schemes including schemes for irrigation and water harvesting schemes have been identified to be included in the district agricultural plan. The details of these schemes in terms of villages covered, beneficiary families, potential area along with required funds are provided in Table 6.2 and Table 6.3 The proposed schemes include watershed harvesting, soil/land conservation, protected cultivation, organic farming, agro-tourism, horticultural schemes, sericulture, fisheries, livestock improvement, rural roads and bridges and rural markets.

6.3 Prioritisation of Different Schemes

While carrying out field survey, the progressive farmers and other stakeholders were asked about prioritisation of the implementation of different schemes//works proposed in the plan in different sectors, namely, agriculture, horticulture and animal husbandry. These priorities are given in Table 6.4. The table shows that in case of agriculture, the provision of irrigation has been given the highest priority followed by tackling monkey menace and the problem of stray cattle, provision of quality inputs including seeds, providing technical know how about protected cultivation and organic farming. Insofar as horticulture is concerned, the provision of marketing infrastructure has been assigned the top most priority followed by the provision of technical know, irrigation/micro-irrigation,

quality planting material, provision of frost resistant varieties of mango, and so on. The implementation of breed improvement programme, provision of quality fodder varieties, technical know-how on scientific management of animal health, provision of diagnostic laboratories and the schemes /works that required on priority.

6.4 Projected Outcomes, Growth and Input Requirement

The implementation of the proposed plan is expected to accelerate the pace of agricultural development in the district. Assuming the assured irrigation facilities are provided by harnessing the irrigation potential and harvesting rain water, the foodgrains 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 (Table 6.5 and Table 6.6). The detailed outcomes are listed below.

- Irrigation potential shall be created which will provide irrigation to an area of 9,841 hectares (Table 6.5).
- Available water potential shall be exploited and thereby 9,841 hectares of land shall be brought under protective and assured irrigation (Table 6.5).
- With the implementation of plan 32.94 per cent of the arable land will have assured irrigation facilities compared to existing 10.67 per cent (Table 6.5).
- A huge chunk of land amounting to 8,962.5 hectares infested with soil erosion, stream bank erosion, etc shall be treated by adopting soil conservation measures (Table 6.5).
- Support land (private grasslands) of 39,591 hectares shall be treated against invasive weeds and shrubs. This shall improve the fodder production to the approximate level of 3,959.1 metric tons (Table 6.5).
- Foodgrain production shall increase from 1,15,431 metric tons to 1,42,303 metric tons after the implementation of the plan recording a growth rate of 4.66 per cent per annum in scenario I. Even in scenario II when 20 per cent of irrigated land is shifted to vegetable production, the growth rate in foodgrains production shall be 4.32 per cent per annum (Table 6.6).

- Production of vegetables would increase from 50,082 metric tons to 98,090 metric tons in scenario I registering a growth rate of 19.17 per cent per annum when the proportion of area under these crops remains same and to 2, 19,197 metric tons recording a growth rate of 67.54 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, 97,277 metric tons which in monetary terms amounts to Rs.197.28 crores. The market disposal of this surplus shall generate huge employment opportunities for rural unemployed youths through forward and backward linkages (Table 6.6).
- Based on the yields of average farmers and that of progressive farmers of different crops and the current area under different crops, the projected production of different crops has been worked out. The growth rate over the existing production are very high ranging from as high as 23.48 per cent in case of sesame followed by toria (21.75 per cent per annum) and sarson (17.74 per cent). The growth in case of cereal crops are projected at 13.90 per cent for maize, 20.05 per cent for paddy and 16.96 per cent for wheat (Table 6.7).
- Based on yields of progressive farmers, the production of different fruit crops is expected to register high growth rates. For example, the production of important fruit crops like mango, citrus and pear is expected to increase at a rate of 5.80 per cent, 13.99 per cent, and 12.79 per cent per annum respectively (Table 6.8).
- The milk production is expected to increase by more than fifty per cent. Insofar as milk production of different categories of animals is concerned, crossbred cows, local cows and buffaloes' milk is expected to increase at a rate of 7.76 per cent, 5.46 per cent and 20.18 per cent (Table 6.9).
- The demand for different types of fertilisers like CAN, UREA, IFFCO (12:32:16), SSP and MOP is projected to increase to 651.56, 4200, 2288.78, 150 and 195.47 metric tonnes, respectively by the year 2012-13 under scenario I. Under scenario II, the demand for these fertilisers is projected to increase at 786.86, 5,119.78, 2,755.99, 182.85 and 236.06 metric tonnes respectively. And in scenario III it is projected to increase to 946.95, 6,217.03, 3,307.35, 222.04 and 284.08 metric tonnes, respectively. The projections for different fertilisers are given in Table 6.11.
- The projected sectoral growth rates are 14.51 per cent for agriculture, 13.76 per cent for horticulture and 18.59 per cent for animal husbandry. The overall agricultural growth rate excluding fisheries is projected at 18.12 per cent per annum during the plan period. The fish production is projected to grow at 31.48 per cent per annum (Table 6.10)

6.5 Growth Drivers

The availability of suitable agro-climatic conditions to grow high value cash crops, rising demand for these crops coupled with huge market for them in the neighbouring states and available technologies for growing different crops are the most important growth drivers of the crop sector particularly the cultivation of high value cash crops. Likewise, emerging huge local demand for dairy products, especially milk, in the district is a very important potential growth driver of animal husbandry sector. In a similar vein, the district has a huge potential for fish production because of the Gobind Sagar water reservoir. The provision of basic infrastructural facilities especially irrigation is the important growth driver for different sectors. The development and diffusion of new agricultural technologies to increase yield levels, eradicate weeds to improve the productivity of support and pasture lands and reduce the cost of cultivation is a *sine qua non* for realising the rich potential available in the district.

6.6 Vision of Next Plan

The implementation of the propose plan in its entirety shall accelerate the ongoing process of crop diversification which include the cultivation of vegetable and floriculture in polyhouses. The district has a potential to emerge as a leading producer of maize and has a potential to support maize based agro industries. The harnessing of irrigation potential both through irrigation schemes like flow irrigation and water harvesting through watershed development shall go a long way in reducing risks and stabilising the production of different crops. Likewise, improving rural connectivity and proving marketing infrastructure shall further accelerate the process of crop diversification towards fruit and vegetables 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.

The climate change may require the introduction of new crops and threaten the economic viability and ecological sustainability of existing crops. Many more new challenges are

expected to surface like the emergence of new diseases and insects and pests. There might be shortage of water due to less snow fall and its early melting. Besides climate changes, several second generation problems may also emerge like newer and more efficient technologies which may endanger the economic viability of the existing crops and cropping systems. All these emerging challenges call for concerted efforts to understand full implications of such changes and devise effective strategies to cope up with such impending challenges. The next plan, therefore, should focus on consolidation of the gains being realised through the implementation of the existing plan. The entire scheme, particularly those relating to irrigation and water harvesting may not be completed in the current plan primarily because of resource constraint. Therefore, the incomplete schemes are required to be carried forward in the next five year plan.

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

Sr. No.	Schemes	Total Plan Outlay	Yearly Allocation				
			I	II	III	IV	V
I	Interventions to Improve and Enhance Sustainability of Crop Production System	3050	457.5	610	610	610	762.5
1	Improvement of productivity of cereals, pulses, oilseeds, vegetables and spice crops through promotion of HYV seeds including hybrids	360	54	72	72	72	90
2	Improvement of soil health through vermi-composting, bio-fertilizers, micro nutrients, soil testing etc.	350	52.50	70	70	70	87.50
3	Protection of crops against biotic stresses (diseases, pests, weeds) and abiotic stresses (hailstorms, drought, flash floods, etc) and other risk factors	260	39	52	52	52	65
4	Water use efficiency through micro irrigation	560	84	112	112	112	140
	(i) Sprinkler	500	75	100	100	100	125
	(ii) Drip	60	9	12	12	12	15
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 etc. to remove women drudgery	65	9.75	13	13	13	16.25
6	Protected (poly house) cultivation to minimize risk factors and enhance quality and productivity	1400	210	280	280	280	350
7	Strengthening and improvement of quality control infrastructure (seed, pesticides, fertilizer testing laboratories)	25	3.75	5	5	5	6.25
8	Strengthening of seed production farms and promotion of infrastructure to improve seed production and replacement	30	4.5	6	6	6	7.5
II	Need Based Infrastructure Development	7453	1117.95	1490.6	1490.6	1490.6	1863.25
1	Irrigation	3382	507.3	676.4	676.4	676.4	845.5
2	Improvement of on-farm water delivery and efficiency of existing irrigation systems	2499	374.85	499.8	499.8	499.8	624.75
3	Rural markets	237	35.55	47.4	47.4	47.4	59.25
4	Rural roads for connectivity	1335	200.25	267	267	267	333.75

III	Natural Resource Conservation and Management	19358	2903.7	3871.6	3871.6	3871.6	4839.5
1.	Soil conservation of arable and non-arable land through engineering measures	87	13.05	17.4	17.4	17.4	21.75
2.	Water harvesting check dams, ponds, tanks, etc	18767	2815.05	3753.4	3753.4	3753.4	4691.75
3.	Land improvement	504	75.6	100.8	100.8	100.8	126
IV	Niche Based Enterprises for Rural Entrepreneurs	85	12.75	17	17	17	21.25
	(i) Organic farming	60	9	12	12	12	15
	(ii) Agro-tourism	25	3.75	5	5	5	6.25
V	Fruit Production	945	141.75	189	189	189	236.25
VI	Livestock, Poultry & Fisheries	1873	280.95	374.6	374.6	374.6	468.25
1	Livestock improvement	1645	246.75	329	329	329	411.25
2	Fisheries	228	34.2	45.6	45.6	45.6	57
VII	Human Resources	356	53.4	71.2	71.2	71.2	89
1	Additional man power requirement	346	51.9	69.2	69.2	69.2	86.5
2	Capacity building of extension personnel	10	1.5	2	2	2	2.5
VIII	Research & Extension	477	71.55	95.4	95.4	95.4	119.25
IX	All Sectors & Schemes	33597	5039.55	6719.4	6719.4	6719.4	8399.25

Table 6.2 New Schemes for Agriculture Development

Block	No. of schemes	Village (No.)	Beneficiary families (No.)	Potential area (Ha)	Funds required (Rs. Lakh)
Watershed harvesting scheme					
Bilaspur Sadar	5	15	5000	2000	70.00
Ghumarwin	8	8	64	76	80.00
Jhandhutta	20	40	1000	4000	200.00
Total	33	63	6064	6076	350.00
Soil/land conservation schemes					
Bilaspur Sadar	3	3	45	12	6.00
Ghumarwin	10	70	1500	600	24.00
Jhandhutta	3	4	50	150	40.00
Total	16	77	1595	762	70.00
Protected cultivation					
Bilaspur Sadar	1	-	-	10.00	466.67
Ghumarwin	1			10.00	466.67
Jhandhutta	1			10.00	466.67
Total	3			30.00	1400
Organic farming					
Bilaspur Sadar	1			134	20.00
Ghumarwin	1			133	20.00
Jhandhutta	1			133	20.00
Total	3			400	60.00
Agro-tourism					
Bilaspur	1	-	-	-	25.00
Other agril schemes					
Bilaspur Sadar	1	10	100	100	125.00
Ghumarwin	1	9	950	400	20.00
Jhandhutta	1	8	800	320	20.00
Total	3	27	1850	820	165.00
Horticultural schemes					
Bilaspur Sadar	5	300	500	25	15.00
Ghumarwin	1	20	70	50	10.00
Jhandhutta	5	100	7000	300	20.00
Total	11	420	7570	375	45.00
Sericulture					
Bilaspur Sadar	2	210	1500	260	30.00
Ghumarwin	3	190	1600	270	100.00
Jhandhutta	2	190	1300	250	40.00
Total	7	590	4400	780	170.0
Fisheries					

Bilaspur Sadar					
I. Pond					
1. Construction of new pond/ renovation of old pond	1	25	40	15000	15.00
2. Running water unit	1	20	25	1000	5.00
II. Riverine					
To provide cast nets	1	20	50	-	0.25
III. Reservoir					
1. Seed stocking	1	27	400	8000.0	25.00
2. Close season assistance (Fishermen)	1	27	400	8000.0	25.00
3. Grant-in-aid	1	27	400	8000.0	25.00
Fish craft scheme	1	50	100	-	10.00
Total					105.25
Ghumarwin					
I. Pond					
1. Construction of new pond/ renovation of old pond	1	5	10	50000	5.00
2. Running water unit	1	10	15	5000	25.00
II. Riverine					
To provide cast nets	1	50	270	-	2.50
Total					32.50
Jhandutta					
I. Pond					
1. Construction of new pond/ renovation of old pond	1	5	10	50000	5.00
II. Riverine					
To provide cast nets	1	10	50	-	0.50
III. Reservoir					
1. Seed stocking	1	30	550	7500.0	25.00
2. Close season assistance (Fishermen)	1	30	550	7500.0	25.00

3. Grant-in-aid	1	30	550	7500.0	25.00
Fish craft scheme	1	50	100	-	10.00
Total					90.50
Livestock improvement schemes					
Bilaspur Sadar	2	454	24945	0	500.00
Ghumarwin	3	284	10120	0	20.00
Jhandhutta	4	326	11500	0	1100.00
Total	9	1064	46565	0	1620.00
Rural markets					
Bilaspur Sadar	2	10	3000	150	60.00
Ghumarwin	1	70	1400	300	50.00
Jhandhutta	2	163	9589	350	60.00
Total	5	243	13989	800	170.00
Rural roads (Kms)					
Bilaspur Sadar	30	30	450	0	300.00
Ghumarwin	50	75	11250	0	500.00
Jhandhutta	200	47	11750	0	200.00
Total	280	152	23450	0	1000.00
Bridges (No.)					
Bilaspur Sadar	5	30	450	0	10.00
Ghumarwin	50	60	6000	0	75.00
Jhandhutta	100	47	11750	0	250.00
Total	155	137	18200	0	335.00

Source: Field Survey, 2007-08

Table 6.3 New Irrigation Schemes

Particular	Bilaspur Sadar	Ghumarwin	Jhandutta	District
1. Lift irrigation				
Number	10	2	6	18
Amount required (Rs. Lakh)	1740	94.5	337.5	2172
Villages to be covered				
Beneficiaries (No.)	800	48	350	1198
Command area (Ha)	1160	63	225	1448
2. Groundwater use				
Number	100	0	50	150
Amount required (Rs. Lakh)	200		50	250
Villages to be covered	20	0	50	70
Beneficiaries (No.)	100	0	50	150
Command area (Ha)	100	0	25	125
3. Kuhl				
Number	15	3	0	18
Amount required (Rs. Lakh)	937.50	22.50	0	960
Villages to be covered	15	3	0	18
Beneficiaries (No.)	300	34	0	334
Command area (Ha)	750	18	0	768

Source: Field Survey, 2007-08

Table 6.4 Prioritizations of Different Schemes

Sector	Scheme	Rank			
		Bilaspur Sadar	Ghumarwin	Jhandutta	District
Agriculture	Irrigation/ micro-irrigation	1	1	1	1
	Tackling monkey menace	4	4	4	4
	Solving problems of stray cattle and wild boars	5	6	5	5
	Ensuring quality inputs	3	2	2	2
	Providing technical know-how about protected cultivation	2	3	3	3
	Providing technical know-how about organic farming	6	5	7	6
Horticulture	Marketing infrastructure	7	7	6	7
	Technical know-how	3	4	3	3
	Irrigation/ micro-irrigation	1	1	1	1
	Quality planting material	2	2	2	2
	Cold chain transportation	4	3	7	4
	Research on frost resistant mango varieties	5	5	4	5
Animal Husbandry	Marketing infrastructure	6	6	5	6
	Promoting of cultivation of medicinal plants	7	7	6	7
	Popularization of regular bearing mango varieties	8	8	8	8
	Breed improvement programme	1	1	1	1
	Quality fodder varieties	3	2	3	3
	Technical know-how on scientific management of animal health	2	3	2	2
Marketing infrastructure	Diagnostic lab at block level	5	4	5	5
	Marketing infrastructure	4	5	4	4

Source: Field Survey, 2007-08

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

Blocks	Cultivated land	Potential cultivable land	Productive support land	Potential support land	Existing irrigated area	Potential irrigated land	Irrigation potential through water harvesting
Bilaspur Sadar	10856	4438	12021	12021	1520	2010	2000
Jhandutta	9831	1933	3862	1287	588	81	1500
Ghumarwin	9188	2535	6240	4160	1080	250	4000
District	29875	8906	22123	17468	3188	2341	7500

Table 6.6 Projected Output of Foodgrains and Vegetables

Crops	Existing			Potential production (MT)		Growth (% p.a.)	
	Area (Q/ha)	Production (MT)	Yield (Q/ha)	Scenario I	Scenario II	Scenario I	Scenario II
Maize	25158	49800	19.79	60649	59543	4.36	3.91
Paddy	1412	1912	13.54	2863	2820	9.95	9.50
Wheat	26252	62879	23.95	77593	76197	4.68	4.24
Barley	204	294	14.38	349	342	3.75	3.31
Pulses	442	310	7.01	368	361	3.75	3.31
Foodgrains	53474	115431	21.59	142303	140391	4.66	4.32
Vegetables	2053	50082	244.00	98090	219197	19.17	67.54

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

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

Crop	Current production (Quintals)	Projected production (Quintals)	Growth rate (% p.a.)
Maize	648532	1099285	13.90
Paddy	18587	37217	20.05
Wheat	476757	881018	16.96
Barley	2929	4707	12.14
Mash	3065	4546	9.67
Gram	2457	3810	11.02
Sesame	410	892	23.48
Sarson	723	1364	17.74
Toria	2812	5869	21.75
Ghobi sar	73	128	14.83
Potao	2792	4200	10.08
Peas	7991	12120	10.33
Tomato	199566	310781	11.15
Cabbage	5541	7875	8.42
Cauliflower	11363	18000	11.68
Beans	3237	5500	13.99
Capsicum	9261	10875	3.49
Bhindi	10484	12455	3.76

Brinjals	7902	10400	6.32
Cucurbit	2535	4400	14.71
Onion	6410	11250	15.10
Ginger	11907	17888	10.05
Garlic	1581	2200	7.83

Note: Projections are based on the average yields and yields obtained by the progressive farmers

Table 6.8 Projected Output Growth in Fruit Production

Particulars	Existing			Potential (MT)			Growth rate in production (% p.a.)
	Area (Ha)	Production (MT)	Yield (Q/ha)	Area (Ha)	Production (MT)	Yield (Q/ha)	
Mango	3955	2670	6.75	4312	4528	10.50	5.80
Litchi	137	28	2.04	149	75	5.50	13.99
Citrus	960	436	4.54	1083	921	8.50	9.27
Pear	887	946	10.66	965	2413	25.00	12.92
Peach	168	30	1.78	180	72	4.00	11.67
Plum	147	14	0.95	154	31	2.00	10.12
Amla	53	29	5.47	84	69	8.25	11.49

Note: i. Projections are based on the average yields and yields obtained by the progressive farmers

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

Table 6.9 Projected Output Growth in Livestock and Fish Production

Particulars	Existing			Potential (MT)			Growth rate in production (% p.a.)
	No	Production (000 Mt/day)	Milk yield (L/day)	No.	Production (000 Mt/day)	Milk yield (L/day)	
Milk (000 lt./day)							
Crossbred cows	2210	12.86	5.82	2100	17.85	8.50	7.76
Local cows	4212	8.93	2.12	3791	11.37	3.00	5.46
Buffaloes	46788	154.87	3.31	44449	311.14	7.00	20.18
Goats	11702	5.50	0.47	11117	11.12	1.00	20.44
Fish (M. T. per annum)	-	456.50	-	-	1175.0	-	31.48

Note: Projections are based on the average yields and yields obtained by the progressive farmers

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

Sector	Current value of output (Rs. Lakh)	Projected value of output (Rs. Lakh)	Growth rate (% p. a.)
Agriculture	11754	20282	14.51
Horticulture	126	216	13.76
Animal husbandry	113695	219376	18.59
Fisheries	799	2056	31.48
Over-all without fisheries	125575	239874	18.12

Table 6.11 Fertiliser Demand, Actual Supply and Projections for 2012-13 (M.T.)

Year	CAN		UREA		IFFCO (12:32:16)		SSP		MOP	
	Demand	Supply	Demand	Supply	Demand	Supply	Demand	Supply	Demand	Supply
2003-04	400	58.00	4200	3646.70	1200	442.15	150	7.60	120	4.05
2004-05	400	32.20	4200	3677.80	1400	700.15	150	7.30	150	2.40
2005-06	500	10.900	4400	3914.70	1600	847.80	150	5.35	150	2.75
2006-07	500	13.00	4400	3295.50	1600	954.85	150	5.15	150	2.45
2007-08	500	8.00	4200	3721.55	1600	465.450	150	8.30	150	9.70
Growth rate (% p .a)	5.00	-17.24	0.00	0.41	6.67	1.05	0.00	1.84	5.00	27.90
Projection for 2012	651.56	-	4200	3799.00	2288.78	490.83	150	9.12	195.47	47.44
Projection making allowance for crop diversification @ 2 %	786.86	-	5119.78	4627.26	2755.99	597.10	182.85	11.08	236.06	55.40
Projection making allowance for irrigation@ 2 % over diversification	946.95	-	6217.03	5614.63	3307.35	723.65	222.04	13.41	284.08	64.55

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

Appendix Table 1 Demographic and Institutional Features

Sr. No	Particular	Block			District
		Bilaspur Sadar	Ghumarwin	Jhandutta	
1.	Gram panchayats	63	40	48	151
2.	Villages	454	281	326	1061
3.	Households	22703	18859	19178	60740
4.	Total population	124725	92171	102038	318934
	Male	64196	44540	50752	159488
	Female	60529	47631	51286	159446
	Schedule caste	32136	21369	28837	82342
	Schedule tribe	5580	996	2342	8918
	Rural	124725	92171	102038	318934
	Urban	14219	5721	2011	21951
	Sex ratio	933	1058	1010	1000
5.	Literacy rate (Male) (%)				
	Literacy (Female)(%)	55.27	64.5	71.05	69.50
6.	Households economic status				
	Antodaya households	4208	2881	4396	11485
	BPL households	6352	4349	6636	17337
	APL1 households	10711	3311	15821	29843
	APL2 households	10711	3311	3905	17927
7.	Village amenities				
	Connected with pucca roads	380	84	265	729
	Connected with kuchha roads	58	113	47	218
	Connected with no roads	16	84	14	114
	Drinking water supply	418	83	48	549
	Villages electrified	454	281	48	783
	Tel connection to panchayats	52	40	40	132
	Post office	51	27	43	121
	Fair price shops				
	<i>Co-op depots</i>	88	55	57	200
	<i>Private dealers</i>	28	4	4	36
8.	Educational and health institutions				
	Primary schools	265	106	196	567
	Middle schools	59	28	37	124

	High schools	63	38	38	139
	Technical institutions				
	<i>Polytech/Engg</i>	0	0	0	0
	<i>ITI</i>	2	0	1	3
	<i>Nursing TI</i>	2	0	0	2
	<i>College of Education</i>	1	1	0	2
	PHC	16	6	5	27
	Dispensaries	2	0	0	2
	Sub-health centres	51	33	33	117
	Community HCs	2	2	2	6
	Hospitals	1	1	0	2
	Medical college cum hospitals	0	0	0	0
	Veterinary hospitals	6	6	6	18
	Veterinary dispensaries	35	32	27	94
	Gosadan	1	1	1	3
	Other health institutions	30	1	3	34
	Anganwaries/balwaries	315	180	355	850
9.	Village/community organizations				
	Mahila mandals	187	261	231	679
	Self help groups	154	97	679	930
	Youth clubs	0	0	7	7
	NGOs	3	1	2	6
	Farmers co-operatives	16	5	0	21
10	Banking institutions				
	Commercial banks	25	11	9	45
	RRBs	0	1	6	7
	Central co-operative banks	12	8	7	27
	Co-operative credit societies	95	55	57	207

Source: Field Survey, 2007-08

Appendix Table 2 Distribution of Workers and Categories of Households

Particular	Bilaspur Sadar	Ghumarwin	Jhandutta	District
Workers				
Cultivators	38356	32986	42747	114089
Agricultural labour	882	888	1109	2879
Others	18527	11608	11317	41452
Total	57765	45482	55173	158420
Main workers	42527	27689	32916	103132
Marginal workers	15238	17793	22257	55288
Households				
Landless	318	170	0	488
Marginal	10336	15333	8920	34589
Small	10931	5500	17532	33963
Large	1507	2670	4306	8483
Total	23092	23673	30758	77523

Source: Field Survey, 2007-08

Appendix Table 3 Farm Gate Prices of Different Crops

Sr. No.	Crop	Price (Rs./q)
1	Maize	650
2	Paddy	850
3	Wheat	1000
4	Barley	1500
5	Mash	3500
6	Gram	3000
7	Sesame	4500
8	Sarson	3000
9	Toria	3000
10	Ghobi sarson	3000
11	Potato	400
12	Peas	1500
13	Tomato	700
14	Cabbage	400
15	Cauliflower	600
16	Beans	800
17	Capsicum	1800
18	Bhindi	800
19	Brinjals	500
20	Cucurbits	700
21	Onion	500
22	Ginger	2000
23	Garlic	2500
24	Mango	1000
25	Citrus	2000
26	Amla	1000
27	Milk	1500
28	Fish	5000

