*Management Journal for Advanced Research* *Peer Reviewed and Refereed Journal*
*ISSN (Online): 2583-1747*
*Volume-4 Issue-4 || August 2024 || PP. 149-154* DOI: 10.5281/zenodo.13842973

# Production and Productivity Trends of Major Food-Grain Crops in Uttar Pradesh

Prof. Yudhvir Singh*
*Principal, Meerut College, Meerut, India*

***Corresponding Author:** Prof. Yudhvir Singh*

| Received: 29-07-2024 | Revised: 14-08-2024 | Accepted: 30-08-2024 |
|---|---|---|

***ABSTRACT***
*The present paper sheds light on major food-grain crop production and productivity trends in Uttar Pradesh. The study was conducted using data from 2010 to 2020. As one of India's largest agricultural economies and the foremost producer of food grains, Uttar Pradesh has demonstrated positive growth in total food production from 2010-11 to 2019-20. The area dedicated to food grain cultivation has experienced only minor fluctuations and a slight increase, indicating that the rise in production is primarily due to enhanced crop productivity. Among the various categories, coarse cereals have exhibited the highest productivity growth, followed by wheat and rice, while pulses have shown the lowest yields. The increase in production aligns with improvements in yield, with coarse cereals leading in production rates, followed closely by wheat and rice.*

***Keywords:*** *production, productivity, grain, crops*

## I. INTRODUCTION

The economics of Uttar Pradesh is based mainly on Agriculture and around 65 % of the total population is dependent on agriculture (upagripardarshi.gov.in). This is the fourth largest and most populous state in the country occupying 7.33% of the total area with 199.8 million people (Census 2011), accounting for 16.5% of India's total population. UP is blessed with fertile Indo-Gangetic plains and divided into nine agro-climatic zones. Even though agro-climatic conditions vary widely in the state, food grains comprise an important component of UP's production basket. It is one of the major producers of food grains in the country. About 28% of India's wheat and 12% of rice is produced by the state. Cereals accounted for 69% and pulses for 9.1% of the gross cropped area (GCA) in TE 2014–15. Within UP, there is wide regional variation in the value of output from agriculture and allied activities. The Western region contributed 49.6% of the total value of output from agriculture and allied activities, followed by the Eastern region (27.7%), central region (17.2%) and Bundelkhand (5.5%) in TE 2015–16 (Agriculture Statistics, 2015). In the western region, most of the value of output was from livestock (34%), followed by cereals (16%) and sugarcane (15%). In the eastern region, livestock and cereals together contribute 62% of the total value of output. In the central region, livestock accounts for 27%, followed by cereals (22%) and sugarcane (16%). In the Bundelkhand region, which is the lowest contributor to UP's agriculture, livestock and cereals contribute about 46% to the value of output from agriculture and allied activities (Agriculture Statistics, 2015). Thus, most of the value of output in agriculture in UP comes from the livestock, cereals and sugarcane sectors.

Food grains are an important source of agricultural growth in UP, contributing 7.2% to agricultural growth between 2001–02 and 2015–16. The state is the largest producer of food grains in the country, producing 17% of the total produce and accounting for 15.8% of the total area under food grains in TE 2015–16 (Agriculture statistics, 2015). Therefore, considering the significance of food grains in the U.P. agriculture profile and its overall contribution to the nation's food grain basket, this study is conducted to determine the trends of production growth rate and productivity growth rate of food grains in U.P. over the last ten years from 2010-2020. This work is based on secondary data, collected from the UPDES and RBI handbook of statistics. In this paper, we considered major food grain crops of U.P. which included Wheat, Rice, coarse cereals and pulses.

## II. LITERATURE REVIEW

**Goyal, A.K. et al, 2013**, The paper provides an in-depth analysis of the cropping pattern and agricultural production trends in Uttar Pradesh across seven sections. These sections cover various aspects such as the growth rate in plan periods, land use, cropping pattern/coverage, production of different crops in Uttar Pradesh and all of India, and productivity of different crops. Over the period from 1950-51 to 2011-12, the production of wheat and rice in Uttar Pradesh saw substantial increases,

*ISSN (Online): 2583-1747*
*Volume-4 Issue-4 || August 2024 || PP. 149-154* DOI: 10.5281/zenodo.13842973

while the production of pulses and oilseeds exhibited negative trends. The area under all coarse cereals declined, but there were increases in the areas under wheat and rice. Overall, there was an increasing trend in production for major crops, and productivity also improved. The study suggests that there is still potential for further progress in the state's agricultural sector. Diversifying the cropping pattern to include less water-consuming crops and embracing technological advancements could lead to significant improvements in Uttar Pradesh's agriculture.

**Pradeep Mishra, 2015,** To ensure food and nutritional security, it is crucial to forecast the production patterns of major food crops. It is essential for planners to have an understanding of the historical and potential production trends of these crops. This study examines the performance of total food grain production in India and its major states from 1950 to 2009. The study analyzes the stability in production behavior concerning the area, production, and yield of total food grains. Additionally, it focuses on forecasting the area and production of total food grains in India using the Autoregressive Integrated Moving Average (ARIMA) model. The success of agriculture is influenced by various factors, including policy formulation, implementation, input availability, and climatic conditions. To enhance forecast accuracy, this study incorporates production factors into the ARIMA model as auxiliary variables. The results indicate that incorporating these factors into the model improves the accuracy of the estimated figures. Based on the best-fitted ARIMA models, the forecast suggests that Uttar Pradesh will be the leading state in India for total food grain production. It is estimated that Uttar Pradesh will produce 49455 thousand tonnes from an area of 19982 thousand hectares, with a yield of 2718 kg/ha in the year 2020.

**Ajay K. Singh, 2014,** Climate change poses a significant threat to agricultural production, particularly in developing countries like India, where resources to mitigate its effects are limited. Over 700 million people in India rely on agriculture and related activities, with 52% depending on climate-sensitive sectors such as agriculture, forestry, and fisheries. This sector is highly vulnerable to climate change, impacting food security. This study analyzes the effects of climatic and non-climatic factors on food grain productivity in India, utilizing a Cobb-Douglas production model across 13 states from 1980 to 2009. The findings reveal that climate factors significantly affect the productivity of various crops, though the impact differs by crop. For instance, higher maximum temperatures negatively impact rice, maize, sorghum, and ragi, while increased minimum temperatures adversely affect wheat, barley, gram, and rice. Additionally, excessive rainfall and shifting patterns have detrimental effects on barley, rice, maize, and ragi. The study emphasizes the urgent need for targeted agricultural policies to address climate change's adverse effects, particularly for different crops. It also underscores the importance of irrigation and optimal fertilizer use, along with ensuring fair pricing for farmers' products during harvest seasons.

**Ajit Singh, et al 2017,** This study aims to assist farmers in choosing suitable crops and cropping patterns, as well as adapting their farming practices for Kharif crops across different regions of U.P. Eastern U.P. has the highest area under rice cultivation at 149,000 hectares, followed by central U.P. at 112,000 hectares, while western U.P. covers 65,000 hectares. The Bundelkhand region has the least rice area, at only 12,140 hectares. Although rice cultivation in eastern U.P. is declining, it is increasing in western and central U.P. From 2000-2001 onward, rice productivity has risen in all sectors, with eastern and western U.P. showing similar and higher rates of increase compared to central and Bundelkhand regions. The maximum yield gap of 7.3 q/ha occurred in eastern U.P. with 865 mm of rainfall, followed by central U.P. at 7.1 q/ha with 780 mm, and 5.9 q/ha in Bundelkhand with 610 mm. The lowest yield gap was in western U.P. at 3.9 q/ha with 710 mm of rainfall. Interestingly, eastern U.P. recorded the lowest yield of 23 q/ha despite higher water availability, while central U.P. had a productivity of 24 q/ha with 780 mm of rainfall. In contrast, western U.P. achieved the highest yield of 25 q/ha with lower water availability at 710 mm.

**HarshitaTewari, et al 2017**, This paper examines the growth and instability of wheat in Uttar Pradesh, focusing on area, production, and productivity. The analysis utilizes the compound annual growth rate and decomposition analysis to assess the contributions of area and productivity to output growth. The study covers the period from 1990-91 to 2013-14, divided into five sub-periods. Throughout the entire period, the area dedicated to wheat consistently showed positive growth across all regions of the state. In contrast, while production and productivity generally experienced positive growth, this was not the case during sub-period III. The highest productivity was observed in the western region, while the Bundelkhand region recorded the lowest. Instability analysis revealed greater fluctuations in production and productivity compared to the area under wheat. The growth in wheat production was further broken down into three components: area effect, yield effect, and interaction effect. The results indicated that the yield effect played a dominant role in driving production growth.

## III. ANALYSIS AND DISCUSSION

India’s total area under food grain production was 126671.4 (000 Ha) in 2010-11, and Uttar Pradesh's contribution to this total cropped area was 15.63%, which is 19804 (000 Ha), mentioned in Figure 1. From this figure, we can also observe that the total cropped area under food grains has not increased much both in India as well as U.P. by 2019-2020. This area under cultivation has just shown minor fluctuations.

*ISSN (Online): 2583-1747*
*Volume-4 Issue-4 || August 2024 || PP. 149-154* DOI: 10.5281/zenodo.13842973

| Years | India's Total area under food grains | U.P. Area under Food grain crops | U.P. share in total food grain area |
|---|---|---|---|
| 2010-11 | 126671.4 | 19804.0 | 15.63415262 |
| 2011-12 | 124754.9 | 20133.0 | 16.13804348 |
| 2012-13 | 120778.7 | 19960.0 | 16.52609276 |
| 2013-14 | 125048.8 | 20142.0 | 16.10731171 |
| 2014-15 | 124300.6 | 20078.0 | 16.15277802 |
| 2015-16 | 123217.7 | 19355.0 | 15.70797053 |
| 2016-17 | 129231.2 | 20164.0 | 15.60304323 |
| 2017-18 | 127524.2 | 19800.0 | 15.52646478 |
| 2018-19 | 124776.2 | 19493.0 | 15.62237029 |
| 2019-20 | 126994.5 | 19949.0 | 15.70855431 |

**Figure 1:** Total cropped under food grains cultivation in India and U.P.
**Note:** Area is in (000 Ha) and U.P. share is in percentage terms. Source: UPDES Agriculture RBI Handbook of Statistics

Table 1, demonstrates the general profile of the food grains production in Uttar Pradesh from 2010-11 to 2019-20. Here we have taken wheat, rice, coarse cereals and pulses as major food grains. In Table 1, it can be observed that the total cropped area under food grain cultivation has not improved much in the U.P., but the total food grains production has increased from 47247.5 (000 ha) to 56169.1 (000 ha). This means there is an improvement in the productivity of the food grain crops.

| **Food grain Crops and Area** | **2010-11** | **2011-12** | **2012-13** | **2013-14** | **2014-15** | **2015-16** | **2016-17** | **2017-18** | **2018-19** | **2019-20** |
|---|---|---|---|---|---|---|---|---|---|---|
| Total Area under food grains | 19804.0 | 20133.0 | 19960.0 | 20142.0 | 20078.0 | 19355.0 | 20164.0 | 19800.0 | 19493.0 | 19949.0 |
| Total Food grains Production | 47247.5 | 50283.6 | 50745.4 | 50027.5 | 39594.0 | 42550.8 | 49903.4 | 51369.9 | 54643.4 | 56169.1 |
| Wheat Production | 30001.0 | 30292.6 | 30301.9 | 29890.9 | 22417.4 | 25425.2 | 30056.0 | 31879.1 | 32741.3 | 33815.5 |
| Rice Production | 11992.0 | 14022.0 | 14416.0 | 14636.0 | 12167.9 | 12501.0 | 13754.0 | 13274.0 | 15545.3 | 15517.9 |
| Coarse cereals | 3217.6 | 3566.0 | 3695.5 | 3803.2 | 3570.0 | 3460.0 | 3909.0 | 4016.8 | 3948.9 | 4388.5 |
| Pulses production | 2037 | 2403 | 2332 | 1697.4 | 1438.7 | 1164.6 | 2184.4 | 2200 | 2408 | 2447.3 |

**Table 1:** General profile of food grains in U.P.
**Note:** Area (000 Ha) and Production (000 tonnes) Source: UPDES Agriculture RBI Handbook of statistics

The production of wheat has increased from 30001 in 2010-11 to 33815.5 (000 tonnes), while the rice production has changed from 11992.0 to 15517.9 (000 tonnes) in the study period. This is shown in chart 1 and 2 also.

*ISSN (Online): 2583-1747*
*Volume-4 Issue-4 || August 2024 || PP. 149-154* DOI: 10.5281/zenodo.13842973

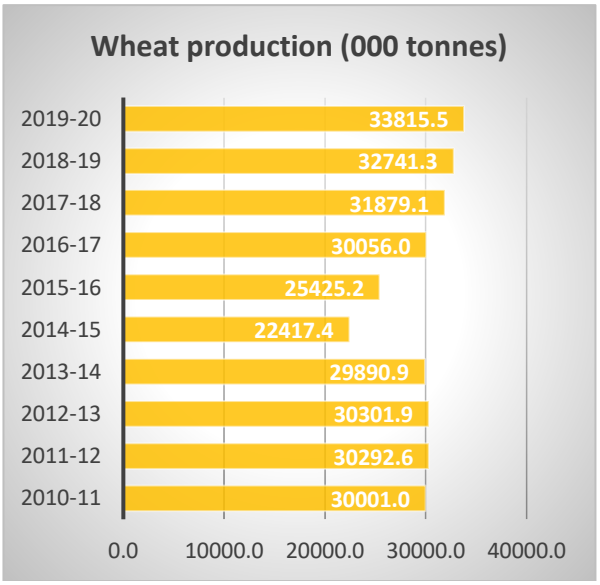


**Chart 1:** Wheat production in U.P.

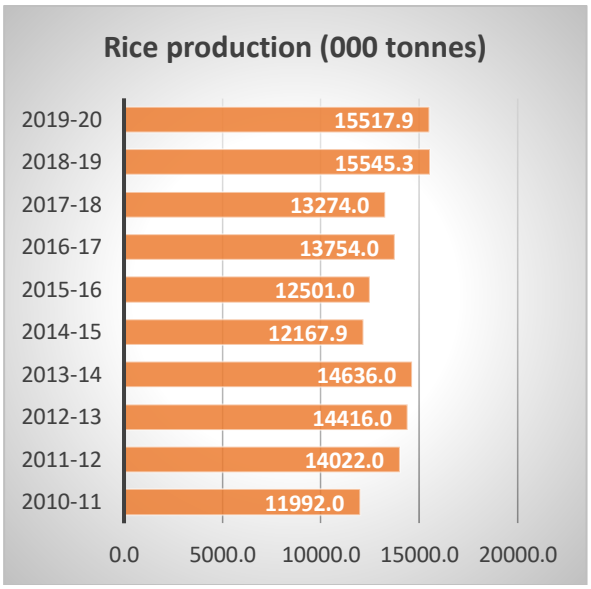


**Chart 2:** Rice Production in U.P.

Chart 3 presents the Coarse cereal and pulses production in U.P. The figure revealed that pulses production has faced more fluctuations and showed the lowest growth in 2015-16.

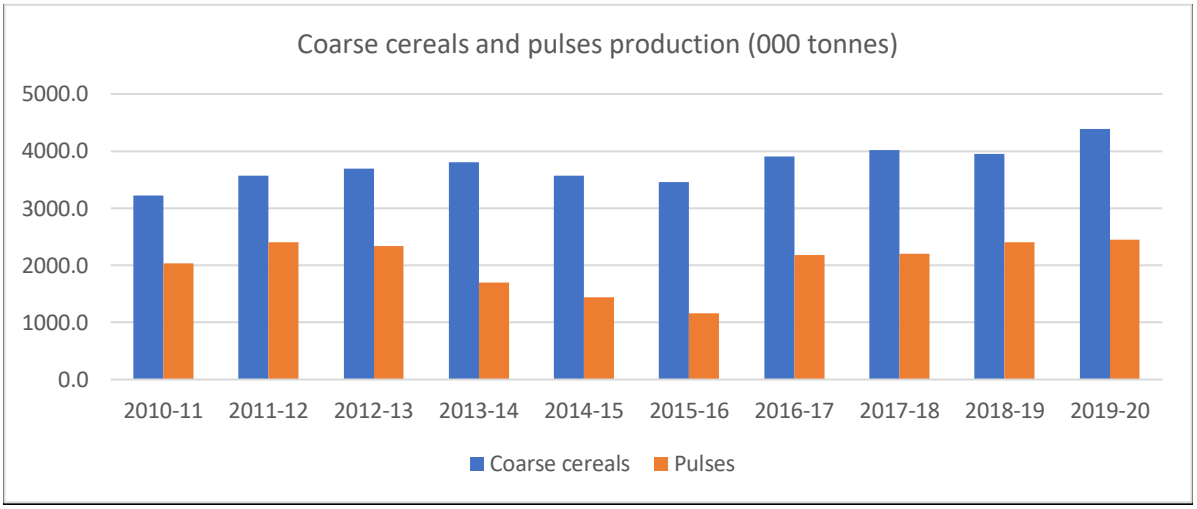


**Chart 3:** Coarse grains and pulses production.
**Source:** UPDES Agriculture RBI Handbook of Statistics

Then it increased continuously from 2016-17 onwards. The production of pulses increased from 2037 to 2447 (000 tonnes), with little rise and fall.

From the above analysis, we found that all the food grains included in the study have increased in their production. However as mentioned in Table 1, the area under food grains cultivation has shown a meagre increase. So, to understand this growth rate in production, we observed the yield data over the ten years of this study period. The yield data is mentioned below in Table 2 and Chart 4.

*ISSN (Online): 2583-1747*
*Volume-4 Issue-4 || August 2024 || PP. 149-154* DOI: 10.5281/zenodo.13842973

| Yield | 2010-11 | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 | 2018-19 | 2019-20 |
|---|---|---|---|---|---|---|---|---|---|---|
| Wheat | 3113 | 3113 | 3113 | 3038 | 2277 | 2636 | 3113 | 3269 | 3432 | 3432 |
| Rice | 2120 | 2358 | 2460 | 2447 | 2072 | 2133 | 2295 | 2283 | 2704 | 2705 |
| Coarse cereals | 1561 | 1753 | 1850 | 1887 | 1776 | 1760 | 1947 | 2038 | 2063 | 2206 |
| Pulses | 832 | 993 | 985 | 736 | 612 | 619 | 871 | 973 | 1051 | 1033 |

**Table 2:** Yield of Wheat, Rice, Coarse cereals and Pulses (Kg/Ha)
**Source:** UPDES Agriculture RBI Handbook of Statistics

The data revealed that the reason for the increase in production is the productivity growth. The productivity of all the food grains has increased sharply in the study period. Among them, coarse cereals have shown the highest yield, followed by rice, then wheat, and at the end pulses. The pulses have shown the least productivity growth.

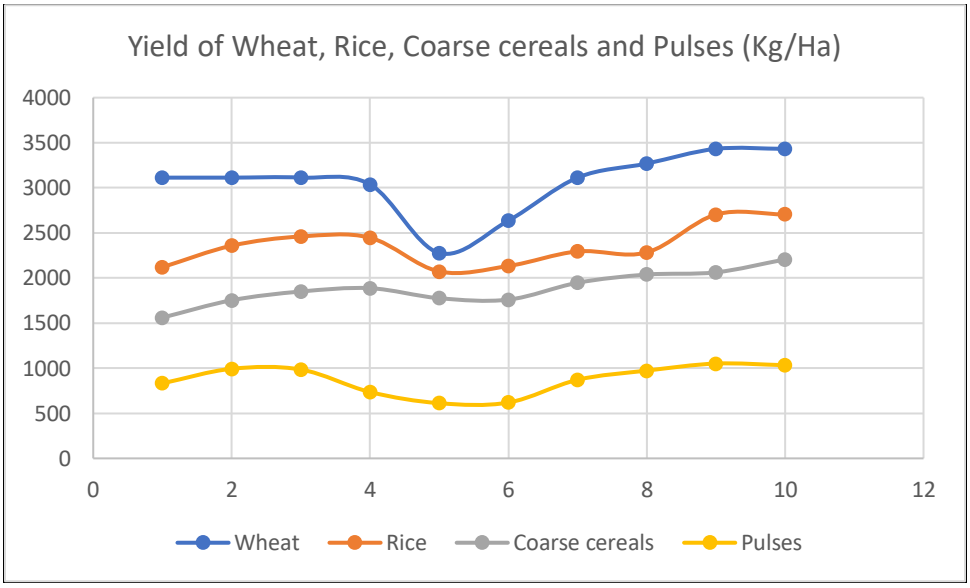


**Chart 4:** Productivity of Wheat, rice, coarse cereals and pulses
**Source:** UPDES Agriculture RBI Handbook of statistics

## IV. CONCLUSION

As Uttar Pradesh is one of the largest agricultural economy of India, and the largest producer of food grains. This study about the major food grains productions in U.P. has shown that from 2010-11 to 2019-20, there is positive growth in total food production. The area cropped under food grains has shown minor fluctuations and a very little increase. This indicates that, the rise in production is due to the rise in productivity of the crops. The coarse cereals has shown the highest growth in its productivity, followed by wheat, rice, and pulses has shown the least yield. The production increasement is also followed by yield, the coarse cereals are rising with highest production rate, this is again followed by wheat and rice. The marked increase in productivity levels, primarily attributed to the adoption of high-yielding varieties, improved agronomic practices, and enhanced irrigation facilities. Additionally, the integration of technology, such as precision farming and data analytics, has enabled more efficient resource management and crop monitoring, further boosting yield potential.

*ISSN (Online): 2583-1747*
*Volume-4 Issue-4 || August 2024 || PP. 149-154* DOI: 10.5281/zenodo.13842973

## REFERENCES

1. Census. (2011). *Census of India*. Retrieved May 2019, from Registrar General of India, Ministry of Home Affairs, Government of India.
2. Goyal, A.K. (2013). Agricultural production trends and cropping pattern in Uttar Pradesh: An overview. *International Journal of Agriculture Innovations and Research, 2*(2).
3. Mishra, Pradeep et al. (2015). Study of instability and forecasting of food grain production in India. *International Journal of Agriculture Sciences, 7*, 474-481.
4. *Agricultural Statistics at a Glance*. (2015). New Delhi, Ministry of Agriculture and Farmers' Welfare.
5. Singh, A. et al. (2017). Agricultural statistics of area, production and productivity of rice of different sectors of U.P., India. *Plant Archives, 17*(2), 1324-1328.
6. Tewari, H. et al. (2017). Growth and instability in wheat production: A region wise analysis of Uttar Pradesh, India. *International Journal of Current Microbiology and Applied Sciences, 6*(9), 2537-2544. https://doi.org/10.20546/ijcmas.2017.609.312.
7. http://mospi.nic.in/.
8. Singh, Ajay. (2014). *Climatic effects on food grain productivity in India: A crop wise analysis.*