
Agriculture in Himachal Pradesh: Issues for the Twelfth Five Year Plan

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I

INTRODUCTION

Agriculture is the main source of livelihood for majority of the people in Himachal Pradesh. The farming in the state has witnessed huge transformation since Independence, more so after 1971 when the state attained full statehood. The state has experienced substantial diversification in its agriculture towards high value cash crops such as fruits and vegetables. Various economic and ecological implications of this process have been examined in detail during the last fifteen years or so (Chand, 1996; Sharma, 2005 and Sharma, 2011). The continuously declining holding size, livelihood security concerns, changing consumption patterns and availability of newer technological options have, *inter alia*, compelled the farmers to shift to new cash crops. The agricultural diversification that was hitherto confined to selected pockets and valleys in the higher and mid-hills, has descended to new areas in the low and mid-hills of the state. Many new developments such as protected cultivation and micro irrigation have added new dimensions to the agriculture in the state. Of late, agriculture and allied activities in the state have received increased policy support from the government. Notwithstanding all these developments, sustaining this process of agricultural transformation might become difficult as the population increase, urbanisation and industrialisation has taken a heavy toll of the net sown area in the state. Secondly, despite liberal allocation to irrigation in the state during various plans, irrigated area has declined in the state. With this background, the paper seeks to examine the patterns of allocation to the agriculture sector during various five year plans and also raise the issues that should be given priority in the Twelfth Five Year Plan.

II

AGRICULTURE IN THE STATE ECONOMY

The economy of the state has exhibited remarkable growth during the last fifteen years or so (Table 1). Except for the years 2000-01 and 2001-02 when it registered

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less than six per cent annual growth of the gross domestic product (GDP), the growth rate of the economy has been well above 7 per cent for most of the years. However, the primary sector of which agriculture and allied activities are the main contributors, did not do well except for the first five years of the last decade. More recently, the agriculture sector has witnessed negative growth for a couple of years even when the overall economy registered 7 to 9 per cent growth in GDP. Further, the percentage contribution of agriculture and allied sectors in total state domestic product (SDP) has declined from 26.5 per cent in 1990-91 to 14.5 per cent in 2009-10 as a natural transition of development process. But the stark reality of agriculture being main livelihood provider remains as the proportion of population dependent upon agriculture has not declined accordingly.

TABLE 1. GROWTH RATES OF GROSS DOMESTIC PRODUCT ORIGINATING IN PRIMARY SECTOR IN HIMACHAL PRADESH, 2005-06 TO 2009-10

<i>(Per cent per annum at constant prices)</i>		
Year (1)	Agriculture, forestry and logging, fishing, mining and quarrying (2)	Gross State Domestic Product (at factor cost) (3)
1994-95	1.2	9.6
1995-96	2.0	6.2
1996-97	1.5	6.9
1997-98	1.6	6.4
1998-99	1.2	7.2
2000-01	15.6	6.3
2001-02	8.5	5.2
2002-03	2.2	5.1
2003-04	11.6	8.1
2005-06	6.1	8.4
2006-07	-0.6	9.1
2007-08	8.9	8.6
2008-09	-0.1	7.4
2009-10	-5.7	8.1

Source: Economic Survey, 2010-11, Department of Economics and Statistics, Government of Himachal Pradesh.

The state has made tremendous progress in agricultural production including horticulture. The foodgrain production in the state is expected to be 15.80 lakh tonnes in 2010-11. From the viewpoint of commercial and diversified agriculture, the production of vegetables (including potato) touched the 13.91 lakh tonnes mark. Also, the total fruit production in the state is expected to the tune of 8.92 lakh tonnes during the current year (2010-11) of which apple alone is contributing 8.30 lakh tonnes (93 per cent of total fruit production). In addition to these crops, the livestock sector has also registered magnificent growth in the production of milk, wool, eggs and meat. The production of milk in the state has reached a high level of 8.84 lakh tonnes in 2008-09. The decomposition of the gross value of output in agriculture revealed that horticulture is becoming the prime mover of the growth in agriculture of late. This is amply reflected by its share in gross value of output that has gone up from 25.21 per cent in 1999-2000 to 40.67 per cent in 2006-07 (Table 2). The share

of crop production has come down from 42.60 to 29.22 per cent during the same period. The contribution of livestock sector has remained almost stagnant at 30 per cent level.

TABLE 2. GROSS VALUE ADDED IN VARIOUS SUB-SECTORS OF AGRICULTURE, IN HIMACHAL PRADESH, 1999-2000 TO 2006-07 (AT CONSTANT PRICES)

<i>(per cent)</i>				
Per cent gross value added				
Year (1)	Crops (2)	Horticulture (3)	Livestock (4)	Total agriculture (5)
1999-2000	42.60	25.21	32.19	100.0 (334688)
2000-01	30.41	40.44	29.16	100.0 (382894)
2001-02	38.71	32.46	28.83	100.0 (414928)
2002-03	29.00	41.60	29.40	100.0 (418309)
2003-04	29.09	43.31	27.61	100.0 (473967)
2004-05	27.59	43.54	28.87	100.0 (519702)
2005-06	23.43	46.50	30.06	100.0 (518869)
2006-07	29.22	40.67	30.11	100.0 (552058)

Source: *Gross Domestic Product of Himachal Pradesh (1999-2000 to 2006-07)*, Department of Economics and Statistics, Government of Himachal Pradesh.

Note: Figures in parentheses are gross value added (Rs. lakh) in agriculture.

III

HIMACHAL PRADESH AGRICULTURE THROUGH FIVE YEAR PLANS

The allocation of funds to a particular sector or activity *vis-a-vis* other sectors indicates the relative importance that is given to a particular sector during a particular time or a plan period. The data on outlays set aside for agriculture during different Five Year Plans/Annual Plans since Independence in this hilly state have been given in Table 3. It is evident from this table that the plan allocations (as a per cent of total plan outlay) were quite high ranging from about 25 per cent to 31 per cent during the period from mid-1960s to mid-1970s. This was, perhaps, attributable to the need of the times which later on came to be regarded as green revolution. However, the actual plan expenditure on agriculture in this state was much lower during the same period which may be attributed to the lower absorptive capacity of the typically subsistence hill agriculture. It was during the sixth five year plan (1985-80) that the allocation to agriculture dipped to around 17 per cent and remained at around that level (17-18 per cent) till the Eighth Plan. But after that it further slid down to 10-12 per cent in the Ninth, Tenth and the Eleventh Five Year Plans. In the later part of the planning period, the gap between the allocations and expenditures has also narrowed down which might be attributed to the proper utilisation of earmarked allocations. Interestingly, during 2010 the state was given 'Leadership Award' by a magazine group for allocating the highest (12 per cent) plan outlay to agriculture throughout the country.

TABLE 3. AGRICULTURE THROUGH PLANS IN HIMACHAL PRADESH, 1951-2012

(Rs. lakh)						
Five Year/Annual Plan (AP) (1)	Agril. outlay (2)	Per cent of TPO* (3)	Agril. expenditure (4)	Per cent of TPE** (5)	Total plan outlay (6)	Total plan expenditure (7)
I (1951-56)	120.27	21.31	73.81	14.00	564.4	527.12
II (1956-61)	218.53	14.84	251.27	15.68	1472.53	1602.6
III (1961-66)	649	23.24	769.15	22.73	2793	3384.47
AP(1966-67)	279.21	31.02	155.38	16.42	900	946.05
AP(1967-68)	459	29.20	305.16	21.13	1572	1443.94
AP(1968-69)	376	24.26	278.87	17.48	1550	1595.19
IV (1969-74)	3000	29.59	2736.03	24.12	10140	11342.97
V (1974-79)	5874	24.58	4218.2	26.02	23895	16214.1
AP(1978-79)	1765.44	24.09	1730.87	25.42	7329.11	6810.17
AP(1979-80)	1699	23.27	2182.27	27.47	7300	7945.36
VI (1980-85)	10412.9	16.74	10509.95	15.81	62217	66471.4
VII (1985-90)	20551	17.45	26000.17	19.63	117800	132474.75
AP (1990-91)	6426	17.85	6960.94	18.43	36000	37762.93
AP (1991-92)	7496	18.28	8495	20.98	41000	40482
VIII(1992-97)	43965	17.57	48661	13.91	250200	349905
IX (1997-02)	88701	11.85	91820	11.63	748800	789672
X (2002-07)	120168	9.96			1207057	
XI(2007-12)	147008	10.67			1377800	

Source: 'State Statistical Abstract of Himachal Pradesh 2009-10, Department of Economics and Statistics, Government of Himachal Pradesh.

Note: *TPO- Total plan outlay and ** TPE – Total plan expenditure.

A broad look at the plan allocations may not help in charting out the right course for future planning. Hence an attempt was made to examine the activity/sub-sector-wise fund devolutions in the recent Annual Plans (Table 4). Here it is pertinent to mention that allocations for irrigation, both major and minor, which are otherwise not covered under the agricultural activities have also been included to have an 'all inclusive view' for the agricultural sector. As may be seen in the table, the outlay for agricultural and allied activities (as per cent of total plan outlay) have increased from 9.70 per cent in 2003-04 to 15.11 per cent in 2009-10, the allocation being the highest at 17.29 per cent in 2008-09.

The composition of this outlay reveals that 50 to 55 per cent of the total funds go for irrigation, both major and medium as well as minor irrigation. However, it is saddening to note that the net irrigated has remained stagnant at 17-19 per cent during all these four decades since 1971. Also, soil and water conservation has been another area that has got plenty of funds in the last decade or so and rightly so as the uneven terrain needs massive treatments. However, the time has come to examine whether such huge investments have increased the productivity of agriculture or not. Therefore, the outcomes of such efforts need to be evaluated objectively. It is worrying that the allocations for animal husbandry and dairying have come down during the last 7-8 years. This sub-sector is very important from the holistic farming approach as it has both economic and ecological implications for the commercial hill farming. As such it should be given due importance in the Twelfth Plan. The

TABLE 4. SHARE OF DIFFERENT SUB-SECTORS IN PLAN OUTLAYS IN AGRICULTURE, 2003-04 TO 2009-10

Head of development (1)	(per cent)						
	2003-04 (2)	2004-05 (3)	2005-06 (4)	2006-07 (5)	2007-08 (6)	2008-09 (7)	2009-10 (8)
1. Crop husbandry	7.11	2.83	2.96	2.75	2.99	3.23	3.84
2. Horticulture	-	3.26	3.10	2.28	1.93	1.95	2.16
3. Soil and water conservation	15.82	9.65	6.98	5.85	4.23	5.28	10.96
4. Animal husbandry	8.86	7.24	7.40	5.19	4.90	3.89	4.31
5. Dairy development	0.55	0.40	0.34	0.32	0.24	0.12	0.12
6. Fisheries	1.14	0.86	0.96	0.78	0.67	0.58	0.61
7. Agricultural research and education	0.77	19.69	21.66	20.80	15.02	15.68	19.17
8. Marketing and quality control	7.18	3.71	5.70	3.53	2.72	2.82	3.09
9. Co-operation	0.60	0.68	0.61	0.45	0.34	0.39	0.42
10. Major and medium irrigation	12.34	8.37	7.53	11.29	32.36	31.34	20.84
11. Minor irrigation	44.00	41.99	41.15	45.57	33.65	33.90	33.61
12. Command area development	1.63	1.31	1.62	1.19	0.98	0.84	0.86
Agricultural plan outlay (Rs. lakh)	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Agri. outlay (Per cent of total plan outlay)	12956	16166.2	19311.7	26158.9	35850.2	41485.4	40795
Total plan outlay (Rs. lakh)	9.70	11.54	12.07	14.53	17.07	17.29	15.11
	133500	140038	160000	180000	210000	240000	270000

Source: *Economic Survey*, Department of Economics and Statistics, Government of Himachal Pradesh (various issues).

allocation to marketing and quality control has also showed a declining trend over these years. But given the fact that state has plenty of fruits and vegetables production and due to poor road connectivity in the remote interiors of the state a lot of wastage occurs, this activity needs further strengthening in the form of controlled atmosphere chambers, cold chains, etc. besides improved connectivity.

IV

LAND CONSTRAINTS IN HIMACHAL PRADESH

In the hilly regions, the area under plough is always a cause of serious concern and it is impossible to bring more area under cultivation due to colossal costs involved. The trio of population increase, urbanisation and industrialisation has taken a heavy toll on the net sown area in the state. The temporal changes in land use pattern in the state during the period 1974-75 to 2007-08 are given in Table 5 and a few observations are as follows. The net sown area initially witnessed an increase from about 552.53 thousand ha in triennium ending (TE) 1974-75 to 582.80 thousand ha in TE 1990-91. However, it declined by around 31 thousand hectares to 551.83 thousand ha by TE 1999-2000. Thus, there was massive shrinkage of cultivated land during the decade of nineties. The slump continued unabated and the area under plough dwindled by another 22 thousand hectares to 529.7 thousand ha by TE 2007-08. The net sown area is declining precipitously (the net sown area in the state

declined by 46,700 ha between 2000-01 and 2007-08) in the extant culturable land scarce mountain terrain. In the land category that is amenable to cultivation such as current fallows, other fallows and culturable waste, the land under fallows has increased considerably and it was more so for the category 'other fallows'. Of late, such factors as the wild animal menace (monkeys, blue bulls, stray animals, wild boars, etc.) and the widespread infestation by obnoxious weeds (such as *Lantana*, *Parthenium Ageratum*, etc.) have been fuelling the process of rendering culturable lands unfit for use and the farmers are being compelled to abandon their main livelihood option of farming in many areas.

On the other hand, land put to non-agricultural uses increased after mid-1980s and the increase was quite pronounced after mid-1990s. Here it is worth mentioning that most of the increase in the non-agricultural uses category comes from the cultivated area only. The diversion of good quality fields to such non-agricultural uses on and near the road heads and small hamlets/markets is a common feature anywhere in the state. Most of these changes in all likelihood may not have been incorporated in the revenue records also. Such inclusions might flare up the decline in the net sown area in the state. This will have implications not only for the sustainability of ongoing diversification but also for food security of the state.

TABLE 5. CHANGES IN LAND USE IN HIMACHAL PRADESH, 1974-75 TO 2007-08

Land use category (1)	Triennium ending				
	1974-75 (2)	1980-81 (3)	1990-91 (4)	2000-01 (5)	2007-08 (6)
1. Reporting area (According to village papers)	2933.6 (100.00)	2991.4 (100.00)	3364.23 (100.00)	4536.6 (100.00)	4493.1 (100.00)
2. Forests	638.0 (21.75)	782.43 (26.16)	1001.43 (29.77)	1093.37 (24.10)	1094.53 (24.36)
3. Barren	130.23 (4.44)	151.2 (5.05)	184.07 (5.47)	856.60 (18.88)	652.9333 (14.53)
4. Non-agricultural uses	195.6 (6.67)	182.67 (6.11)	198.67 (5.91)	283.00 (6.24)	465.57 (10.36)
5. Culturable waste	129.5 (4.41)	161.3 (5.39)	126.13 (3.75)	117.10 (2.58)	127.57 (2.84)
6. Permanent pastures	1187.17 (40.47)	1050.73 (35.13)	1162.27 (34.55)	1497.27 (33.00)	1482.73 (33.00)
7. Miscellaneous tree crops	43 (1.47)	42.67 (1.43)	45.73 (1.36)	62.70 (1.38)	65.40 (1.46)
8. Current fallows	53.53 (1.82)	45.1 (1.51)	44.00 (1.31)	55.77 (1.23)	59.50 (1.32)
9. Other fallows	3.6 (0.12)	6.97 (0.23)	19.27 (0.57)	18.93 (0.42)	15.33 (0.34)
10. Net sown area	552.93 (18.85)	568.37 (19.00)	582.80 (17.32)	551.83 (12.16)	529.73 (11.79)

Sources: Computed from the data from the Annual Season and Crop Report (various issues), Directorate of Land Records, and Statistical Outline of Himachal Pradesh, 2009-10, Department of Economics and Statistics, Government of Himachal Pradesh.

V

CROP DIVERSIFICATION AND CHANGES IN CROPPING PATTERN

Notwithstanding the decline in area under plough, the state has witnessed several changes in its cropping pattern over the years. Major cropping pattern changes with respect to major crops and crop groups were examined for various points of time, i.e., starting with 1992-93 through 2004-05 (Table 6). As is evident, foodgrains which accounted for about 85 per cent of the total cropped area in the state witnessed a small decline (about four per cent points) in the area during the period 1992-2004. Among foodgrains, wheat during *rabi* and maize during *kharif* seasons dominated the cropping pattern accounting for 38.57 per cent and 31.31 per cent of the gross cropped area, respectively. The area under pulses, oilseeds and 'other cereals' (which included ragi and other common and small millets) declined during the period 1992-2004. The area under fruits also increased substantially to 6.45 per cent over the period under consideration with apple continuing to be the major fruit crop of the state. Here it is worth mentioning that the productivity levels of most of the crops except maize and vegetables in the state are below the national level yields.

TABLE 6. CHANGES IN CROPPING PATTERN IN HIMACHAL PRADESH, 1992-93 TO 2004-05

Crops (1)	<i>(per cent cropped area)</i>			
	1992-93 (2)	1997-98 (3)	2002-03 (4)	2004-05 (5)
Rice	8.42	8.74	8.81	8.34
Maize	31.90	31.62	30.03	31.31
Wheat	38.90	38.26	38.03	38.57
Barley	2.79	2.81	2.50	2.46
Other cereals	2.08	1.67	2.17	1.30
Pulses	4.22	3.64	3.19	2.94
Total foodgrains	88.32	86.73	85.67	84.91
Fruits	4.78	5.63	6.51	6.45
Vegetables	2.61	3.42	3.63	3.60
Oilseeds	2.35	2.04	1.47	1.61
Others	1.94	2.17	2.72	3.38

Source: Computed from the data from the Annual Season and Crop Report, Directorate of Land Records, Government of Himachal Pradesh, Shimla (various issues).

The state has emerged as a model of agricultural diversification towards high-value cash crops, mainly off-season vegetables. Earlier, the production of vegetables such as green peas, tomato, beans, cabbage, cauliflower, capsicum, etc. in the state was confined to select mid-and high-hill pockets. However, the remunerative returns from these off-season vegetables have allured the farmers in low and mid-hill locations in the 1990s to undertake the cultivation of these crops. Recently, the vegetable and flower cultivation in the polyhouses has further given momentum to the diversification of agriculture in the state. These changes have been aptly captured in Table 7. At present, the state is producing 10.90 lakh tonnes of vegetables (excluding potato) from an area of 58,743 ha, with an average productivity of 18.56

t/ha (2008-09). Most of the increased production of the vegetables has come through an increase in area as shown by the compound growth rate (CGR) of 6.17 per cent per annum. The growth rate of productivity of vegetables, however, was 0.93 per cent per annum. Thus, there is a strong need to increase the productivity of vegetables in the state as the further shifting of area from main foodgrain crops will have its own ramifications from the food security perspective.

TABLE 7. AREA, PRODUCTION AND YIELD OF VEGETABLES IN HIMACHAL PRADESH, 1990-91 TO 2009-10

Year (1)	Area (ha) (2)	Production (tonnes) (3)	Yield (t/ha) (4)
1990-91	23,000	3,65,000	15.87
1994-95	24,500	4,00,000	16.33
1998-99	29,000	5,00,000	17.24
2002-03	35,220	6,21,918	17.66
2009-10	63,879	12,06,242	18.88
Growth rate (per cent per annum)	6.29* (0.0442)	7.28* (0.0456)	0.93* (0.0026)

Source: Directorate of Agriculture, Government of Himachal Pradesh, Shimla.

Note: Figures within parentheses are standard errors. *Indicates significance at 5 per cent probability level.

VI

IRRIGATION AND CROP DIVERSIFICATION

Agriculture in the state is overwhelmingly dependent on the natural conditions as about 81.0 per cent of the cultivated area is rainfed. Because of the undulating topography, it is not easy to bring more area under irrigation like the plains as it involves huge costs. Not only that, the availability of water is also uneven across various altitudinal regions as the mid-hills have higher availability of water as compared to other regions. The ultimate irrigation potential, 85.0 per cent of which is in minor irrigation, is estimated to be around 62 per cent of the net sown area in the state (Table 8). A total of 2.39 lakh ha of culturable command area (CCA) has been created up to December 31, 2010. This constitutes 71 per cent of the ultimate irrigation potential, thus leaving 29 per cent of the potential untapped. However, only about 50.0 per cent of the created CCA stands used till date.

TABLE 8. ASSESSED, CREATED AND UTILISED IRRIGATION POTENTIAL IN HIMACHAL PRADESH

Sl. No. (1)	Particulars (2)	Area (lakh ha) (3)
1.	Total geographical area	
	(i.) By professional survey	55.67
	(ii) By village papers	45.45
2.	Net sown area	5.43
3.	Ultimate irrigation potential available of which	3.35 (61.69 per cent of net sown area)
	(i) Major and medium irrigation	0.50 (14.93 per cent)
	(ii) Minor irrigation	2.85 (85.07 per cent)
4.	CCA created up to 31.12.2010	2.39 (71.30 per cent)

Source: Economic Survey, Himachal Pradesh, 2010-11, Department of Economics and Statistics, Government of Himachal Pradesh.

The data on changes in the net irrigated area by different sources of water in the state during the period 1995-96 to 2008-09 have been brought out in Table 9. The net irrigated area decreased by 11240 ha during the past one decade or so. The broad composition of the net irrigated area by source of water reveals that 'other sources', which primarily include *kuhls* (gravity flow channels), account for 78 per cent of the irrigated area in the state. Here it is important to point out that most of the *kuhl* irrigation in the state has been affected adversely in comparison to what it used to be, say two decades ago. Partly, this may be attributed to the receding snowline and consequent drying up of the springs from where these *kuhls* emanate due to changing climate. The unrelenting population pressure, unsystematic construction, poor management, etc. have further rendered these *kuhls* less effective. In the high-hill districts of Kinnaur, Kullu, Lahaul & Spiti and Shimla, which are the leading cash crop producing districts, the entire irrigation is through the *kuhls*. All these changes are going to impact the diversification process adversely in the state. So there is a strong need to strengthen the irrigation infrastructure in the state on one hand and use the scarcest natural resource of water more prudently on the other.

TABLE 9. SOURCE-WISE NET IRRIGATED AREA IN HIMACHAL PRADESH: 1995-96 TO 2008-09

Source (1)	(ha)	
	1995-96 (2)	2008-09 ^P (3)
Canals	3393 (3.24)	4390 (4.69)
Tanks	397 (0.04)	236 (0.25)
Shallow and deep wells	13082 (12.48)	15752 (16.84)
Other sources	87918 (83.90)	73172 (78.22)
Total	104790 (100.0)	93550 (100.0)

Source: *Statistical Outline of Himachal Pradesh, 2008-09*, Department of Economics and Statistics, Government of Himachal Pradesh.

Note: Figures in parentheses show percentages to total. P: Provisional.

VII

ISSUES FOR TWELFTH PLAN

Given the aforementioned agricultural production and policy regime, it follows from the above that while the liberal fund allocations for irrigation, soil and water conservation are necessity of the state, these need to be evaluated objectively. There is also a need to enhance the allocations for animal husbandry and dairying activities in the state. Further, there is a need to strengthen the marketing infrastructure in the form of controlled atmosphere chambers, cold chains, etc., in the ensuing Twelfth Five Year Plan. Again, there is a need to halt the ongoing shifting of quality crop lands to non-agricultural uses in the state as it might jeopardise the food security. The other vital natural resource of water needs to be used judiciously as the success of comparative advantage of commercial horticultural activities hinges on this. Again, there is even an impending need to increase agricultural productivity in the state as the productivity levels of most of the crops are well below the national yields. The

success of various ambitious schemes of the government such as *Pandit Deen Dayal Kisan-Bagwan Samridhi Yojna* to augment its micro irrigation potential on one hand and to promote precision/polyhouse cultivation on the other, diversification project of agriculture with the help from Japan International Cooperation Agency (JICA), Horticulture Technology Mission to boost horticultural production in the state and *Doodh Ganga Yojna* to develop and augment milk production programme in the state, etc., is also contingent upon the scarce land and water resources. Finally, the human resource required to carry out all these activities should also not be overlooked in the plan as reaching out to the farmers in the land locked terrains is a costly and time consuming process.

REFERENCES

- Chand, Ramesh (1996), "Ecological and Economic Impact of Horticultural Development in the Himalayas: Evidence from Himachal Pradesh", *Economic and Political Weekly*, Vol. 31, No. 26, June 29, pp. A93-A99.
- Sharma, H.R. (2005), "Agricultural Development and Crop Diversification in Himachal Pradesh: Understanding the Patterns, Processes, Determinants and Lessons", *Indian Journal of Agricultural Economics*, Vol. 60, No.1, January-March, pp.71-93.
- Sharma, H.R. (2011), "Crop Diversification in Himachal Pradesh: Patterns, Determinants and Challenges", *Indian Journal of Agricultural Economics*, Vol. 66, No.1, January-March, pp. 97-114.