

# How Agricultural Productivity is Affected in Meerut Region

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## Abstract

Our country is undergoing various issues related to the national food security and environmental sustainability. The Western part of the UP state has registered very high agricultural growth while the 2<sup>nd</sup> wave of 'Green Revolution'. The fast urbanization and developmental processes are increasingly posing various conflicts with the agriculture. This research explores various factors which affect the agricultural productivity trends in Meerut district of western UP. The affecting factors include geographical, social, economic as well as political factors. The geographical factors imbibe climate, relief topography and underground water which also impact the agricultural productivity. The micronutrients already present in the Meerut district soil affects the agriculture productivity. Social factors i.e. agriculture system, holding size and Zamindari system has also affected the agriculture productivity. The research presented in this work indicates how the economic factors like transport means and large estate ownerships affect the productivity. Political and administrative factors also impact the agriculture at various levels i.e. local, regional, national and international. It is argued that augmenting the agriculture production via various factors assessment like social, economic, political to increase the food security and system sustainability.

**Keywords:** Social, Economic, Political, relief topography, agricultural productivity

## 1. Introduction

Uttar Pradesh is the most populated state of India. It constitutes about 16 % population and 7.3 % of the geographical area of the country [1]. It is the 2<sup>nd</sup> largest state-economy and contributes about 8 % to country's gross domestic product [2]. The economy is predominantly agriculture covering a sizeable part of the highly fertile Upper Gangetic Plain. About 79 % population lives in the rural areas and 62 % of the total workers are employed in agriculture [3]. The state is known for its wide diversity and variations in natural resources, climate, soil, topography and institutional and socioeconomic conditions across its regions. Over the years, these have led to uneven performance of the agricultural sector and disparities in the rural and economic development across regions. These regional disparities and inequities have been the major policy concerns of the decision-makers. The agricultural productivity growth is considered an important strategy for rural poverty reduction in the developing countries [4]. Inclusive market-oriented agricultural growth can contribute to higher income for farm families, creation of rural non-farm employment, higher wages and thereby reduced poverty. Harnessing new income and employment opportunities for small farms from production of high value crops and livestock products and food processing and value addition may lead to a pathway of rural poverty reduction. Enabling

conditions may be created for greater participation and higher net share of small producers in the entire food value chain and additional income from non-farm activities. Linkages between agricultural production and consumption demand for rural goods and services and rural non-farm employment may help in enhancing farm income and investment, reduce dependence of labor force on agriculture and in turn, pathways to reduce poverty [5]. This research focuses on the factors that affect the agricultural productivity of the Meerut Region. The factors include geographical, social, economic and political.

## 2. Methods

The proposed research is supported by primary and secondary data collection where the primary data has been gathered by the questionnaire and secondary data related to agriculture-based industries has been gathered via statistical magazines of government.

### Factors Affecting Productivity

**Geographical Factors:** The influence of physical factors affect agricultural forms. Due to natural and physical factors, similarity and diversity are seen in the condition of agriculture in different agricultural regions [6]. In large regions, the influence of physical environment is more on the elements displaying agricultural characteristics, whereas in small regions, the influence of cultural environment is more. Among the factors affecting agriculture in the study area (district Meerut), climate, relief topography and underground water are the main ones which have a direct impact on agricultural productivity [7-9]. Climate has the main place among natural factors. Different types of crops are grown in different climates. The effect of temperature and humidity on agricultural productivity is important. Different types of climates are required for sowing and harvesting of crops. There is a considerable difference in the time of sowing and harvesting of crops in the areas of high and middle latitudes. In agriculture, factors like temperature, sunlight, rainfall, availability of moisture in soil, frost, hail, snow fall etc. affect the climatic conditions [10]. Temperature is required for sowing and growth of seeds. Temperature of 60 to 75 Fahrenheit is useful for the growth of crops. Due to lack of proper temperature, the growth of the plant gets affected. Growing crops is a difficult task in sunny areas where there are clouds for a long time. Proper sunlight is necessary for the growth of the plant. Through sunlight, plants carry out synthesis processes due to which plants grow. Through this process, greening of leaves occurs in plants. Moisture in the soil is very important for the growth of crops. Plants obtain moisture in two ways – first from the soil and second through rain. Most of the moisture needed for plant growth is obtained directly and indirectly through rainfall. Water harvesting crops are grown in areas where there is more rainfall. Rice and sugarcane are produced in areas with annual rainfall of 100 cm. Maize and wheat are cultivated from 50 to 100 cm. Jowar and millet are cultivated in areas with less than 25 to 50 cm rainfall and there is lack of agriculture in areas with less than 25 cm rainfall.

Soil is a factor which is the foundation of agriculture. It is impossible to grow crops without fertile soil. Depending on the properties, different crops are grown in different types of soils. The colors of soil symbolize the characteristics of soil. On the basis of color, soil is black, red, yellow, light brown and clay etc. Soil is formed based on the properties of rocks. Depending on the characteristics of the soil, black soil has more capacity to absorb moisture and this soil is so fertile that agriculture can be done even without adding fertilizer. After black soil comes the soil brought by rivers. This soil is formed every year. Minerals and fertile substances are available in the soil brought by rivers and produce good crops. Rivers like Ganga and Brahmaputra in India and Yangtze River in China spread the soil carried by the rivers during the rainy

season. Which is more useful for agriculture. These soils provide intensive nutrition. Grain clay is less fertile than these soils. Nutrient-rich red and ramer soils are found in the southern part of India. This is the reason why coarse grains are cultivated in these areas. Crop productivity is affected due to various types of problems in the soil. The fertility of the soil can also be measured on the basis of pH value. If the pH value of the soil is low then the amount of salinity is high which is not useful for crop production. If the pH value of the soil is high then the amount of alkali in the soil is high as a result of which the crop gets destroyed. Which is opposite to alkaline and salinity crop production.

**Social Factors:**

The production of crops in a region is affected by the political and social conditions of that region. In the region where demand for agricultural commodities is high, the production of those commodities is especially high[11]. Along with continuous changes in political, economic and social structure, there is change in agricultural production. The boundaries and characteristics of an agricultural region are changeable. Humans do agricultural work (crop production) influenced by various human and historical factors. Social factors are divided into three categories i.e. System of agriculture, Size of holding and Zamindari system or owner of the land[12].

**System of agriculture and social characteristics of the farmer:** On the basis of agriculture, the method and system of subsistence style of the farmer is studied. There is a special kind of internal relationship between agriculture and social characteristics. In the countries of Africa and monsoon Asia, food crops are produced on small-sized farms to meet their local needs. In countries like Canada, Australia and New Zealand etc., crops are produced in the field of commercial agriculture. This type of agriculture is called commercial agriculture. Commercial agriculture reflects a developed economy while subsistence method reflects a developed economy. There is a difference between subsistence agriculture and commercial farming system on the basis of social perspective. At present, it is essential to observe the cultural level, contact area, education and adoption. The farmer's perspective and ability to adopt is low. For this reason, their economic level is also low. In the field of labor education, the less educated and supportive sector is limited, on the other hand, in commercial agriculture, the farmer's outlook is broader and the capacity for adoption is greater. The contact area of commercial agriculture is large.

**Size of holding:** The use of technology within the economy is of very low level. To use scientific technology, the size of the land holding must be large. Due to increase in the size of land holding, per capita land does not increase and the problem of unemployment increases. In fact, there is no need of heavy machines in these agricultural areas so that labor can be saved, on the other hand, factors that increase production such as improved seeds, use of fertilizers, irrigation and use of crops are less related to the size of land holding and income. exceeds the level. These can be used in all types of small and big agricultural fields. Farmers in large agricultural areas and medium agricultural areas get capital easily and quickly adopt the factors of agricultural development. If collective arrangements for trade, processing and security can be made, then even small-scale farmers can produce these crops. In most of the countries, the main problem is to determine the limits of the size of the agricultural area and to create larger agricultural areas by combining small and scattered pieces. These are addressed through consolidation or land reform. The policy to improve the condition of agriculture in India started after independence. Its main objectives were abolition of zamindari system, simplification of land rights, that is, determination of upper limit, distribution of land, ban on land division and consolidation and cooperative farming system.

**Landowner and lease:** Land owner means some kind of land agreement through which the farmer obtains agricultural land. Land tenure affects people in many ways i.e., Time period of land lease, Cost period, Resources available to the farmer for agricultural development, Cost of animals and land, Expansion of agricultural area by new purchase or sale of agricultural land etc.

**Economic Factors:** Agriculture sector is the backbone of Indian economy. The agriculture sector provides employment to almost half of India's population and contributes about 15 percent to India's GDP. The agricultural sector also provides primary production for secondary industries. At present the agriculture sector is going through many problems. Problems related to sustainable agriculture due to lack of irrigation facilities, dependence on monsoon, reduction in income, problem of marginal land holding, unavailability of market, lack of technique and technology, climate change and use of chemical fertilizers can be seen in the Indian agricultural sector.

**Political Factors:** Political and administrative factors impact agriculture at all levels, local, regional, national and international. In-depth studies have been done regarding consolidation plans in Europe and India. In this way, plans have an impact at the national and regional level. According to Mr. Stamp, Britain's land use reform is related to the policy of self-reliance adopted by the government. The administration operates agriculture in different forms due to the following reasons:

- Agriculture is directly related to land and government control over land owner, size of land holding and cultural characteristics is necessary.
- Agriculture is a small business. In this business, the farmer gets joint money like a big industry and the farmer has to face problems in getting the price to sell his produce.
- Agriculture is a business in which the availability of capital is difficult even with improving economic conditions.
- Prices of agricultural production are variable and administrative protection is necessary due to other characteristics.

### 3. Tabulation Analysis

The following statistical analysis shows how various factors like geographical, political, economic and social affect agriculture productivity:

**Table1: The agricultural productivity difference per hectare 2001-2021**

Sr.No	Crop	Year 2001	Year 2011	Year 2021	Difference in agricultural productivity per hectare 2001 & 2021
1	Wheat	38.64	36.67	45.57	6.93
2	Barley	26.02	34.76	40.00	13.8
3	Sorghum	7.70	0.00	0.0	7.70
4	Pearl millet	15.08	19.47	10.0	15.08
5	Maize	12.53	17.74	21.79	9.26
6	Urad	4.54	4.19	11.69	7.15
7	Green Gram	3.12	6.89	8.47	5.35
8	Red Lentil	3.18	8.13	9.78	2.6
9	Gram	9.69	8.26	12.106	2.37
10	Pea	18.08	13.02	16.45	1.63
11	Pigeon Pea	7.73	8.15	8.9	1.17
12	Mustard	11.08	13.24	14.28	3.2
13	Rice	24.83	25.59	29.23	4.4
14	Sugarcane	568.84	656.12	910.104	34.2
15	Potato	298.62	233.45	345.00	46.38

The Table 1 given below indicates that between 2001 to 2021, there has been negative growth in three crops, jowar 7.70 kg per hectare, millet 15.08 kg per hectare and pea 1.63 kg per hectare. In the year 2001, the productivity of millet was 15.08 cu/ha, sorghum 7.70 cu and pea 18.08 cu/ha. The productivity of these crops in the year 2011 and 2021 is millet 19.47 cu 0/ha and pea 13.02 and in 2021 there has been no change in the productivity under the crop. Whereas in 2021, there has been no change in the crop productivity of millet crop also. In the study area in the year 2001, wheat was 38.64 cu/ha, barley 26.02 cu/ha, maize 12.53 cu/ha, urad 4.54 cu/ha, moong 3.12 cu/ha, lentil 3.18, gram 9.69 cu/ha, pigeon pea 7.13 cu/ha., mustard was 11.08 kg/ha, rice was 24.83 kg/ha, sugarcane was 568.84 kg/ha and potato were 298.62 kg/ha. In the year 2011, crop productivity was respectively wheat 36.67 kg/ha, barley 34.76 kg/ha.

In the table 2 size of land holding and number of farmers have been depicted.

**Table 2. Size of Land holding and number of farmers in Meerut district**

<b>Land holdings and the number of farmers</b>					
<b>Category</b>	<b>size of land</b>	<b>2001</b>	<b>2011</b>	<b>2001</b>	<b>2021</b>
Very low category	0-5 h. & 1-00 h.	58053	98868	93577	8524
Low category	0-00-5 h. & 1-00 h.	36780	49543	40115	3335
Middle category	1-00 h. & 2-00 h.	39280	34988	35265	-4015
Under the upper category	2-02 h. & 4-00 h.	20191	18947	18695	-1496
Upper category	more than 4-00	622	6158	5861	5244

#### 4. Conclusions

It can be seen clearly that the agricultural productivity has got a sharp increase between 2001 and 2021 due to various factors like geographical, political, social and economic factors which has also affected the livelihood of farmers. The poverty of this region has declined due to increase in the productivity of grain crops. The agro economic factors has created change in agricultural patterns like the production of crops like rice and sugarcane has increased. The transport resources need to be improved as they affect agricultural pattern and cropping intensity.

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- Use equation editor feature of your word processing software to create equation if equation contains division, or multiple lines.
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- Add a blank paragraph before and after each equation.
- Use same font size as normal paragraph for the equations.
- Use a zero before decimal points: “0.25”, not “.25”.

$$(a + b)^2 = a^2 + b^2 + 2ab \quad (1)$$

$$y^4 + \frac{xy}{2} = \frac{x^3}{3} - xy^2 + y^2 - \frac{1}{7} \quad (2)$$

## 8. Headings

- Headings to be formatted with same font family and font size as normal text.
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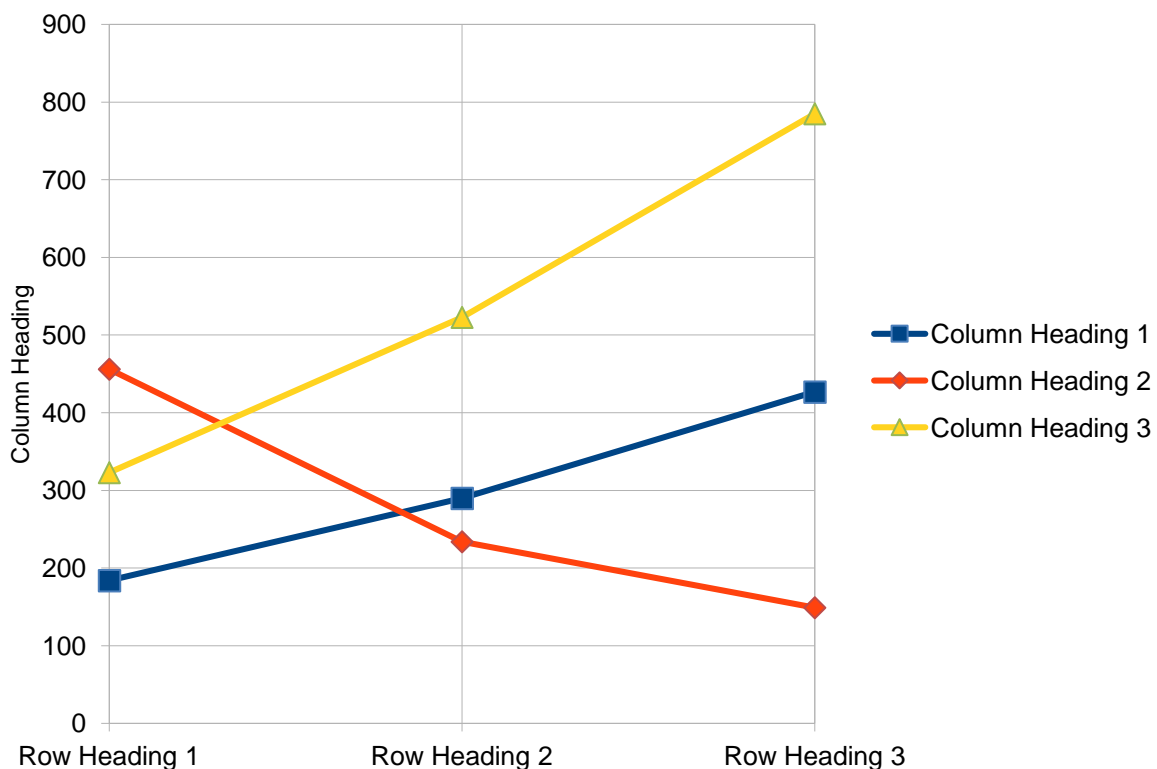
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- Add blank paragraphs above and below the figures and tables.

**Table 1: Table Type Styles**

	Column Heading 1	Column Heading 2	Column Heading 3
Row Heading 1	184	456	323
Row Heading 2	290	234	523
Row Heading 3	427	149	785
Total	901	839	1631

The above data is pictured in the next graph.

**Figure 1: Temperature After Each Pass**



### 10. Some Common Mistakes

- Using 0 (Zero) or O with superscript formatting for the degree symbol used for temperature (Celsius/Fahrenheit), angle (including latitude-longitude). (Proper usage: Use the degree symbol: °.)
- Add a full-stop/period after “et”. (Proper usage: There is no period after the “et” in the Latin abbreviation “et al.”.)
- Improper use of “i.e.” and “e.g.”. (Proper usage: The abbreviation “i.e.” means “that is”, and the abbreviation “e.g.” means “for example”.)

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