

Assessment of Crop Production in Uttarakhand in the Context of Cultivation of Cereals, Pulses, Oilseeds and Sugarcane

Dr. Prakash Vir Singh

Associate Professor, Department of Geography, Tilak Mahavidyalaya, Auraiya-206122, U.P., India
(Affiliated to C.S.J.M. University, Kanpur, INDIA)

Abstract

Uttarakhand is primarily an agricultural state, and agriculture forms the backbone of its economy. The region enjoys a long growing season, allowing crops to be cultivated year-round. The people of the Uttarakhand Himalaya have traditionally relied on agriculture for their livelihood. In this region, two main crop seasons, Rabi and Kharif, are commonly practised. The research study focuses on the cultivation of cereal crops, pulses, oilseeds, and sugarcane. A significant portion of the state's land is used for growing these crops, particularly cereals such as wheat, rice, and maize, along with pulses, oilseeds, and sugarcane. Wheat is the state's main crop, while rice ranks second in production. The purpose of this research paper is to assess crop production in Uttarakhand, specifically focusing on cereals, pulses, oilseeds, and sugarcane, and to determine the intensity of production for these crops.

Keywords: Production, cultivation, infrastructure, yield, commercialisation.

Introduction

Agriculture in Uttarakhand involves two main types of farming: subsistence farming in the hill areas and commercial farming in the plains. However, there is a decrease in both the total area under cultivation and crop productivity. Cereals are the main crops grown, but traditional oilseeds and legumes are becoming less common. Sugarcane grows well in the Tarai region, while pulse and oilseed production varies. The state's agricultural landscape is changing, and there is a need to increase commercial production of traditional crops to ensure sustainable farming and improved food security. Four specific factors are considered to assess the yield per hectare of selected crops. These are -

- Per Hectare Yield of Cereals.
- Per Hectare Yield of Pulses.
- Per Hectare Yield of Oilseeds.
- Per Hectare Yield of Sugarcane.

Per-hectare yield of cereals

While each species has its own peculiarities, the cultivation of all cereal crops is similar.

*Corresponding Author Email: pvs kabirpanthi@yahoo.com

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Wheat and barley are cool-season cereals, whereas rice is a warm-season cereal grown in lowland areas during the frost-free season. Similarly, the productivity and yield of cereals vary by species and variety. The state, on average, produces 14.42 quintals of cereals per hectare. Nearly half of the total districts have production above this average. Productivity varies greatly across the state. All the districts with high and moderate production are found in small groups across the state. Among these six districts, Udham Singh Nagar has high productivity. He scores highest with 26.32 quintals of cereals, followed by Nainital (20.90), Haridwar (18.67), Uttarkashi (16.65), Dehra Dun (16.43) and Tehri Garhwal with 14.93 quintals of cereals per hectare of cultivated area. All these districts are scattered in the western and southern parts of the region. These areas have an assured water supply for irrigation, fertile soils, and other infrastructure required for high cereal productivity (Table 1.1).

Table 1.1

Standard Score Values of per Hectare Yield of Cereals (in quintals) 2004-05

Classes & Z-Score Values	No. of Districts	%	Districts (Z-Scores)
(i) High > 0.00	06	46.15	Udham Singh Nagar (2.38), Nainital (1.30), Haridwar (0.85), Uttarkashi (0.45), Dehra Dun (0.40), Tehri Garhwal (0.10)
(ii) Moderate - -0.75 to 0.00	03	23.08	Chamoli (-0.47), Bageshwar (-0.55), Pauri Garhwal (-0.72)
(iii) Low < - 0.75	04	30.77	Rudraprayag (-0.79), Pithoragarh (-0.86), Almora(-0.88), Champawat (-1.19)

Source: *Uttarakhand, Directorate of Economics & Statistics*

Three districts score in the moderate category of cereal productivity. They have a production range of 12.08 quintals per hectare in Chamoli and 10.83 quintals per hectare in Pauri Garhwal district. They are concentrated mainly in the central parts of the state. The fertile areas of these districts lie in the river basins. But due to limited farming tools, the intensity of cereal production is not high.

Low cereal production per hectare is noted in four districts of Uttarakhand. The category's maximum yield is 10.42 quintals per hectare in Rudraprayag. The other districts are Pithoragarh (10.10), Almora (10.01) and Champawat with a yield of 08.48 quintals per hectare of cultivated area. These districts are mostly located in the central and eastern parts of Uttarakhand. The low productivity is assured due to a shortage of irrigation and low-fertility land in these areas. Traditional cultivation methods and farmers' poor economic conditions have also affected production.

Per-hectare yield of pulses

Pulses are one of the most important crops of Uttarakhand. It includes *arhar*, gram, pea, *urad*, *moong*, *masoor*, etc. These are small beans, almost similar in size and shape to lentils and are eaten in the form of a thick soup called '*dal*', while green provides a high protein element in fodder. In a largely vegetarian population, pulses take a very high place and are the principal source of protein in the diet. They are indeed poor man's meat and are often used in conjunction with other foods rich in starch, for example, rice or wheat.

Pulses are widely grown across the districts of the state in two ways: first, in those districts where rice and other kharif crops are not grown on a large area, pulses are grown as a single crop for certain natural reasons. Secondly, these are grown alongside food grains in both seasons. Their productivity is quite high when they are grown commercially. It is thus gaining importance in the *Tarai* belt of Kumaon and the Garhwal region. The productivity of pulses varies greatly across regions in the state. On average, Uttarakhand yields 6.79 quintals per hectare of pulses. The highest is in Udham Singh Nagar district, with a yield of 10.43 quintals per hectare of cultivated area, and the lowest is in Pauri Garhwal, with 03.61 quintals per hectare.

The south-eastern part of Uttarakhand is much richer in pulse production than the other parts of the state. The high pulse production ratio is attributable to five districts in the state. Among these districts, the highest is Udham Singh Nagar with 10.43 quintals, followed by Haridwar (08.58), Champawat (08.54), Nainital (08.53), and Bageshwar, the lowest, with 08.26 quintals of pulses per hectare of cultivated area. These districts are rich in fertile arable land and a developed irrigation system. These districts specialise in the production of '*urad*', '*masoor*', and pea compared with other pulse varieties (Table 1.2).

Three districts note the moderate production. They have a range from 08.00 quintals in Pithoragarh to 06.15 quintals in Tehri Garhwal district. These districts are in the Sarju-Kali and Bhilangana basins, which have good arable land suitable for cultivation. Thus, '*urad*', '*masoor*' and '*arhar*' are mostly cultivated for both soil enrichment as well as commercialisation.

Table 1.2

Standard Score Values of per Hectare Yield of Pulses (in quintals) 2004-05

Classes & Z-Score Values	No. of Districts	%	Districts (Z-Scores)
(i) High > 0.70	05	38.46	Udham Singh Nagar (1.77), Haridwar (0.87), Champawat (0.85), Nainital (0.84), Bageshwar (0.71)
(ii) Moderate -0.35 to 0.70	03	23.08	Pithoragarh (0.59), Almora (0.17), Tehri Garhwal (-0.31)

(iii) Low < - 0.35	05	38.46	Chamoli (-0.69), Dehra Dun (-0.71), Uttarkashi (-1.03), Rudraprayag (-1.50), Pauri Garhwal (-1.54)
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Source: *Uttarakhand, Directorate of Economics & Statistics*

The five districts in the region have low pulse productivity. Chamoli with 05.35 quintals of pulses reached the highest position of the low category, followed by Dehra Dun (5.32), Uttarkashi (4.67), Rudraprayag (3.71), and Pauri Garhwal with 3.61 quintals, which scored the lowest production of pulses per hectare of cultivated area. These districts are mostly concentrated in the north-western part of the Garhwal division. The farmers of these areas pay much attention to the cultivation of food grains.

Per-hectare yield of oilseeds

Oilseeds form an important part of the state's agricultural economy. It ranks third in importance to food grains and sugarcane. These oilseeds provide vegetable oil, which is produced from a variety of crops, including mustard, rai, rapeseed (sarson), groundnut, and sunflower seeds. These oilseeds are largely cultivated in the state. These are widely used as cooking oil in most districts of the state.

The high category includes five districts of the study area. In this category, Haridwar has the highest productivity, followed by Champawat (10.22), Bageshwar (10.21), Almora (09.89), and Chamoli (09.26) quintals per hectare of cultivated area (Table 1.3). These areas belong to the Ramganga and Alaknanda river basins. Out of which, the Yamuna-Ganga Tract occupies the top position in oilseed cultivation. These regions have plenty of water for irrigation, but farmers here mainly grow mustard, oilseeds, and soybeans, as well as food crops like wheat. They also grow it in a section of their farms, alongside sugarcane. At some places, these oilseeds are grown on some inferior soils. It is also noteworthy that the districts with high productivity in food crops have low productivity in oilseeds. High and moderate-yielding districts dominate the eastern part of Uttarakhand. This part of the state receives more rainfall than the western part.

Table 1.3

Standard Score Values of per Hectare Yield of Oilseeds (in quintals) 2004-05

Classes & Z-Score Values	No. of Districts	%	Districts (Z-Scores)
(i) High > - 0.01	05	38.46	Haridwar (3.11), Champawat (0.31), Bageshwar (0.30), Almora (0.25), Chamoli (0.14),
(ii) Moderate -0.40 to - 0.01	03	23.08	Nainital (-0.04), Pithoragarh (-0.05), Udham Singh Nagar (-0.39)

(iii) Low < - 0.40	05	38.46	Tehri Garhwal (-0.53), Dehra Dun (-0.55), Pauri Garhwal (-0.80), Rudraprayag (-0.90), Uttarkashi (-0.95)
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Source: *Uttarakhand, Directorate of Economics & Statistics*

Groundnut and mustard are mostly cultivated in these areas. The moderate category includes three districts of the region. These districts have a range of production, from 08.70 quintals in Nainital district to 6.26 quintals in Udham Singh Nagar district. These districts are located in the Goriganga basin and Ramganga-Kali Tract of the state.

Low production is observed across five districts of the state, ranging from 05.33 quintals in Tehri Garhwal to 03.09 quintals in Uttarkashi. Here, the low yield of oilseed is due to an inefficient drainage system and farmers' low interest in their production. They prefer to grow food crops first, then consider cultivating oilseeds on inferior land that is not well suited to food crops. The farmers cultivate oilseeds also to fulfil their own domestic requirements. Fluctuations in the market price of oilseeds are also responsible for the state's low production. With the increasing demand for vegetable oils, oilseed farming is also gaining importance and has become an indicator of agro-production development.

Per-hectare yield of sugarcane

Next to oilseed, sugarcane is another leading cash crop of the season. It is mostly cultivated in the Sarju-Kali basin and the Yamuna-Ganga Tract. Sugarcane is an unusual crop in several ways in Uttarakhand's environment. It is a perennial, requires large inputs: labour, water, seeds and fertilisers and produces no appreciable amount of fodder. Harvesting is not necessarily done at the usual time or in the usual manner, and high transportation costs are involved. Finally, it is subject to government control (Singh, G.B. 1979).

The crop demands heavy loam soils with assured supplementary irrigation. Intensive preparatory tillage is essential for a good sugarcane crop. It is sown in early March, before the rabi harvest begins. The planting material consists of sets, whose treatment varies greatly. The common practice, however, is to bury the whole cane in the ground, in late November or early December, until needed. The purpose of burying is to protect the rootstock from frost, which can be very harmful to the buds. At the time of sowing, the sets are taken out from the buried cane. The sets consist of short sections of the stems or tops containing two nodes or joints and buds, usually a foot long. For a good stand, it is necessary to have 40,000 healthy sets per acre. Then these sets are placed by hand in furrows which are normally one foot apart. Thereafter, the furrows are earthed over. As sugarcane is a tropical crop, the *Tarai region of Uttarakhand yields the highest*. It is the main source of sugar. The state fulfils all the geographical requirements for its cultivation. The average yield per hectare of sugarcane production in the state is 1,491.91 quintals. Out of the total district, Udham Singh Nagar and Dehra Dun score the highest, with yields of 6330.40 and 630.00 quintals of sugarcane per hectare, respectively. It is because the availability of a well-drained system, fertile soil, and an assured supply of water by irrigation and rainfall are the root factors. Farmers show strong interest in cultivating this crop due to the high returns from the market compared to other cash crops; also, one of the factors behind its high growth is. The farmers of these areas are developed in the economy,

having large-sized land holdings, presence of sugarcane mills in sugarcane farms, high accessibility of roads, mechanisation of agriculture, especially the increasing use of tractors and the cash payment of their production by the mills and good banking facilities.

The moderate category comprises two districts, with the highest being Nainital at 633.04 quintals of sugarcane per hectare of cultivated area, followed by Haridwar at 529.73 quintals per hectare (Table 1.4). These districts mostly lie in the *Tarai* and Yamuna-Ganga Tracts. Here, canals and stream irrigation have encouraged the cultivation of this crop. More than half of the sugar mills are situated in these areas and have good road access, with strong linkages between mills and farms. Here, block development authorities also provide incentives for the distillery industry and have supplied molasses and ethanol as raw materials.

Table 1.4

Standard Score Values of per Hectare Yield of Sugarcane (in quintals): 2004-05

Classes & Z-Score Values	No. of Districts	%	Districts (Z-Scores)
(i) High > - 0.40	02	15.38	Udham Singh Nagar (2.23), Dehra Dun (-0.39)
(ii) Moderate -0.45 to - 0.40	02	15.38	Nainital (-0.40), Haridwar (-0.44)
(iii) Low < - 0.45	02	15.38	Pithoragarh (-0.47), Champawat (-0.53)
Negligible	07	53.86	Uttarkashi, Chamoli, Rudraprayag, Tehri Garhwal, Pauri Garhwal, Bageshwar, Almora

Source: *Uttarakhand, Directorate of Economics & Statistics*

The low category of sugarcane production is found only in two districts. Pithoragarh has a production of 478.33 quintals per hectare, and Champawat has 350.00 quintals per hectare of cultivated area. This zone is located near the moderate growing districts. These districts receive sufficient rainfall and have adequate irrigation facilities, yet they still don't achieve high sugarcane yields. The farmers of these districts mostly prefer to grow wheat, rice, *madua*, barley, *sava*, maize and potato. Along with this, the small size of land holdings has also affected the development of sugarcane production in this region. Besides, seven districts in the region fall under the negligible category. The negligible productivity in these areas is due to low farmer interest, as they prefer to grow food crops. Geographical factors are also responsible for negligible productivity.

Conclusion

Ultimately, the high-yielding sugarcane districts show farmers' interest in its cultivation as this

crop provides two elements of the human diet, i.e. sugarcane and iron, neither of which is obtained in appreciable amounts by any other means. Only a few of the above-discussed districts possess sugarcane crop production, while the remaining districts largely represent unsuitable land for its cultivation. Unlike cereals, it does not attain the status of a first-ranking crop anywhere in the region except the Dehra Dun district and other small patches of the Yamuna-Ganga Tract.

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