



## Agriculture in Himachal Pradesh and Its Neighbouring Himalayan States: The Present Scenario

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### ABSTRACT

Agriculture in the mountainous states of North-Western India is a very difficult activity as it faces climate adversities like severe winters, snowfall, heavy rainfall, landslides etc. throughout the year. These problems have made livelihood of people in these states difficult, however most of the farmers in these states are solely dependent on their agriculture for livelihood. Therefore the present paper is an attempt to understand the situation of agriculture in the three Himalayan states of India i.e. Himachal Pradesh, Jammu-Kashmir and Uttarakhand. To understand the situation of agriculture in these states change in the area and production of various crops has been analyzed for the years 2001 and 2015. The results of the study have highlighted that the area under almost every crop in these states has decreased, however improved agricultural infrastructure and availability of other facilities in agriculture has led to an increase in its production.

### 1. Introduction

Agriculture is an art of cultivating various plants and livestock. In the early age of human civilization the word agriculture meant to produce or gather something to eat. Later on humans started planting crops for subsistence, but with the development of various technologies, increase in the population, demand for various food products etc. agriculture modernized. This modernized agriculture is like a business where farmers cultivate not only for subsistence but for commercial purposes too.

Himachal Pradesh shares its border with Jammu-Kashmir on the north side and with Uttarakhand on the south-eastern side. They have similar physiography and climate as they are located at almost same altitude. Moreover common agricultural practices are followed. In this research paper we shall be discussing area occupied along with the production of various crops in the states of Himachal Pradesh, Jammu-Kashmir and Uttarakhand.

Agriculture is a critical sector of Indian economy and it forms the backbone of the economic development of the country. However the share of agriculture and allied services in overall GDP of the country has fallen from about 23 percent in 2000-01 to less than 18 percent in 2010-11. The reason could be the growth of population coupled with many other factors leading to a change in the land use and cropping

pattern of the country as a whole and the northern states of the country are following the same trend. In the three Himalayan states i.e. Himachal Pradesh, Jammu-Kashmir and Uttarakhand the industrial sector is contributing more than agriculture to the GDP (Table I). Kumar and Prashar (2012) in their study have also analyzed that the economy of Himachal Pradesh has shifted from agriculture sector to industries and services as the percentage contribution of agriculture and allied activities in State Domestic Product has decreased. According to them due to lack of irrigation facilities in the Himalayan states, the agricultural production mostly depends upon timely rainfall and weather conditions.

Himachal Pradesh and Jammu-Kashmir have almost the same percent share i.e. 19 and 20 percent respectively which is little higher than the national average/percentage. However, the share of agriculture and allied services is very low in percent to GDP in Uttarakhand whereas agriculture and allied services contribute only 10 percent towards GDP. These three Himalayan states have almost similar topographical and climatic attributes and these attributes have directly controlled the agriculture in these states. Agriculture in these states has been facing a downfall from the past many years as the development of secondary or tertiary activities provide better employment opportunities. Also decrease in the share of agriculture share towards GDP, decrease in the

**Table I.** Sector-Wise Contribution to Gross State Domestic Product, 2015 (in Percentage)

States	Agriculture	Industry	Services
Himachal Pradesh	19	38	43
Jammu-Kashmir	20	23	57
Uttarakhand	10	38	52

Source: Ministry of Agriculture, Government of India, 2015

area under agriculture, changed climatic conditions etc. have added to this downfall. To understand the relation between agriculture of Himachal Pradesh and its neighbouring states (Jammu-Kashmir and Uttarakhand) a comparison between the change in the area, production and yield of the various important crops in these states between 2001 and 2015 has been drawn.

## 2. Objectives

Objective of the present research paper are as follows:

- To analyze the situation of agriculture in Himachal Pradesh, Jammu-Kashmir and Uttarakhand.
- To highlight area and production of various crops in the three Himalayan states for the years 2001 and 2015.

## 3. Methodology

In the present research paper secondary data related to area, production and yield has been used for the years 2001 and 2015. Secondary data has been collected from the published records of the Ministry of Agriculture, India. After collection, tabulation and analyses data has been presented in table form.

## 4. Results and Discussions

The results and discussion have been presented under two sections:

- Area under Different Crops in Himachal Pradesh, Jammu-Kashmir and Uttarakhand.
- Production of Different Crops in Himachal Pradesh, Jammu-Kashmir and Uttarakhand.

### a) Area under Different Crops in Himachal Pradesh, Jammu-Kashmir and Uttarakhand

The area covered by any crop exhibits its importance as greater the area covered more is the importance. The role of climate and soil in deciding the cropping pattern can never be underestimated. Since the three states of north-western Himalaya share the same climatic conditions and almost same altitude, hence their agricultural practices too have many similarities. In these states the diffusion of fruits and vegetables has been very rapid due to supportive climatic conditions. The share of food grains and pulses however has decreased mainly because fruits and

vegetables fetch better returns. Along with this the shortage of arable land, small size of landholdings, hindrances in the use of modern machinery due to undulating terrain, road connectivity and short sowing season etc. are other factors that have contributed in the decreasing the share of food grains in these states.

## Cereals

Among all the food grains, rice and wheat enjoy a special place in the Indian agriculture scenario. Along with these two major cereal crops Maize, barley and other cereals like jowar, millets, ragi, bajra, sorghum etc. also play a pivotal role in Indian agriculture.

The major hindrance in the cultivation of these crops is that they need large farms, advanced agricultural infrastructure and most importantly an even terrain (like Ganga plains). The Himalayan states lack in all these important factors due to uneven terrain which ultimately is leading to a decrease in the share of cereal crops in agriculture of Himalayan states. Apart from this climate is not very suitable for the cultivation of cereal crops in these states and most of its area is covered with snow throughout the year.

Due to the restrictions related to climate and terrain coupled with many other factors the share of area under the major cereal crops i.e. rice and wheat decreased. The share of rice fell from 6.61 percent (82 thousand hectares) in 2001 to 5.11 percent (73.57 thousand hectares) in 2015 in Himachal Pradesh and in Uttarakhand from 18.85 percent (283 thousand hectares) to 16.15 percent (262.27 thousand hectares) during same time period. The share of wheat crop in Himachal Pradesh decreased from 28.38 percent (363 thousand hectares) in 2001 to 23.57 percent (339.23 thousand hectares) in 2015 and in Uttarakhand from 25.05 percent (376 thousand hectares) to 21.16 percent (343.63 thousand hectares) for the same time span. In Jammu-Kashmir for the same time period the area under rice and wheat increased although their percent share has shown a different trend where the share of area under rice increased slightly from 20.16 percent (243.33 thousand hectares) in 2001 to 20.28 percent (288.10 thousand hectares) in 2015 and for the same time period the area share under the wheat crop went down from 21.97 percent (263 thousand hectares) to 20.87 percent (296.47 thousand hectares) (Table II and III).

In the three mentioned states of north western Himalayas the area and the percent share of both maize and

barley crops had shown a declining trend (Table II and III) between 2001 and 2015. In Himachal Pradesh the area under maize and barley declined from 23.43 percent (299.67 thousand hectare) to 20.39 percent (293.43 thousand hectare) and from 1.91 percent (24.40 thousand hectare) to 1.42 percent (20.43 thousand hectare) respectively. However in Jammu-Kashmir it decreased from 27.20 percent (328.33 thousand hectare) to 20.39 percent (296.03 thousand hectare) and from 0.92 percent (11.10 thousand hectare) to 0.47 percent (6.70 thousand hectare). In Uttarakhand it reduced from 2.13 percent (32 thousand hectare) to 1.43 percent (23.27 thousand hectare) and from 1.93 percent (29.03 thousand hectare) to 1.23 percent (20.73 thousand hectare) respectively. The decline in these two crops is correspondent to the increase in the area under cash crops, as these crops are not very profit generating for farmers in these state.

Although the area under other cereals and total cereals increased in Himachal Pradesh and Uttarakhand, their percent share to total cropped area displayed a different trend. The percent share of area under other cereals increased in both the states from 17.25 percent (220.62 thousand hectare) in 2001 to 24.16 percent (354.17 thousand hectare) in 2015 in Himachal Pradesh and in Uttarakhand from 33.31 percent

(500 thousand hectare) to 37.25 percent (605.60 thousand hectare) during the same time period. However during the same phase the percent share of area under total cereals decreased from 77.38 percent (989.69 thousand hectare) to 75.11 percent (1080.83 thousand hectare) in Himachal Pradesh and in Uttarakhand from 81.28 percent (1220.03 thousand hectare) to 77.27 percent (1255.50 thousand hectare). In case of Jammu-Kashmir the area under other cereals decreased and so did its percent share i.e. from 7.14 percent (86.83 thousand hectare) to 5.31 percent (75.40 thousand hectare) during the same time span. However the area under total cereal crops increased but their percent share decreased from 77.21 percent (931.99 thousand hectare) to 67.78 percent (962.70 thousand hectare) between 2001 and 2015.

#### Pulses

Cereals and pulses as food grains have almost equal importance for the farmers of India. In India the food grains like wheat, rice, maize, pulses are of high preference not only among farmers but consumers too. Pulses are grown mainly for human consumption, livestock fodder and for enhancing

**Table 2.** Area under Different Crops in Himachal Pradesh, Jammu-Kashmir and Uttarakhand, 2001-2015 (in 000 Hectare)

Crops	Himachal Pradesh		Jammu-Kashmir		Uttarakhand	
	2001	2015	2001	2015	2001	2015
<b>Cereals</b>						
Rice	82.00	73.57	<b>243.33</b>	<b>288.10</b>	283.00	262.27
Maize	299.67	293.43	328.33	296.03	32.00	23.27
Wheat	363.00	339.23	<b>263.00</b>	<b>296.47</b>	376.00	343.63
Barley	24.40	20.43	11.10	6.70	29.03	20.73
Other Cereals	<b>220.62</b>	<b>354.17</b>	86.23	75.40	<b>500.00</b>	<b>605.60</b>
Total Cereals	<b>989.69</b>	<b>1080.83</b>	<b>931.99</b>	<b>962.70</b>	<b>1220.03</b>	<b>1255.50</b>
Total Pulses	30.33	29.77	27.67	19.20	<b>16.67</b>	<b>63.43</b>
<b>Total Food Grains</b>	<b>1020.02</b>	<b>1110.60</b>	<b>959.66</b>	<b>981.90</b>	<b>1236.70</b>	<b>1318.93</b>
<b>Fruits</b>						
Apple	<b>87.70</b>	<b>110.27</b>	<b>91.07</b>	<b>144.43</b>	38.97	28.20
Other Fruits	<b>112.67</b>	<b>116.53</b>	<b>43.17</b>	<b>176.07</b>	<b>109.33</b>	<b>157.67</b>
<b>Total Fruit Crops</b>	<b>200.37</b>	<b>226.80</b>	<b>134.24</b>	<b>320.50</b>	<b>148.30</b>	<b>185.87</b>
<b>Total Vegetables</b>	<b>41.23</b>	<b>89.13</b>	<b>40.47</b>	<b>61.93</b>	89.73	89.40
<b>Oilseeds</b>						
Sesamum	4.53	2.33	6.40	4.40	2.47	1.80
Rapeseed/ Mustard	<b>0.63</b>	<b>8.70</b>	0.00	51.07	<b>9.73</b>	<b>15.03</b>
Soyabean	9.97	0.63	65.70	0.00	12.80	12.77
Other Oilseeds	2.23	0.80	0.67	0.63	1.27	1.07
<b>Total Oilseeds</b>	17.36	12.46	72.77	56.10	<b>26.27</b>	<b>30.67</b>
<b>Total Cropped Area</b>	<b>1278.98</b>	<b>1438.99</b>	<b>1207.14</b>	<b>1420.43</b>	<b>1501.00</b>	<b>1624.87</b>

Source: Ministry of Agriculture, Government of India, 2001 and 2015

soil fertility. Pulses have many health benefits due to which they are the most preferred food in India. The most common pulse in the Himalayan states is rajmash and along with rajmash, black gram, yellow gram, black peas, white peas, masur, kulth etc. also hold importance. But due to the restriction of climate and size of landholdings, the cultivation of pulses is becoming difficult in the Himalayan states due to which area under pulses in these states has shown a decline. The area occupied by pulses in Himachal Pradesh has decreased from 2.37 percent (30.33 thousand hectare) in 2001 to 2.07 percent (29.77 thousand hectare) in 2015. For the same time period the area share under pulses in Jammu-Kashmir has decreased from 2.29 percent (27.67 thousand hectare) to 1.35 percent (19.20 thousand hectare) (Table II). However in case of Uttarakhand the situation is opposite to Himachal Pradesh and Jammu-Kashmir as the area under pulses increased almost four times from 16.67 thousand hectares to 63.43 thousand hectares for the same time period. The major reason behind this is the availability of water for irrigation in this state and also the influence of the agriculture pattern of the parent state i.e. Uttar Pradesh's in the few districts adjoining Uttarakhand.

### Total Food Grains

The area under total food grains i.e. cereals and pulses increased in all the three states of north western Himalaya's i.e. Himachal Pradesh, Jammu-Kashmir and Uttarakhand between 2001 and 2015. However the percentage of area under the food grains to total cropped area decreased simultaneously in the same time period. It decreased from 79.75 percent (1020.02 thousand hectare) to 77.18 percent (1110.60 thousand hectare) in Himachal Pradesh, 79.50 percent (959.66 thousand hectare) to 69.13 percent (981.90 thousand hectare) in Jammu-Kashmir and from 82.39 percent (1236.70 thousand hectare) to 81.17 percent (1318.93 thousand hectare) in Uttarakhand. The area under total food grains in general increased due to increase in the total cropped area in all the three states. However the percent share decreased due to the changed food demands of the growing population, farmers desire to earn more money, climate change, small size of landholdings etc.

**Table 3.** Area under Different Crops as Percentage to Total Cropped Area in Himachal Pradesh, Jammu-Kashmir and Uttarakhand, 2001-2015

Crops	Himachal Pradesh		Jammu-Kashmir		Uttarakhand	
	2001	2015	2001	2015	2001	2015
<b>Cereals</b>						
Rice	6.41	5.11	<b>20.16</b>	<b>20.28</b>	18.85	16.15
Maize	23.43	20.39	27.20	20.84	2.13	1.43
Wheat	28.38	23.57	21.79	20.87	25.05	21.16
Barley	1.91	1.42	0.92	0.47	1.93	1.28
Other Cereals	<b>17.25</b>	<b>24.61</b>	7.14	5.31	<b>33.31</b>	<b>37.25</b>
Total Cereals	77.38	75.11	77.21	67.78	81.28	77.26
Total Pulses	2.37	2.07	2.29	1.35	1.11	3.91
<b>Total Food Grains</b>	79.75	77.18	79.50	69.13	82.38	81.16
<b>Fruits</b>						
Apple	<b>6.86</b>	<b>7.66</b>	<b>7.54</b>	<b>10.17</b>	2.60	1.74
Other Fruits	8.81	8.10	<b>3.58</b>	<b>12.40</b>	<b>7.28</b>	<b>9.71</b>
<b>Total Fruit Crops</b>	<b>15.67</b>	<b>15.76</b>	<b>11.12</b>	<b>22.56</b>	<b>9.88</b>	<b>11.44</b>
<b>Total Vegetables</b>	<b>3.22</b>	<b>6.19</b>	<b>3.35</b>	<b>4.36</b>	5.98	5.50
<b>Oilseeds</b>						
Sesamum	0.35	0.16	0.53	0.31	0.16	0.11
Rapeseed/ Mustard	0.05	0.60	0.00	3.60	<b>0.65</b>	<b>0.93</b>
Soyabean	0.78	0.04	5.44	0.00	0.85	0.79
Other Oilseeds	0.17	0.06	0.06	0.04	0.08	0.07
<b>Total Oilseeds</b>	1.36	0.87	6.03	3.95	1.75	1.90
<b>Total Cropped Area</b>	100	100	100	100	100	100

Source: Ministry of Agriculture, Government of India, 2001 and 2015

### **Fruits and Vegetables**

The shift of agriculture in the Himalayan states started with the introduction of apple. Due to its early introduction and suitable conditions, apple occupies most of the area under fruits in the Himalayan states. The area under apple crop increased in Himachal Pradesh and Jammu-Kashmir between 2001 and 2015 from 87.70 thousand hectares (6.86 percent) to 110.27 thousand hectares (7.66 percent) and from 91.07 thousand hectares (7.54 percent) to 144.43 thousand hectares (10.17 percent) respectively (Table III). The demand of apple crop in the nearby markets like Punjab, Haryana, Chandigarh, Delhi etc. led to the increase in the area under apple in these states. The area under apple in Uttarakhand however decreased despite holding the third rank in the Himalayan states. This is because area under other fruit crops like walnut, mango, citrus etc. increased from 7.28 percent (109.33 thousand hectare) to 9.71 percent (157.67 thousand hectare) during same time period.

The area under other fruit crops increased slightly in Himachal Pradesh between 2001 and 2015 but its percent share to total cropped area has decreased from 8.81 percent (112.67 thousand hectare) to 8.10 percent (116.53 thousand hectare). However the area under other fruit crops in Jammu-Kashmir increased more than four times for the same time period. The climate of Jammu-Kashmir is suitable for the cultivation of other fruits like walnut, almond etc. The area under total fruits in general and in percent share to total cropped area increased in all the three states despite mixed trends of individual fruit crops in the states.

Agriculture in the Himalayan states started diversifying with the introduction of fruits and the process still continues. In the later half of nineties agriculture diversified towards fruits and presently i.e. the beginning of 21<sup>st</sup> century agriculture is diversifying towards vegetables. The main cause for diversification from fruits to vegetables is higher income generation from vegetables. Fruits are grown only once annually but due to advantage of climate there are three to four seasons of vegetables which automatically lead to more income. The area under vegetable crops in all the three states in general has increased between 2001 and 2015. However in Uttarakhand the percent share of area under vegetable decreased from 5.98 percent (89.73 thousand hectare) to 5.50 percent (89.40 thousand hectare) during the same time period (Table II).

### **Oilseeds**

Oilseeds are mainly grown for oil and used for cooking purpose. The main oilseeds used for extracting oil are rapeseed, mustard, sesamum, soyabean etc. Traditionally Indian agriculture was dominated by food grains, pulses and oilseeds, but with the growth of modern technologies and changed food demands, the area under these crops came to be

occupied by fruits and vegetables. This led to a decrease in area under all traditional crops. In case of oilseeds the area under rapeseed-mustard increased in Himachal Pradesh and Jammu-Kashmir between 2001 and 2015. The area under other oilseeds like soyabean, sesamum and other oilseeds decreased drastically. Whereas area under total oilseeds decreased in Himachal Pradesh and Jammu-Kashmir but increased slightly in Uttarakhand.

The area under any crops in general is directly dependent on the importance of that crop. Along with this available resources, machinery, climate, demand of agricultural produce etc. all play a vital role in the selection of any crop in any area. From the above discussion on area under various crops it is clear that in these North-Western Himalayan states the climate, farm size, soil (three most important factors of agriculture) are not suitable for the cultivation of food grains. The results also show that as compared to food grains fruits and vegetables are more viable and profit generating for the growers. Fruit trees along with fruit crops also help in controlling soil erosion. Vegetable crops are also more profit generating than fruits as one can simultaneously have 3-4 seasons of vegetables annually. Thus it can be said that in the Himalayan states of Himachal Pradesh, Jammu-Kashmir and Uttarakhand cultivation of fruits and vegetables is a more viable solution to all problems related to agriculture.

## **2.2 Production of Different Crops in Himachal Pradesh, Jammu-Kashmir and Uttarakhand**

### **Cereals**

Production in general terms means the outputs resulting from the inputs. In agriculture, production means the quantity of crops produced in any season. The production of any crop mainly depends on factors like climate, seeds, machinery, soil fertility and many other factors which directly or indirectly control the production of crops.

Increased production directly means use of good quality seeds (i.e. HYV seeds), timely rainfall, good temperature, high soil fertility etc. and vice versa. However the increased production also indicates the importance of that particular crop in a particular area whether commercial (like fruits) or non-commercial (like cereals for subsistence).

**Table 4.** Production of Different Crops in Himachal Pradesh, Jammu-Kashmir and Uttarakhand, 2001-2015 (in 000 Tonnes)

Crops	Himachal Pradesh		Jammu-Kashmir		Uttarakhand	
	2001	2015	2001	2015	2001	2015
<b>Cereals</b>						
Rice	116	133.90	419.33	578.60	572.97	624.27
Maize	645.03	700.30	519.67	483.80	49.53	42.43
Wheat	462.80	672.77	299.33	443.77	733.13	769.53
Barley	27.67	35.97	6.00	4.10	31.90	23.00
Other Cereals	121.09	210.81	75.50	77.50	253.63	313.43
Total Cereals	1372.59	1753.75	1319.83	1587.77	1641.16	1772.66
Total Pulses	15.83	47.30	13.17	9.57	23.30	56.37
<b>Total Food Grains</b>	<b>1388.43</b>	<b>1801.05</b>	<b>1333.00</b>	<b>1597.33</b>	<b>1664.46</b>	<b>1829.03</b>
<b>Fruits</b>						
Apple	301.87	630.13	871.60	1571.33	40.00	78.51
Other Fruits	92.17	133.80	69.10	474.03	458.40	624.13
<b>Total Fruit Crops</b>	<b>394.04</b>	<b>763.93</b>	<b>940.70</b>	<b>2045.36</b>	<b>498.40</b>	<b>702.64</b>
<b>Total Vegetables</b>	<b>716.33</b>	<b>1732.93</b>	<b>606.57</b>	<b>1390.30</b>	<b>794.30</b>	<b>945.27</b>
<b>Oilseeds</b>						
Sesamum	2.03	0.80	2.70	1.87	0.60	0.63
Rapeseed/ Mustard	5.63	4.53	29.20	31.53	8.40	12.70
Soyabean	1.03	0.80	0.00	0.00	8.23	15.83
Other Oilseeds	0.73	0.27	0.43	0.47	1.17	1.23
<b>Total Oilseeds</b>	<b>9.42</b>	<b>6.40</b>	<b>32.33</b>	<b>33.87</b>	<b>18.40</b>	<b>30.39</b>
<b>Total Production</b>	<b>2508.21</b>	<b>4304.31</b>	<b>2912.60</b>	<b>5066.87</b>	<b>2975.56</b>	<b>3507.33</b>

Source: Ministry of Agriculture, Government of India, 2001 and 2015

Rice and wheat are the main staple crops of an Indian state. This is evident from the increased production of these crops in the three north-western Himalayas states between 2001 and 2015 (despite the decrease in the area under these crops) (Table II). The impact of green revolution in the neighbouring states i.e. Punjab, Haryana and Uttar Pradesh is obvious and is also directly evident in these states too as the use of HYV seeds, improved irrigation facilities, machinery, electrification of the villages, use of chemical fertilizers etc. after the revolution increased the production of main cereal crops in these states also.

In case of rice crop, the production increased significantly in the three Himalaya states whereas the percentage share of rice production declined from 4.62 percent (116 thousand tonnes) to 3.11 percent (133.90 thousand tonnes) in Himachal Pradesh, 14.40 percent (419.33 thousand tonnes) to 11.42 percent (518.60 thousand tonnes) in Jammu-Kashmir and from 19.52 percent (572.97 thousand tonnes) to 17.80 percent (624.27 thousand tonnes) in

Uttarakhand for the same time period (Table V). The cultivation of rice crop needs lot of irrigation and stagnant water for few days, which is difficult in the states practicing terrace farming. These three states of Himalayas have terrace farms and also dominance of small size of land holdings (less than one hectare) where the cultivation of rice crop is not suitable as it harms the farms directly. Due to this disadvantage the production share of rice decreased in these states, as the production of rice did not increase as significantly as other crops.

Between 2001 and 2015 the production of wheat crop increased in these neighbouring Himalayan states despite this increase, the share of its production to total production has decreased from 18.45 percent (462.80 thousand tonnes) to 15.63 percent (672.77 thousand tonnes) in Himachal Pradesh, 10.28 percent (299.33 thousand tonnes) to 8.76 percent (443.77 thousand tonnes) in Jammu-Kashmir and from 24.97 percent (733.13 thousand tonnes) to 21.94 percent (769.53 thousand tonnes) in Uttarakhand. This

declining trend in the percentage share of wheat crop is the outcome of the decline in the area of wheat crop in these states.

Despite the decline in the percentage share of maize and barley in the state of Himachal Pradesh their total production increased in the state from 645.03 thousand tonnes to 700.30 thousand tonnes and from 462.80 thousand tonnes to 672.77 thousand tonnes respectively from the year 2001 to 2015. The production of maize and barley also decreased in the state of Jammu-Kashmir for the same time period i.e. from 17.84 percent (519.67 thousand tonnes) to 9.55 percent (483.80 thousand tonnes) and from 1.69 percent (6 thousand tonnes) to 1.21 percent (4.10 thousand tonnes) respectively. Uttarakhand displayed a similar trend as its percentage share of maize and barley production declined from 0.21 percent (49.53 thousand tonnes) to 0.08 percent (42.43 thousand tonnes) and from 1.09 percent (31.90 thousand tonnes) to 0.66 percent (23 thousand tonnes) respectively.

As the area under other cereals and total cereals increased in all the states except for a small decline in Jammu-Kashmir their production increased simultaneously in 2015 from 2001. However the share of their production increased in case of other cereals in Himachal Pradesh from 4.83 percent (121.09 thousand tonnes) to 4.90 percent (210.81 thousand tonnes) for the same time period. Otherwise the percentage share of other cereals and total cereals production to overall production decreased in all the three states, as the percent share of fruits and vegetable production increased between 2001 and 2015.

#### Pulses

Despite the decline in the percentage share of production to the total production the general production of pulses increased in Himachal Pradesh and Uttarakhand from 15.83 thousand tonnes to 47.30 thousand tonnes and from 23.30 thousand tonnes to 56.37 thousand tonnes respectively between 2001 and 2015. However the percentage share of production and total production for pulses has decreased in Jammu-Kashmir from 0.45 percent (13.17 thousand tonnes) to 0.19 percent (9.57 thousand tonnes) for the same time period.

#### Total Food Grains

The production of total food grains in India increased post Green Revolution period and these three Himalayan states were no exception. However the share of production of total food grains to the total production of the states has decreased in all the three states due to the increased share of fruits and vegetables production. In 2001 total food grains has a percentage share of 55.35 percent in Himachal Pradesh, 45.77 percent in Jammu-Kashmir, 56.70 in Uttarakhand; however this has declined in 2015 to 41.84 in Himachal Pradesh, 31.53 in Jammu-Kashmir, 52.15 in Uttarakhand (Table V).

#### Fruits and Vegetables

Lumpkin, Weinberger and Moore (2005) studied the ways to increase income through fruit and vegetable production, their opportunities and challenges and noticed that horticultural produce and processed products were enjoying increased domestic and international demand. The expansion of markets and the liberalization of trade policies are providing new opportunities for rural people to escape poverty through production and exchange of non-staple crops. They also suggested that the research agenda for agriculture must be broadened and more emphasis must be put on the growing importance of the fruit and vegetable sector and how these crops can contribute towards poverty alleviation, economic development and human health. Such investments will allow a significant portion of the world's poor nations, farmers and landless labourers to gain from horticulture and propel societies toward healthier and more diverse diets. Part of this investment should be directed toward a coordinating program, such as the suggested Global Horticulture Initiative. This initiative can bring focused efficiency and synergy to horticultural research and development, especially toward collective action in areas such as molecular genetics/genomics, biodiversity, safe production practices, value chains, enabling environment and targeted nutrition programs.

**Table 5.** Production of Different Crops as Percentage to Total Production in Himachal Pradesh, Jammu-Kashmir and Uttarakhand, 2001-2015

Crops	Himachal Pradesh		Jammu-Kashmir		Uttarakhand	
	2001	2015	2001	2015	2001	2015
<b>Cereals</b>						
Rice	4.62	3.11	14.40	11.42	19.26	17.80
Maize	25.72	16.27	17.84	9.55	1.66	1.21
Wheat	18.45	15.63	10.28	8.76	24.64	21.94
Barley	1.10	0.84	0.21	0.08	1.07	0.66

Other Cereals	<b>4.83</b>	<b>4.90</b>	2.59	1.53	<b>8.52</b>	<b>8.94</b>
Total Cereals	54.72	40.74	45.31	31.34	55.15	50.54
Total Pulses	<b>0.63</b>	<b>1.10</b>	0.45	0.19	<b>0.78</b>	<b>1.61</b>
<b>Total Food grains</b>	55.35	41.84	45.77	31.53	55.94	52.15
<b>Fruits</b>						
Apple	<b>12.04</b>	<b>14.64</b>	<b>29.93</b>	<b>31.01</b>	<b>1.34</b>	<b>2.24</b>
Other Fruits	3.67	3.11	2.37	9.36	<b>15.41</b>	<b>17.80</b>
<b>Total Fruit Crops</b>	<b>15.71</b>	<b>17.75</b>	<b>32.30</b>	<b>40.37</b>	<b>16.75</b>	<b>20.03</b>
<b>Total Vegetables</b>	<b>28.56</b>	<b>40.26</b>	<b>20.83</b>	<b>27.44</b>	26.69	26.95
<b>Oilseeds</b>						
Sesamum	0.08	0.02	0.09	0.04	0.02	0.02
Rapeseed/ Mustard	0.22	0.11	1.00	0.61	<b>0.28</b>	<b>0.36</b>
Soyabean	0.04	0.02	0.00	0.00	<b>0.28</b>	<b>0.45</b>
Other Oilseeds	0.03	0.01	0.01	0.01	0.04	0.04
<b>Total Oilseeds</b>	0.38	0.15	1.10	0.66	<b>0.62</b>	<b>0.87</b>
<b>Total Production</b>	100	100	100	100	100	100

Source: Ministry of Agriculture, Government of India, 2001 and 2015

The population is growing rapidly and so are its food habits which are shifting towards a healthy lifestyle. However the agriculture of mountainous states like Himachal Pradesh, Jammu-Kashmir and Uttarakhand also demands diversification due to limitation of terrain, small size of landholdings; limited/less land available for agriculture and climatic limitations, short season for agriculture. Therefore the aim of farmers is to generate income from the available resources.

The farmers in these states are more focused on cultivation of fruits and vegetables and the climate is one of the dominant factors favouring their choices. The main fruit crop in all the three states is apple whose share to the total production has increased in all the three states and the production in general has increased to almost double between 2001 and 2015 from 301.87 thousand tonnes to 630.13 thousand tonnes in Himachal Pradesh, 871.60 thousand tonnes to 1571.33 thousand tonnes in Jammu-Kashmir and from 40.00 thousand tonnes to 78.51 thousand tonnes in Uttarakhand (Table V).

The area and production of other fruits and total fruits increased between the year 2001 to 2015 in all the three states of north-western Himalayas. In Himachal Pradesh the production of other fruits increased from 92.17 thousand tonnes to 133.80 thousand tonnes, in Jammu-Kashmir from 69.10 thousand tonnes to 474.03 thousand tonnes and in Uttarakhand from 450.40 thousand tonnes to 624.13 thousand tonnes during this time period. The production of total fruits doubled in the states of Himachal Pradesh as well as Jammu-Kashmir both for the same time period from 394.04 thousand tonnes to 763.93 thousand tonnes and from 940.70 thousand

tonnes to 2045.36 thousand tonnes respectively. The production of total fruits increased in Uttarakhand for the same time span from 458.40 thousand tonnes to 702.64 thousand tonnes.

The vegetable crops are more profit generating than the fruit crops as one can have three to four seasons of vegetable crops in one year. As the farmers in the 21<sup>st</sup> century are more profit focused, therefore they are shifting towards vegetables to earn more profit from the available lands. This is evident from the increased production of vegetables in these three states between 2001 and 2015. The production of vegetables increased from 716.33 thousand tonnes to 1732.93 thousand tonnes in Himachal Pradesh, 606.57 thousand tonnes to 1390.30 thousand tonnes in Jammu-Kashmir and from 794.30 thousand tonnes to 945.27 thousand tonnes in Uttarakhand. The percent share of production of total vegetables and total fruits increased between 2001 and 2015.

#### **Oilseeds**

Oilseeds have been considered as most important crop of Indian agriculture from ancient time but their importance is decreasing day by day due to increased interest of farmers in earning more profit due to which oilseeds are being replaced by crops like food grains, fruits and vegetables.

Along with these choices the farmers in the hilly states are also restricted by climate which is a hindrance in the cultivation of crops like oilseeds, which need higher temperature for growing and for better yield. The production of almost all the major oilseeds like sesamum, rapeseed/mustard, soyabean and other oilseeds has decreased



over time with an exception of increase in the production of rapeseed/mustard in Jammu-Kashmir and Uttarakhand and soyabean in Uttarakhand only. However the percent share of production of oilseeds to the total production has decreased for the same time period. The production of total oilseeds has also increased in Jammu-Kashmir and Uttarakhand during the same time period from 32.33 thousand tonnes to 33.87 thousand tonnes and from 18.40 thousand tonnes to 30.40 thousand tonnes respectively. On the other hand the production decreased in Himachal Pradesh from 9.42 thousand tonnes to 6.40 thousand tonnes. However the share of their production has increased only in Uttarakhand from 0.63 percent to 0.87 percent for the same time period. In Himachal Pradesh and Jammu-Kashmir it has decreased from 0.38 percent to 0.15 percent and from 1.10 percent to 1.67 percent respectively.

Production of a crop directly depends on the area covered by it, quality of seeds used, irrigation facilities, soil fertility, climate etc. If the production of a particular crop increased overtime it means that the climate is suitable for that crop, soil fertility is high and there is a positive effect of fertilizers. The production of almost all the crops in the above discussed states increased (despite decrease in the area). The main reasons for this increase is the use of good quality seeds, use of fertilizers, improved road facilities and demand of agricultural commodities in the nearby markets etc. Dependency on agriculture for employment in the states of Himachal Pradesh, Jammu-Kashmir and Uttarakhand is also a major reason behind the increased production of many crops in these states. More than 70 percent of their population is directly dependent on agriculture for their livelihood.

## 5. Conclusion

These three north-western Himalayan states i.e. Himachal Pradesh, Jammu-Kashmir and Uttarakhand together occupy 10.1 percent (approximately) of total geographical area of the nation, whereas their population size is very small as compared to their area size. These three states together contribute 2.4 percent (approximately) share of the total population of India. Harsh living conditions, physiography, annual disasters etc. contributes to low population percentage in these states.

From the above discussion on the area, production and yield of various crops in these states it is clear that these states have almost similar agricultural scenarios. It has been observed that if the area covered by food grains is decreasing in Himachal Pradesh, it is also decreasing in Jammu-Kashmir and Uttarakhand. In Himachal Pradesh the area under total food grains has decreased from 79.75 percent in 2001 to 77.18 percent in 2015. Similarly during same time period the area under total food grains has decreased in Jammu-Kashmir and Uttarakhand from 79.50 percent to 69.13 percent and

from 82.38 percent to 81.16 percent respectively. Small size of land holdings, less output, low income generation, restriction in the use of modern machinery, limitations of terrace farming, climatic restriction etc. all played a pivotal role leading to a decrease in area under food grains in these states.

However the area under fruits and vegetables has increased in all the three states between 2001 and 2015 from 18.89 percent to 21.95 percent in Himachal Pradesh, 14.47 percent to 26.92 percent in Jammu-Kashmir, 15.86 percent to 16.94 percent in Uttarakhand respectively. Climatic advantage, appropriate size of landholdings, higher income, more profits, more demand of horticultural produce etc. have helped in boosting the area under fruits and vegetables. Similar to food grains the area under oilseeds too decreased in Himachal Pradesh and Jammu-Kashmir from 1.36 percent to 0.87 percent and from 6.03 percent to 3.95 percent respectively between 2001 and 2015. But the case of Uttarakhand is quite different as the area share under oilseeds has increased slightly here from 1.75 percent to 1.89 percent due to the influence of the parent state on its agriculture.

Despite decrease in the area of many crops the productions of almost all the crops (with few exceptions of decrease) has increased during the study period. In Himachal Pradesh the total production increased to 1796.10 thousand tonnes, in Jammu-Kashmir 2154.27 thousand tonnes, and in Uttarakhand 531.76 thousand tonnes. The main reasons for the increase in the production are use of good quality seeds, improved irrigation facilities, government support etc. The production of food grains also increased during the same time span in Himachal Pradesh (412.62 thousand tonnes), Jammu-Kashmir (264.33 thousand tonnes), and in Uttarakhand (164.56 thousand tonnes) also.

The production of total fruits and vegetables has almost doubled in Himachal Pradesh and Jammu-Kashmir between 2001 and 2015. The production of fruits and vegetables has not only doubled but has significantly increased in Uttarakhand too. In Himachal Pradesh the production of total fruits has increased by 369.89 thousand tonnes, in Jammu-Kashmir 1104.66 thousand tonnes and in Uttarakhand 204.24 thousand tonnes between 2001 and 2015. For the same time period the production of vegetables increased to 1016.60 thousand tonnes in Himachal Pradesh, 783.73 thousand tonnes in Jammu-Kashmir and 150.97 thousand tonnes in Uttarakhand. The production of vegetables is more profitable as they have higher yields as compared to fruits. Therefore there is a need to enhance their cultivation in these areas as they have the advantage of climate suitability.

The production of only oilseeds has declined in Himachal Pradesh (-3.02 thousand tonnes), whereas it has increased in the states of Jammu-Kashmir (1.54 thousand

tonnes) and Uttarakhand (11.99 thousand tonnes) both. The change in the practices of cultivation by farmers towards fruits and vegetables has led to the decrease and low production of oilseeds in the states.

In a nutshell it can be said that the agriculture of any area is restricted because of physiography and climate. Therefore to get higher production and earn more income from agriculture, farmers should focus on the crops suitable for their farms keeping in mind the physiography and climate of the area. The farmers of Himachal Pradesh, Jammu-Kashmir and Uttarakhand are trying to follow this by diversifying their agriculture from cereal crops towards fruits and vegetables. From the results it is clear that the farmers in these states are moving from growing traditional food grains towards cash crops i.e. fruits and vegetables to get higher production and earn more profit as these crops are more climate friendly and income generating.

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