Trends of Crop Intensity in Tribal Regions of Himachal Pradesh

[a]Devender Sharma, [b]Heera Bhagti
[a]Chairman Department of Commerce Himachal Pradesh University Shimla-05, India
[b]Senior Research Fellow Department of Commerce Himachal Pradesh University Shimla -05, India

Abstract

Agriculture is the major source of revenue of majority of rural population in Himachal Pradesh. Continued growth in agricultural production and productivity is essential for over all sustainability of the State economy. The Cropping Intensity of the State is affected by various factors. Irrigation is one of the essential factors affecting crop intensity. Irrigation, simply, refers to the artificial way of providing water to plants. It is a very important non-physical input in modern agriculture as the crop production of an area largely depends on the existing irrigation facility. This paper attempts to find out the crop intensity in tribal areas and the irrigation intensity influencing crop intensity in Kinnaur and Lahaul & Spiti District of Himachal Pradesh for the years of 1993-94 and 2010-11 and the relation between the changes in cropping intensity and irrigation intensity in this period. Karl Pearson's Product Moment Correlation Coefficient method has been adopted to measure the relationship between irrigation intensity and cropping intensity.

KEYWORDS: Intensity, Agriculture, Sustainability.

1. Introduction

Agricultural production of India depends upon millions of small farmers. It is the intensity of their effort and the efficiency of their technique that will help in raising the cropping intensity. And the cropping intensity is highly affected by irrigation intensity, High yielding varieties of seeds and chemical fertilizers were the chief ingredients in increasing the crop production. The use of inputs pre- required the development of certain irrigation" (Singh, 1977).

When we are talking about, the economy of Himachal Pradesh it is solely supported by agriculture. The average cropped area of the State from 1993-94 to 2010-11 is 955456.56 and average cropping intensity of the State is 173.84. The gross average irrigated area of the Sate is 183110.72 and Average irrigation intensity of the State records 174.13percent.[1] Himachal Pradesh is a hilly terrain, the population of the State is growing very fast and the water crisis arises day by day either for consumption or for irrigation. The source of irrigation in study areas is very specific due to its unique geographical conditions. Both the regions are snow bound regions. Kulh is the main source of irrigation in both the regions.

2. The Study Areas

i) Kinnaur

Kinnaur has Uttar Kashi region of Uttaranchal and Rohru tehsil of Shimla district on the north. Its boundary lies with Spiti region on the west including the regions of Rampur and Kullu. It covers total geographical area of 6401sq. Km. It is marked by Sky- High Mountains, which are almost covered with snow most of the times. The district has beautiful valleys and climatically, it has long winter from October to May. The total population of the district is 84,298.[1]

ii) Lahaul&Spiti

Lahaul & Spiti became a district of Himachal Pradesh in 1960. The district in the Western Himalayas is situated between 31^{o} 44' 57" and 32^{o} 59' 57" North latitude and between 76^{o} 46' 29" and 78^{o} 41' 34" East latitude. The total geographical area of the district is 13,835 sq. Km. It is separated in the North from Jammu & Kashmir, Tibet in the East and Kullu, Kinnaur in South-East and Chamba in the South-West and West. The total population of Lahual & Spiti is 31,528.[2]

Review of Literature

William K. Easter and Lee R. Martin, (1977)[3]viewed in the title on 'Water Resource Problems in Developing Countries' that the location of the villages from the main canal happened to be the main factor influencing the cropped area and in turn the cropping intensity.

Bagi F.S. (1981)[4]viewed in the article on 'Economics of Irrigation in Crop Production in Haryana' that irrigation primarily reduces the uncertainty of crop production and consequently increases agricultural productivity in a number of ways. First, it can increase crop yields even without any increased use of agricultural inputs. Second, lower risk and uncertainty of crop production are likely to encourage greater use of inputs. Third, it makes possible to grow crops all year around and hence can increase the cropping intensity. Fourth, cultivation of better quality and high value crops may become feasible. Therefore, the development of irrigation facilities is nothing less than an agricultural revolution.

Rasis Ahmad (1998)[5]in his paper 'Water for Irrigation-An Overview' pointed out that for raising productivity of agriculture one has to shift from traditional to modernized and scientific system of farming for which regular supply of water for irrigation is necessary. In India position is quite different as 2/3 farmers are small and marginal farmers and most of them continuing traditional system of farming. 2/3Cultivable area is dependent on scanty rainfall and any change in the timing of monsoon either before time or delayed and excess or less rainfall may cause extensive damage to crops. The rainfall is thus most unreliable and is marked by wide variations in different parts and also variation from year to year in the quantity, incidence and duration. India is served by south-west and the north-east monsoons**.** Most of the rainfall i.e. about 73.7 per cent occurs during June-September, while rains amount only 2.6 per cent; post monsoon rains are about 13.3 per cent and pre monsoon rains about 10.4 per cent. He has mentioned two types of artificial irrigation systems. First is flow irrigation and the second is lift irrigation. The flow irrigation is dependent on the surface water and it is collected in rivers and canals. The second type is lift irrigation, which is very economic and certain source for having adequate water for irrigation of various crops at proper time.

Narendra Kumar I. and Chandra Sekar Rao G. (2007)[6]have analysed in the title on 'Impact of Irrigation on Employment' on the basis of micro study that irrigation

reduces the risk and uncertainty inherent in the rain fed cropping. Irrigation has a stabilizing impact on agriculture and generates farm employment through higher levels of cropping intensity adoption of new agricultural strategy, growth of high yielding crops and multiple cropping. Their study pertains to Kurnool district of Andra Pradesh with the objective of Impact of Canal and Bore Wells irrigation sources on the farm output and generation of employment relating to the crops like paddy and cotton. They conclude that there is no significant difference between canal and bore well irrigation within the human labour and bullock labour. The important suggestions as follows: i) The main canals up to farm lands are to be lined cement can be avoid leakage of water ii) Ground water potentiality will be increased by different methods like check dams, watersheds and percolation tanks and iii) Micro irrigation is encouraged at every village level, so that the previous water is to be saved.

Somashekaraiah N.T. and Mahendra Kumar S. (2008)[7]in their article, an attempt has been made to assess the impact of tube well irrigation on resource use efficiency in agriculture with special reference to paddy cultivation in the study area. To them, tube well irrigation has made a drastic change in the sample villages. There has been upward trend in the number of tube wells and a change in the pattern of tube wells. More and more tube wells have been energized. The cropping pattern has undergone a forcible change. The traditional crop, ragi has been replaced by paddy. There has been remarkable increase in the level of income of the farmers and in the level of employment of the households. The households have also undergone socio-economic changes. The literacy level has gone up and the banking habits increased. In short, the life-style of the sample village folks has under gone drastic changes in recent years due to resource use efficiency.

N. Bashkaran (2010)[8]in his report on 'Lining of Canals can Improve Irrigation Efficiency by over 15 per cent' stated that only around 53 per cent of the water from head reservoirs actually reach farmers' fields the rest represents losses during transit due to percolation and evaporation. He suggested that Plastic or concrete lining of canals can reduce water seepage and percolation losses by 15 per cent or more, thereby significantly improving irrigation efficiency levels.

Haque.Sakila (2015)[9] in his work 'Impact of Irrigation on Cropping Intensity and Potentiality of Groundwater in Murshidabad District of West Bengal, India,' focused on spatial pattern of change in irrigation intensity and also the relation between irrigation intensity and cropping intensity. The author also attempts to make a comparative study of percentage of area underground irrigation in the C.D. Blocks of the Murshidabad district for the years of 1994-95 and 2010-11. The author finds that dependency of cropping intensity on irrigation intensity has decreased from 1994-95 to2010-11. According to the author cropping intensity in Murshidabad District is not solely dependent on the irrigation but on the other factors also. The author suggest to more emphasis on irrigation through surface water use, construction of more water reservoirs, conservation of the existing wetlands and water bodies, impeding surface run-off, rainwater harvesting and also multi-crop farming.

Database and Methodology

Data Sources: The present study is based on the secondary data which have been collected from the, Annual Season Crop Report, Directorate of Land Records, Kasumpti, Shimla-9, and 1993-94 to 2010-11.

Methods and Techniques: The collected data have been presented statistically. The following formulae are used here:

1. Cropping Intensity has been calculated for the years 1993-94 and 2010-11 using the following formula (after Bureau of Applied Economics and Statistics, Government of Himachal Pradesh)

   Cropping Intensity= (Gross cropped Area/Net Cropped Area) ×100

2. Irrigation Intensity has been calculated for the years 1993-94 and 2010-11 using the following formula (after Bureau of Applied Economics and Statistics, Government of Himachal Pradesh)

   Irrigation Intensity= (Gross Irrigated Area/Gross Cropped Area) ×100

3. The relationship between Irrigation Intensity and Cropping Intensity at district level for the years 1993-94 and 2009-10 has been shown using the Coefficient of Correlation (Karl Pearson, 1896) formula.

Objectives of the study

1. To examine crop intensity in tribal areas.

2. To study the irrigation intensity influencing crop intensity in tribal areas.

Significance of the study

The tribal district Kinnaur and Lahaul & Spiti is well-known for their unique geographical conditions. Horticulture and agriculture is the main occupation of both the districts. The study is pertinent to know the relationship between cropping intensity and irrigation intensity.

1.1 CROPPING INTENSITY

Cropping intensity of Kinnaur and Lahaul & Spiti districts of Himachal Pradesh envisages that the Net Area Sown in these regions has although registered growth yet it is low in the State.

Table 1.1Cropping Intensity

Himachal Pradesh					Kinnaur						Lahaul&Spiti				
Year	**NAS**	**Growth**	**TCA**	**Growth**	**Intensity**	**NAS**	**Growth**	**TCA**	**Growth**	**Intensity**	**NAS**	**Growth**	**TCA**	**Growth**	**Intensity**
1993-94	571744.00 **(100)**		975231.00 **(100)**		171.1	7513.00 **(1.31)**		9553.00 **(0.98)**		127.1	3128.00 **(0.55)**		3280.00 **(0.34)**		104.8
1994-95	568338.00 **(100)**	-0.60	967990.00 **(100)**	-0.74	170.3	7607.00 **(1.34)**	1.25	9285.00 **(0.96)**	-2.81	122.1	3147.00 **(0.55)**	0.61	3285.00 **(0.34)**	0.15	104.4
1995-96	567534.00 **(100)**	-0.14	968217.00 **(100)**	0.02	171.8	7537.00 **(1.33)**	-0.92	9480.00 **(0.98)**	2.10	131.2	3218.00 **(0.57)**	2.26	3361.00 **(0.35)**	2.31	103.6
1996-97	557742.00 **(100)**	-1.73	949888.00 **(100)**	-1.89	170.6	7449.00 **(1.34)**	-1.17	9787.00 **(1.03)**	3.24	125.8	3192.00 **(0.57)**	-0.81	3309.00 **(0.35)**	-1.55	104.4
1997-98	560154.00 **(100)**	0.43	986338.00 **(100)**	3.84	176	7602.00 **(1.36)**	2.05	9970.00 **(1.01)**	1.87	131.1	3238.00 **(0.58)**	1.44	3318.00 **(0.34)**	0.27	102.4
1998-99	549419.00 **(100)**	-1.92	970136.00 **(100)**	-1.64	176.6	7517.00 **(1.37)**	-1.12	9334.00 **(0.96)**	-6.38	124.2	3219.00 **(0.59)**	-0.59	3358.00 **(0.35)**	1.21	104.3
1999-2000	551457.00 **(100)**	0.37	956767.00 **(100)**	-1.38	173.5	7806.00 **(1.42)**	3.84	9059.00 **(0.95)**	-2.95	116.1	3386.00 **(0.61)**	5.19	3486.00 **(0.36)**	3.81	102.9
2000-01	554592.00 **(100)**	0.57	947142.00 **(100)**	-1.01	170.9	7586.00 **(1.37)**	-2.82	9328.00 **(0.98)**	2.97	123	3487.00 **(0.63)**	2.98	3595.00 **(0.38)**	3.13	103.1
2001-02	549643.00 **(100)**	-0.89	955740.00 **(100)**	0.91	173.8	7580.00 **(1.38)**	-0.08	9088.00 **(0.95)**	-2.57	119.9	3292.00 **(0.60)**	-5.59	3377.00 **(0.35)**	-6.06	102.5
2002-03	544575.00 **(100)**	-0.92	945205.00 **(100)**	-1.10	173.8	7268.00 **(1.33)**	-4.12	8592.00 **(0.91)**	-5.46	118.2	3326.00 **(0.61)**	1.03	3413.00 **(0.36)**	1.07	102.6
2003-04	540518.00 **(100)**	-0.74	955614.00 **(100)**	1.10	176.8	7484.00 **(1.38)**	2.97	8745.00 **(0.92)**	1.78	116.8	3043.00 **(0.56)**	-8.51	3174.00 **(0.33)**	-7.00	104.3
2004-05	542550.00 **(100)**	0.38	952517.00 **(100)**	-0.32	175.6	7477.00 **(1.38)**	-0.09	9058.00 **(0.95)**	3.58	121.1	3292.00 **(0.61)**	8.18	3489.00 **(0.37)**	9.92	106
2005-06	539020.00 **(100)**	-0.65	943469.00 **(100)**	-0.95	175.0	7602.00 **(1.41)**	1.67	9017.00 **(0.96)**	-0.45	118.6	3291.00 **(0.61)**	-0.03	3464.00 **(0.37)**	-0.72	105.2
2006-07	540820.00 **(100)**	0.33	943784.00 **(100)**	0.03	174.5	7553.00 **(1.40)**	-0.64	8969.00 **(0.95)**	-0.53	118.7	3283.00 **(0.61)**	-0.24	3460.00 **(0.37)**	-0.12	105.4
2007-08	542500.00	0.25	954824.00	1.14	176.0	7884.00	4.38	9629.00	7.36	122.1	3283.00	0.00	3441.00	-0.55	104.8

	(100)		**(100)**			**(1.45)**		**(1.01)**			**(0.61)**		**(0.36)**		
2008-09	539462.00 **(100)**	-0.56	946134.00 **(100)**	-0.91	175.38	7866 **(1.45)**	-0.22	9619 **(1.01)**	-0.10	122.2	3359 **(0.62)**	2.31	3547 **(0.37)**	3.08	105.6
2009-10	538412 **(100)**	-0.19	940614 **(100)**	-0.58	174.69	8034 **(1.49)**	2.13	9545 **(1.01)**	-0.76	118.80	3398 **(0.63)**	1.16	3591 **(0.38)**	1.24	105.6
2010-11	543365 **(100)**	0.91	938625 **(100)**	-0.20	172.74	8310 **(1.52)**	3.43	10646 **(1.13)**	11.53	128.11	3396 **(0.62)**	-0.05	3517 **(0.37)**	-2.06	103.5
Compound Growth		**-0.26**		**-0.2**			**0.62**		**0.73**			**.54**		**.84**	
Mean	**550102.5**		**955456.56**		**173.84**	**7648.61**		**9372.45**		**122.50**	**3276.56**		**3414.72**		**104.19**
S.D	**10923.07**		**13211.32**		**2.15**	**245.75**		**480.96**		**4.60**	**109.56**		**115.89**		**1.159**
C.V	**1.98**		**1.38**		**1.23**	**3.21**		**5.13**		**3.76**	**3.34**		**3.39**		**1.11**

Source: Annual Season Crop Report, Directorate of Land Records, Kasumpti, Shimla-9, 1993-94 to 2010-11.

The above table shows that the average Net Area Sown (NAS) in Himachal Pradesh over the last 18 years is 550102.5 hectares with S.D. =10923.07 hectares and Coefficient of Variance (C.V.) 1.98 percent with the negative compound growth of -0.26 percent, followed by Average Total Cropped Area 955456.55 hectares with S.D. =13211.32 hectares and C.V. 1.38 percent with a slightly negative compound growth of -0.2 percent. The average intensity of Gross Area Sown to the Net Area Sown is 173.84 percent. The average cropping intensity during 1993 to 2010-11 in Himachal Pradesh is 173.84 percent and in Kinnaur district it is 122.5 percent and in Lahaul and Spiti, it is 104.1 percent. Data indicates that in district Kinnaur more area is utilized to sown for More Than Once in comparison to Lahaul & Spiti, but very less in comparison to the State. Further, the average Cropped Area in Kinnaur is 9372.45 hectare calculated with S.D. of 480.96 hectare C.V. of 5.13 percent, which is 0.98 percent of Average Cropped Area in the State. While in Lahaul & Spiti, such area is 3414.7 hectare with S.D. of 115.89 hectare and C.V. of 3.34 percent. It is 0.35 percent of the Average Cropped Area in the State. Although both the study regions come under the Snow Belt but the variation in Total Cropped Area in district Kinnaur is more (1.79%) as compared to Lahaul & Spiti. And the positive compound growth of both the districts is in Kinnaur, NAS 0.62, TCA 0.73 percent wheareas in Lahaul & Spiti it is 0.54 and 0.84 very slightly difference in both the tribal regions. It has been analyzed that although, the total geographical area of Lahaul & Spiti district is much more than of district Kinnaur, yet in terms of Average Area Sown, Average Area Sown for More than Once and Total Cropped Area, district Kinnaur is much ahead to district Lahaul & Spiti. The reasons for variation of both the districts are Lahaul & Spiti district is more snow bound area as compared to Kinnaur.

1.2 IRRIGATION INTENSITY:

The detail of gross area irrigated, net area irrigated and irrigation intensity in Himachal Pradesh, Kinnaur and Lahaul&Spiti districts is shown in table 1.2.

Table 1.2
Irrigation intensity

Himachal Pradesh						Kinnaur					Lahaul&Spiti				
Year	**NIA**	**Growth**	**GIA**	**Growth**	**Intensity (%)**	**NIA**	**Growth**	**GIA**	**Growth**	**Intensity (%)**	**NIA**	**Growth**	**GIA**	**Growth**	**Intensity (%)**
1993-94	99646 (**100**)		171354 (**100**)		171.96	4307 (**4.32**)		5414 (**3.16**)		125.7	3146 (**3.16**)		3280 (**1.91**)		104.26
1994-95	100454 (**100**)	0.81	177838 (**100**)	3.78	177.03	4517 (**4.50**)	4.88	5622 (**3.16**)	3.84	124.46	3147 (**3.13**)	0.03	3285 (**1.85**)	0.15	104.39
1995-96	104790 (**100**)	4.32	177087 (**100**)	-0.42	168.99	4405 (**4.20**)	-2.48	5523 (**3.12**)	-1.76	125.38	3147 (**3.00**)	0	3307 (**1.87**)	0.67	105.08
1996-97	104792 (**100**)	0	179154 (**100**)	1.17	170.96	4337 (**4.14**)	-1.54	5728 (**3.20**)	3.71	132.07	2308 (**2.20**)	-26.66	3355 (**1.87**)	1.45	145.36
1997-98	102617 (**100**)	-2.08	180124 (**100**)	0.54	175.53	4335 (**4.22**)	-0.05	5869 (**3.26**)	2.46	135.39	3318 (**3.23**)	43.76	3318 (**1.84**)	-1.1	100
1998-99	101510 (**100**)	-1.08	182554 (**100**)	1.35	179.84	4293 (**4.23**)	-0.97	5413 (**2.97**)	-7.77	126.09	3219 (**3.17**)	-2.98	3358 (**1.84**)	1.21	104.32
1999-2000	101907 (**100**)	0.39	178696 (**100**)	-2.11	175.35	4690 (**4.60**)	9.25	5490 (**3.07**)	1.42	117.06	3386 (**3.32**)	5.19	3486 (**1.95**)	3.81	102.95
2000-01	125506 (**100**)	23.16	181275 (**100**)	1.44	144.44	4452 (**3.55**)	-5.07	5727 (**3.16**)	4.32	128.64	3487 (**2.78**)	2.98	3595 (**1.98**)	3.13	103.1
2001-02	102106 (**100**)	-18.64	180966 (**100**)	-0.17	177.23	4530 (**4.44**)	1.75	5478 (**3.03**)	-4.35	120.93	3296 (**3.23**)	-5.48	3377 (**1.87**)	-6.06	102.46
2002-03	102263 (**100**)	0.15	186562 (**100**)	3.09	182.43	4418 (**4.32**)	-2.47	5350 (**2.87**)	-2.34	121.1	3326 (**3.25**)	0.91	3413 (**1.83**)	1.07	102.62
2003-04	105081 (**100**)	2.76	181120 (**100**)	-2.92	172.36	4487 (**4.27**)	1.56	5350 (**2.95**)	0	119.23	3043 (**2.90**)	-8.51	3174 (**1.75**)	-7	104.3
2004-05	104452 (**100**)	-0.6	182974 (**100**)	1.02	175.18	4482 (**4.29**)	-0.11	5627 (**3.08**)	5.18	125.55	3392 (**3.25**)	11.47	3489 (**1.91**)	9.92	102.86
2005-06	104380 (**100**)	-0.07	185607 (**100**)	1.44	177.82	4518 (**4.33**)	0.8	5610 (**3.02**)	-0.3	124.17	3282 (**3.14**)	-3.24	3478 (**1.87**)	-0.32	105.97
2006-07	104320	-0.06	186680	0.58	178.95	4676	3.5	5653	0.77	120.89	3283	0.03	3460	-0.52	105.39

	(100)		**(100)**			**(4.48)**		**(3.03)**			**(3.15)**		**(1.85)**		
2007-08	108328 **(100)**	3.84	192736 **(100)**	3.24	177.92	4860 **(4.49)**	3.93	6015 **(3.12)**	6.4	123.77	3283 **(3.03)**	0	3441 **(1.79)**	-0.55	104.81
2008-09	107852 **(100)**	-0.43	191697 **(100)**	-0.53	177.74	4913 **(4.55)**	1.09	5817 **(3.03)**	-3.29	118.40	3359 **(3.11)**	2.31	3547 **(1.85)**	3.08	105.60
2009-10	106599 **(100)**	-1.16	186560 **(100)**	-2.68	175.01	4995 (4.68)	1.67	6110 (3.27)	5.04	122.32	3398 (3.19)	1.16	3591 (1.92)	1.24	105.68
2010-11	109940 **(100)**	3.13	193009 **(100)**	3.46	175.56	5434 (4.94)	8.79	6847 (3.55)	12.06	126.00	3389 (3.08)	-0.26	3516 (1.82)	-2.09	103.75
C.G.		**0.85**		**0.57**			**1.43**		**1.70**			**1.15**		**0.36**	
Mean	**105363.5**		**183110.72**		**174.13**	**4574.05**		**5672.95**		**124.10**	**3229.21**		**3410.58**		**106.25**
SD	**5729.96**		**5768.89**		**8.11**	**297.48**		**371.08**		**4.56**	**250.49**		**114.86**		**9.59**
CV	**5.44**		**3.15**		**4.65**	**6.5**		**6.54**		**3.67**	**7.76**		**3.36**		**9.02**

Source: Annual Season Crop Report, Directorate of Land Records, Kasumpti, Shimla-9, 1993-94 to 2010-11.

High crop intensity requires irrigation of crops at different time intervals. However, in the State, the rainy seasons fulfils the irrigation demand of the crops during the season. But, the two tribal districts have such a topology that there is no raining while crop intensity is high. The Average Net and Gross Irrigated Areas in Himachal Pradesh since 1992-93 to 2010-11 were accounted for 1,05,363.5 hectares (S.D.=5729.96 and C.V.=5.44) and 1,83,110.72 hectares recording S.D.= 5768.89 hectares and C.V.=3.15 % for gross area irrigated. The average irrigation intensity of the State was 174.13percent, indicating the utilization of irrigation more than once. In Kinnaur, the average irrigation intensity was 124.10 percent and in Lahaul & Spiti it was 106.25percent, which indicates that irrigation intensity is comparatively low in these districts than in the State. Since highest C.V. in irrigation intensity is recorded in (9.02%) in district Lahaul & Spiti followed by, the State (4.65%) and least irrigation intensity was found in district Kinnaur 3.67 percent, it shows that Lahul & Spiti has more variation and least consistency in irrigation intensity, on the contrary district Kinnaur is more consistent and least variation in irrigation intensity as compared to Lahaul & Spiti and the State. The positive compound growth has been recorded in both the districts as well in State.

Table 1.3: Correlation between cropping intensity and Irrigation Intensity

The table 1.3 analyse the correlation between cropping intensity and irrigation intensity.

Table 1.3
Correlation between cropping intensity and Irrigation Intensity

	Kinnaur		Lahaul & Spiti	
YEAR	**CROP INTENSITY**	**IRRIGATION INTENSITY**	**CROP INTENSITY**	**IRRIGATION INTENSITY**
1993-94	127.1	125.7	104.8	104.26
1994-95	122.1	124.46	104.4	104.39
1995-96	131.2	125.38	103.6	105.08
1996-97	125.8	132.07	104.4	145.36
1997-98	131.1	135.39	102.4	100
1998-99	124.2	126.09	104.3	104.32
1999-2000	116.1	117.06	102.9	102.95
2000-01	123	128.64	103.1	103.1
2001-02	119.9	120.93	102.5	102.46
2002-03	118.2	121.1	102.6	102.62
2003-04	116.8	119.23	104.3	104.3
2004-05	121.1	125.55	106	102.86
2005-06	118.6	124.17	105.2	105.97
2006-07	118.7	120.89	105.4	105.39
2007-08	122.1	123.77	104.8	104.81
2008-09	122.2	118.40	105.6	105.60
2009-10	118.80	122.32	105.6	105.68

2010-11	128.11	126.00	103.5	103.75
MEAN	**122.50**	**124.10**	**104.19**	**106.25**
S.D	**4.60**	**4.56**	**1.159**	**9.59**
C.V	**3.76**	**3.67**	**1.11**	**9.02**
R	**.75**		**.15**	

Source: Annual Season Crop Report, Directorate of Land Records, Kasumpti, Shimla-9, 1993-94 to 2010-11.

The above table shows that there is a positive correlation between crop intensity and irrigation intensity in both the tribal districts. The dependency of cropping intensity on irrigation intensity has highly correlated in district Kinnaur from 1993-94 to2010-11 the value of r is 0.75. It indicates that the irrigation intensity highly influence the cropping intensity in district Kinnaur. On the other hand, in Lahaul & Spiti district the dependency of cropping intensity on irrigation intensity has positive correlated. The r value is recorded .15 in the district. In the year 1996-97 both the districts have recorded negative impact of irrigation intensity on crop intensity as compared to other years. It is analysed from the data that the crop intensity of district Kinnaur is highly correlated with irrigation intensity as compared to district Lahaul & Spiti.

Conclusions

The study reveals that in district Kinnaur more area is utilized to sown for More Than Once in comparison to Lahaul & Spiti, but very less in comparison to the State. Further, the average Cropped Area in Kinnaur is 9372.45 hectare calculated with Standard Deviation of 480.96 hectare C.V. of 5.13 percent, which is 0.98 percent of Average Cropped Area in the State. While in Lahaul & Spiti, such area is 3414.7 hectare with S.D. of 115.89 hectare and C.V. of 3.34 percent. It is 0.35 percent of the Average Cropped Area in the State. Although both the study regions come under the Snow Belt but the variation in Total Cropped Area in district Kinnaur is more (1.79%) as compared to Lahaul & Spiti. And the positive compound growth of both the districts is in Kinnaur, NAS 0.62, TCA 0.73 percent whereas in Lahaul & Spiti it is 0.54 and 0.84 very slightly difference in both the tribal regions. It has been analyzed that although, the total geographical area of Lahaul & Spiti district is much more than of district Kinnaur, yet in terms of Average Area Sown, Average Area Sown for More than Once and Total Cropped Area, district Kinnaur is much ahead to district Lahaul & Spiti. The reasons for variation of both the districts are Lahaul & Spiti district is more snow bound area as compared to Kinnaur.

Further, In Kinnaur, the average irrigation intensity was 124.10 percent and in Lahaul & Spiti it was 106.25percent, which indicates that irrigation intensity is comparatively low in these districts than in the State.it indicates that Lahul & Spiti has more variation and least consistency in irrigation intensity, on the contrary district Kinnaur is more consistent and least variation in irrigation intensity as compared to Lahaul & Spiti and the State. The positive compound growth has been recorded in both the districts as well in State.As many as in the year 1996-97 both the districts have recorded negative impact of irrigation intensity on crop intensity as compared to other years. It is analysed from the data that the crop intensity of district Kinnaur is highly correlated with irrigation intensity as compared to district Lahaul & Spiti.

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