

Agricultural Production and Crop Diversification in Poonch District: A block level analysis

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Abstract: Agriculture is a critical sector of the Indian economy and it forms the backbone of the economic development of the country. Increasing the productive capacity of agriculture through higher productivity has been an important goal in developing countries like India. Since this sector faces the largest brunt of underemployment, unemployment and poverty, a growing agriculture and allied sector is expected to contribute vastly to overall growth and poverty alleviation. Due to increasing demands of rapidly growing population, diversification becomes necessary in most of the countries of the world. Growing cereals alone cannot support economic development and to ensure food security to the people diversification becomes necessary. The present study throws light on the extent and nature of crop diversification. The results of the study would provide the needed information for the policy makers to suggest suitable price policy measures which will help to diversify allocation of area under different crops depending on the prevailing domestic demand in the country and the export potential of the crops. How farmers can enhance their income by not depending on single crop as crop diversification itself provides better conditions for food security and enables farmers to grow surplus products for sale at market and to increase crop variety so that farmers are not dependent on a single crop to generate their income. The study also may guide the Government to take suitable steps to diversify the cropping pattern which will be oriented towards employment generation, income growth, poverty alleviation, etc., so as to achieve the developmental goals.

Keywords: Agriculture, Crop Diversification, Food crops, crop productivity.

1. Introduction

Agriculture is an important sector of Indian economy as it contributes about 17% to the total GDP and provides employment to over 60% of the population. Indian agriculture has registered impressive growth over last few decades. The food grain production has increased from 51 million tonnes (MT) in 1950-51 to 250 MT during 2011-12 highest ever since Independence. The production of oilseeds has also increased from 5 million tonnes to 28 million tonnes during the same period. The rapid growth has helped Indian agriculture mark its

presence at the global level. India stands among top three in terms of production of various agricultural commodities like paddy, wheat, pulses, groundnut, rapeseeds, fruits, vegetables, sugarcane, tea, Jute, cotton, tobacco leaves, etc. (Government of India, 2008-09).

Agriculture includes rising of crops from the land, animal, husbandry, agro forestry and pisciculture. India is pre-eminently and agricultural country. Agriculture has been characterized in India since immortal. It plays a vital role in the economy of India. Most of the industries also depend upon the agriculture sector for their raw materials. Sugarcane, cotton, jute and oil seeds are some of the outstanding agricultural raw materials used in industries. The prosperity of industrial sector largely depends upon the agriculture prospect. There is a great need to increase agricultural production so that sufficient exportable surplus commodities are available after meeting our domestic requirements. Agriculture furnishes the central scenario of Indian economy. In fact prosperity of the entire nation depends upon the prosperity of agriculture.

Crop diversification means growing more than one crop in an area. Diversification can be accomplished by adding a new crop species or different variety, or by changing the cropping system currently in use. Crop diversification provides better conditions for food security and

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enables farmers to grow surplus products for sale at market and thus help to obtain increased income to meet other needs related to household well-being. The aim of crop diversification is to increase crop variety so that farmers are not dependent on a single crop to generate their income.

Introducing varieties of crops and seeds also leads to increase in natural biodiversity, strengthening the ability of the agro-ecosystem to correspond to these stresses, reducing the risk of total crop failure and also providing producers with alternative means of generating income. Crop diversification improves the livelihood of farmers. The major driving forces for crop diversification are balancing food demand, withstanding price fluctuation, conservation of natural resources, minimizing environmental pollution, increasing income on small farm holdings.

The crop diversification in India is generally viewed as a shift from traditionally grown less remunerative crops to more remunerative crops. It is intended to provide a wider choice in the production of a variety of crops in a given area so as to expand production related activities on various crops and also to lessen the risk (Bhattacharyya, 2008).

An analysis was done on the report of International Centre for Integrated Mountain Development (ICIMOD) and identified that sericulture, dairy production (fresh milk), vegetable farming, fruit production, poultry and pig rearing as the major off-farm employment (Khatri, 1992).

The impacts of agricultural commercialization on income, nutrition were checked and derived on conclusion that the gender of the head of the households can also influence diversification decisions because of trade-off in labour allocation by women between household chores and high-value crops (Braun, 1995).

An attempt was made to compare two programs of Thailand and Kenya, noticed that at LNO (Lam Nam Oon Irrigation Project) farmers were very reluctant to take up the cultivation of winter crops as long as it meant having to put their current subsistence incomes at risk. But protection from downside risk, offered in this case by the private, together with great increases in maximum possible incomes

brought a great surge in off-season cultivation (Benziger, 1996). The situation of food security in Hindu Kush Himalaya was studied and observed that accessibility of the mountain areas to final markets is a common theme underlying all success stories of crop diversification, especially towards vegetable crops, in the entire Hindu Kush Himalayas region (Nagpal, 1999).

Fourteen major social, economic, technological, political and environmental sustainability-related dimensions of sustainable agriculture were defined. Success in promoting sustainable agriculture can be achieved on seven fronts, viz. Crop diversification, Genetic diversity, Integrated nutrient management (INM), Integrated pest management (IPM), Sustainable water management, Postharvest technology and Sound extension programmes (Swaminathan, 1993).

Agricultural intensification increased crop productivity but simplified production with lower diversity of cropping systems, higher genetic uniformity, and a higher uniformity of agricultural landscapes. Associated detrimental effects on the environment and biodiversity as well as the resilience and adaptability of cropping systems to climate change are of growing concern. Crop diversification may stabilize productivity of cropping systems and reduce negative environmental impacts and loss of biodiversity (Hufnagel et al, 2020)

Crop diversification improves technical efficiency and reduces income variability in Northern Ghana. Crop diversification has been shown to help mitigate climate change effects for farmers. The results show evidence against a 'tradeoff' between technical efficiency and income stability for farmers in Northern Ghana. We find that crop diversification significantly improves efficiency and reduces income variability in Northern Ghana, so farmers do not have to give up efficiency for income stability or vice versa. This suggests that crop diversification could be an ideal Climate Smart Agricultural (CSA) strategy for promoting agricultural growth and resilience in Northern Ghana (Agness, 2013).

2. The Study Area (Figure 1)

Poonch is one of the oldest districts of Jammu and Kashmir State, which came into

existence before the partition of the country in 1947. The district covers an area of 1,674 sq km. It further includes 6 Tehsil (Haveli Tehsil, Mandi Tehsil, Mendhar Tehsil, Surankote Tehsil, Mankote Tehsil, Balakote Tehsil) and 11 Blocks (Balakote, Bufliaz, Lassana, Loran, Mandi, Mankote, Mendhar, Nangali Sahib, Poonch, Sathra, Surankote). There are 228 gram panchayats in district Poonch with two municipalities.

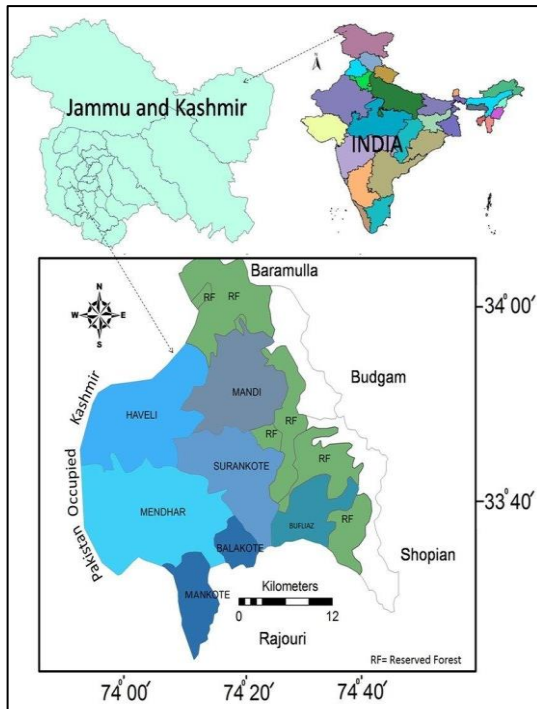


Figure 1: Location map of the study area

Location and Extent: Poonch district is located at atlas 33°25'N 34°01'E latitude and 73°58'N to 74°35'E longitude. It has an average elevation of 981 metres. Pir Panjal range of mountains separate Poonch valley from the Kashmir valley. It consist of four tehsils Haveli, Mendhar, Surankot and Mandi. Poonch district is popularly known as mini kashmir and is among the remote district of J&K.

Physiography: Poonch is primarily a hilly district with altitudes ranges from 1007m near Punch town to 4700m above mean sea level on high hill ranges towards north eastern part of the district. The entire district is traversed by the Siwalik hill ranges and the Pir Panjal range. The outer most Siwalik hill range exhibits a rugged and restive topography. The Pir Panjal ranges remain covered by snow.

Climate: The climate of the district is sub-tropical in the southern part and tends to be temperate on the northern part comprising hill

tops. In the higher region, the climate remains cold throughout the year. Average minimum and maximum temperature in the district varies from -20° to 38°C. The temperature starts rising from third week of March and reaches maximum during the month of May. January is the coldest month. The district receives precipitation in the form of rainfall, mainly during the monsoon period from July to September.

Soil: Soil found in poonch is loamy with little clayey soil and contain small quantity of lime with high content of magnesium. Colour of the soil is dark-brown and varies from dry loams to silt loams with gravels in a small percentage.

3. Objective

The main objective of the present study is to know the agricultural production of major food crops and study the block wise Crop Diversification in the Poonch district.

4. Methodology

The present study is purely based on secondary data. The study is directed at the block level. The data of area of different food crops, their productivity in different seasons, is taken from the Agriculture Department of Poonch District. Only three food crops have been included in the study i.e., Wheat, Maize and Paddy. Besides, composite index is calculated using Bhatia's method to study the agricultural productivity of Poonch District.

5. Results and Discussions

Area under Wheat: In poonch district around 39% wheat is cultivated under improve technology it covers an area of 32700 hectares in 2020-21. There are significant variations in its productivity across the blocks; however it varies from 35% in Nangali sahib to 14% in Mankote where as there is 24% productivity in Loran and 19% productivity in Surankote.

Area under Maize: In the Poonch district around 61% area comes under the cultivation of Maize as it is the most suitable crop under the influence of various physical factors like water supply, topography, climate, etc; that area supports its production. Around 1,53,207 hectares comes under the production of maize whereas 44,560 hectares area of Sathra comes under its production and 56,110 hectares area

of Loran and 1,18,633 hectares area of Lassana come under its production.

Area under Rice: About 30% of the area of Poonch District comes under the cultivation of Paddy which is the least among all the two crops that are Wheat and Maize. As production of paddy required lots of water as well as suitable soil (fertile soil) but the area of Poonch doesn't stand the suitable conditions required for its production.

Vegetables and Fruits: Horticulture is considered a potential labour intensive sector which provides raw material for various processing industries. The climate of the District varies from subtropical to temperate. In Poonch district, horticulture department covers 38% of total area. Therefore, the district has the potential to produce a range of fruit varying from subtropical fruits like Citrus, Guava, Anar etc to temperate fruit like apple, Pear, Plum, Apricot, Walnut due to warm temperate climate and extremes of both temperate and subtropical climates. In district Poonch there is huge potential for Peanuts cultivation as well. Vegetables and fruits can be grown under a wide range of climatic conditions. Important vegetables grown in the district includes tomato, ladyfinger, brinjal, plum, Apple etc.

In the pattern of crop diversification of the Poonch district, we can see apple, plum, and walnut as the main fruit crops grown in cool places like Loran, and Mandi. We can see in 2020-21 there is 2,177 hectares under Apple with 2,025 productions whereas in 2021-2022 we can see the increase in the area of apple that is 2485 hectares with decreasing production that is 2021 and the main reason for the such decline is the climatic conditions the changing climate and if we take the example of plum then we can see the area under plum is 1431 hectares in 2020-21 and production is 1795 whereas in 2021-22 the area under plum is 1451 hectares and the production is 1804.

Pattern of land holdings in Poonch District: An operational holding of agricultural land in Poonch District is defined as "all land, which is used wholly or partly for agricultural production and is operated as one technical unit by one person alone or others. The concept of agricultural land holdings does not include those holding which are not operating any agricultural land and also the land Holdings which are exclusively for livestock, fishing,

Table 1: Area/ Production of Fruit crops of 2020-21 and 2021-2022

Kind (Main Crop)	2020-21		2021-22	
	Area (Ha)	Production (MT)	Area (Ha)	Production (MT)
Apple (Delicious)	2177	2025	2485	2021
Apple (High density)	16	8	1273	8
Pear	1794	4850	1841	4715
Plum	1431	1795	1451	1804
Apricot	719	806	755	838
Peach	621	600	631	645
Citrus	413	654	434	674
Olive	13	0.08	13	0.08
Other fresh	2198	1725	2248	1801
Total fresh	9382	12463.08	11131	12506.08
Pecan-nut	214	12	285	13
Walnut	7104	13490	7185	13505
Total dry	7318	13502	7470	13518
G.Total	16700	25965.08	18601	26099.08

Source: Agriculture Department of Poonch District

poultry, etc. The operational land holding in Poonch District is classified under five categories based on the operated area under the farmers, as shown in the table 2. Based on these marginal holdings in Indian agriculture, changes in the area and the number of operational holdings by different size groups have been analyzed by adopting the data from the Agriculture census from 2011.

Table 2: Types of land holding in Poonch District

S.No.	Category of Holding	Operated Area
1.	Marginal Farmers	Below 1.00 hectares
2.	Small Farmers	1.00 - 2.00 hectares
3.	Semi-Medium Farmers	2.00 - 4.00 hectares
4.	Medium Farmers	4.00 - 10.00 hectares
5.	Large Farmers	Above 10.00 hectares

Source: Agriculture Department, Poonch, 2011

Table 3 represents the Production of major food crops in the Poonch district from 2015-16 and 2020-21. By observing the data we realize that in 2015-16 the production of wheat was 35,700.00 whereas in 2020-21 the production of wheat was 32,700.00 which in some extent decline and the main reason for the decline of such production is climatic variation, uncertain monsoon, topography, the decline in soil

Table 3: Comparative analysis of production of major food crops (2015-16 and 2020-21)

CROP	Production of major food crops in the Year 2015-16 (MT)	Production of major food crops in the Year 2020-21 (MT)
Wheat	35700.00	32700.00
Maize	80640.00	96419.00
Paddy	13307.00	11373.03

Source: Agriculture Department of Poonch District, year 2015-16 and 2020-21

fertility. The same is with the case of paddy the production of food crops in the year 2015-16 is 1,3307.00 whereas in 2020-21 it is 11,373.03, and the main reason for such variation are inadequate irrigation facilities, and lack of monsoon. But the production of maize in the year 2015-16 was 80,640.00 whereas in 2020-21 it was 96,419, maize is a widely used cereal grain in Poonch. Maize seeds are recognized for producing high yields and high-quality maize for our valued clients.

Productivity of Major Food Crops of Poonch district is shown in table 4. If we look into the production of paddy, wheat and maize, it can be made out that there is a lot of variation in the production of paddy in the year 2015-16 and 2020-21. Paddy cultivation requires sunshine, an adequate amount of irrigation, and

temperatures between 20°C-40°C and sometimes up to 42°C. As such, variation in paddy production could be attributed due to unfavorable climatic conditions.

On the other hand, wheat requires cool, moist weather, and heavy rainfall area, a warm climate is not suited for it. But the production of maize increased with time as we can see in 2015-16 the production of maize was 80,640.0 whereas in 2020-21 the production extended to 96,419.00, and the maximum temperature for maize farming is 30°C - 35°C. Maize is a warm-season crop and is cold intolerant.

Table 4: Productivity of major crops in Poonch District

Paddy Production			
Year	Area (ha)	Production (mT)	Yield (qtls)
2015-16	3,620	13,307.00	36.76
2020-21	3,210	11,373.03	35.43
Wheat Production			
Year	Area (ha)	Production (mT)	Yield (qtls)
2015-16	15,000	35,700	23.80
2020-21	15,000	32,700	22.50
Maize Production			
Year	Area (ha)	Production (mT)	Yield (qtls)
2015-16	24,000	80,640	33.60
2020-21	24,410	96,419	40.17

Source: Agriculture Department of Poonch District

Table 5: Computations for working out the composite Index of Agricultural Productivity using Bhatia's Method (2021-22)

S.No	Block	Paddy		Maize		Wheat			$\Sigma CI = \Sigma YC / \Sigma C \times 100$
		Y	C	Y	C	Y	C	ΣYC	
1	Poonch	56.25	877	49.63	3876	30.94	3070	1,070,342.86	13,682
2	Nangali Sahib	51.30	400	27.85	1880	35.6	1100	3,87,855	11,475
3	Sathra	48.70	181	50.85	782	26.1	520	1,86,338.95	12,565
4	Mandi	0	40	41.35	1411	24.65	630	1,37,346	6,600
5	Loran	0	0	62	905	0	100	7,105	706.96
6	Lassana	33.11	250	50.85	2333	19.56	1400	4,12,320.16	10,352
7	Surankote	33.00	492	57.85	2072	23.6	1430	4,57,113.3	11,445
8	Buffliaz	0	210	54.08	1624	14.5	520	1,62,437.32	6,858
9	Mankote	28.00	272	17.8	2418	19.22	1400	2,65,931.8	6,502
10	Mendhar	12.38	357	37.21	4693	23.54	3150	5,99,666	7,313
11	Balakote	24.48	131	30.76	2416	22.78	1680	3,29,790.54	7,802

Y = Productivity, ΣY = Mean value of Y; C = Cropped Area, ΣC = Mean value of C
Source: Agriculture Department of Poonch District

Composite Index of Agricultural Productivity using Bhatia's Method (2021-22): Table 5

represents agricultural productivity for the year 2021-22 using the Bhatia's method which

further includes eleven blocks of Poonch district i.e., Poonch, Nangali sahib, Lassana, Loran, Sathra, Mandi, Surankote, Buffliaz, Mankote, Mendhar and Balakote. It can be clearly seen that Poonch is having high productivity using Bhatia's method i.e., 13,682 and the reason behind it is the awareness among the people about the usage of high yield variety of seeds, insecticides, pesticides, good connectivity whereas Sathra holds 12,565 productivity and Nangali sahib (11,475), Surankote (11,445), Lassana (10,352), Mandi (6600), Mankote (6502) and Loran is an area having least productivity i.e., 706.96 due to less awareness among people about the usage of fertilizers, lack of connectivity.

Table 6 represents the computations for working out the composite index of agricultural productivity using Bhatia's method where Y stands for productivity, C stands for cropped area and CI stands for composite index. Figure 2 shows the block wise composite index of agricultural productivity shows the area of high production of maize, wheat and rice which is between 20-26 denoted by brown color including the areas of Mandi, Loran, Buffliaz, Mankote, Mendhar and Balakote whereas Nangali sahib, Lassana and Surankote area come under medium agricultural productivity zone and it is between 11-20 having blue color and the area of low productivity includes Poonch, Sathra between 0-11 denoted by green color.

Table 6: COMPOSITE INDEX: Block-wise Agriculture Productivity of the year (2021-22)

S.No	Block	Maize Production	Wheat Production	Rice Production	R-1 (maize Production)	R-2 (wheat production)	R-3 (Rice Production)	Total
1	Poonch	49.63	30.94	56.25	6	2	1	9
2	Nangali Sahib	27.85	35.6	51.30	10	1	2	13
3	Sathra	50.85	26.1	48.70	4	3	3	10
4	Mandi	41.35	24.65	0	7	4	9	20
5	Loran	62.00	0	0	1	11	10	22
6	Lassana	50.85	19.56	33.10	5	8	4	17
7	Surankote	57.85	23.6	33.00	2	5	5	12
8	Buffliaz	54.08	14.5	0	3	10	11	24
9	Mankote	17.08	19.22	28.00	11	9	6	26
10	Mendhar	37.21	23.54	12.38	8	6	8	22
11	Balakote	30.76	22.78	24.48	9	7	7	23

Source: Agriculture Department of Poonch District

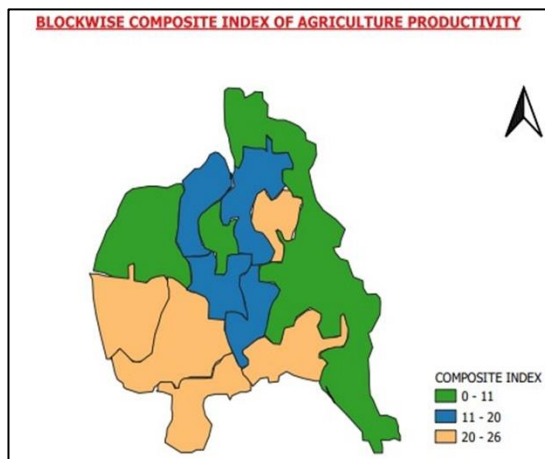


Figure 2: Block wise composite index of Agricultural Productivity

6. Conclusion:

Given the foregoing, we had chosen the district of Poonch which is one of the 22 districts of Jammu and Kashmir State. The district of Poonch is characterized by diverse

terrain, climatic conditions, vegetation, and socio-economic landscape. Our principle objective is to study the distribution of crop area under the crop diversification concept at the block level.

Our major findings are summarized as follows:

- i. By analyzing major food crops in Poonch District we concluded that Maize is a major food crop of Poonch District covers an area of 24,410 hectares with the production of 96,419.00 in the year 2020-21 and 1,05,109.00 in the year 2021-2022. Maize is the most suitable crop in Poonch District under the influence of climatic factors.
- ii. Wheat is having 15,000 hectares area under which 32,700.00 production in the year 2020-21 and in 2015-16 it was 35,700.
- iii. The cultivation of paddy varies in terms of its area as well as product that is in 2015-16 the area under paddy was 3,620

- hectares but with time in 2020-21 we can see a reduction in its area that is 3,210 the main causes for the reduction of an area are population pressure, Agriculture land convert into residential buildings, roads, etc the production of paddy in the year 2015-16 was 13,307.00 but in 2020-21 it decline to 11,373.00 and the decrease in its production is mainly due to climatic changes which further includes late or advanced monsoon, depletion of soil fertility, soil erosion, desertification.
- iv. The main aim of crop diversification is to increase crop variety so that farmers are not dependent on a single crop to generate their income. Crop diversification ensures food security. It minimizes the chance of crop failure. It enables the farmers to grow surplus products for sale at the market and thus obtain increased income to meet other needs. We can analyze that Poonch District is the area having maize as the main crop and the production of paddy is high in Poonch that is 56.25 whereas Surankote is the area having high productivity of Maize that is 57.85 and in case of wheat, the area of Nangali sahib is having high production that is 35.6.
- v. Maize is a major crop in Poonch District. The area under Maize cultivation is approximately 24,410 hectares whereas Loran is the area with high production of Maize which is 62.00 hectares and Surankote is in second place with 57.85 production and Mankote stands in the third position which is 17.05.
- vi. The area under paddy cultivation is 3,210 hectares with Poonch as its higher Production zone which is 56.25 and Nangali sahib comes under the second position which is 51.30 and Sathra is in the third position which is 48.70 respectively. Most of the area of Buffliaz like Chandimarh, Behramgala beside Mandi Sawjian is under mono cropping pattern. In general, Farmers are mostly economically backward. Cultivable waste land still occupies large area in the district.
- vii. Wheat covers an area of 15,000 hectares in which Nangali Sahib is a region having high production which is 35.6 and Poonch stands in the second position which is 30.94 and Sathra is in the third position which is approximately 26.1.

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