

Original Research Article

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## Growth Performance of Major Food-Grain (Wheat, Rice and Gram) In Uttar Pradesh: An Economic Analysis

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### ABSTRACT

#### Keywords

Economics Analysis, Exponential function, Food grain, Rice, Wheat

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Growth analysis is commonly used throughout time to determine the trend of a certain variable and utilized in economic research to make policy choices. The exponential function predicted the compound increase in area, production, and yield of main food grains in Uttar Pradesh. Secondary data were gathered during a 70-year era, from 1950-51 to 2018-19. In Uttar Pradesh, growth in the area, production, and yield of main food grains such as rice and wheat were positive and substantial from 1950 to 2019. However, the rice area grew at a little negative pace. Wheat was discovered to be one of the most popular crops among major food grains, with the largest yearly growth in area, production, and yield. However, efforts should be made to rise the area under other major food grains (rice, wheat) with high-quality seeds of improved varieties, improved food grain production technology, price, marketing support, and effective extension mechanization to boost productivity of major food grains.

### Introduction

Agriculture has a vital and recognized role in India's economy. Agriculture and associated industries employ 54.6 percent of the population (census, 2011) and provide 17.4 percent of the country's Gross Value Added in 2016-17 at current prices (Agricoop, 2017). Food security and the amount of land necessary for food production are heavily reliant on the output of key cereal crops. The grains sector is significantly important in the Indian

economy. According to FAO world agricultural data from 2010, India is the world's second-largest producer of wheat and rice, the world's two most important food essentials. Agriculture is critical to the Indian economy. Uttar Pradesh is India's most populous state and the country's second-biggest in terms of land area. The state's reported area is 24.2 million hectares, of which 16.68 million ha is cultivated. The total cultivated area is 25.5 million hectares. The state's cropping intensity is 153 percent. Small and marginal farmers dominate the

farming community. The average size of a farmer's land is merely 0.83 acres. However, the average size of a marginal farmer's plot is only 0.40 hectare. The state accounts for 11% of India's net sown land and provides more than 41.1 million tonnes of food grain, accounting for almost 20% of the country's total food grain output. (Goyal and Kumar, 2013) Agriculture productivity development has remained a source of contention in both scientific and policy circles in India. The large number of studies have been conducted across the country to better understand the national agricultural growth trend over time (Mahadevan, 2003; Tripathi and Prasad, 2008). Understanding the pattern of agricultural growth and development at the regional level, on the other hand, is a prerequisite for developing long-term strategic decentralised development strategies to ensure inclusive growth in the country (Mathur *et al.*, 2006; Kumar and Elumalai, 2007; Kumar and Jain, 2012). Because states are the ideal administrative entities to research regional characteristics of agricultural growth and development, the current study examined agricultural performance in Uttar Pradesh in terms of crop-wise productivity increase over time (UP). The state was chosen because it produces the most food grains in the country (approximately 17 percent) and hence plays an important role in national food security. Agriculture, which occupies a sizable portion of the exceptionally fertile upper and middle Gangetic plains and employs around 59 percent of the entire workforce, drives the state economy (GoUP, 2018). However, a few recent studies on measuring patterns in productivity growth have included UP as an important instance (Singh and Chandra, 2001; Goyal and Kumar, 2013; Verma *et al.*, 2017) since the state has a major role in the country's agricultural development. They have, however, mainly disregarded the state's productivity growth drivers, information on which is critical for boosting agricultural growth through strategic intervention.

While another study emphasised productivity growth as an important factor for rural development and poverty reduction in UP, Pandey and Reddy

(2012) recognised fertiliser and irrigation as important determinants of productivity growth but ignored social and institutional factors that accentuate a region's productivity growth pattern.

A review of the literature on measuring the development pattern of a region, crop output, and agricultural productivity found that prior research assumed a linear relationship between growth and time (Singh and Chandra 2001; Sharma, 2012; Sharma, 2013; Roy *et al.*, 2015; Gulati *et al.*, 2017).

Because growth is rarely unidirectional, recording the rate of change in the growth rate across time more vividly illustrates the parameter of interest's instantaneous increase or drop in growth rate (Holt, 2008). In this context, we attempted to investigate the trends in area, production, and productivity of food grains in UP, as well as their acceleration or deceleration over time, and identified drivers of food grain productivity at a more disaggregated level for strategic planning and prioritising resource allocation for accelerating productivity growth in the state.

## **Materials and Methods**

The research of expansion in area, production, and productivity of main food grains was undertaken on purpose in the Indian state of Uttar Pradesh. Gram, wheat, and rice were chosen as main food grains in Uttar Pradesh (Directorate of Agriculture and economics, Uttar Pradesh, 2020). Secondary data on crop area under chosen crops, crop production, and agricultural productivity were utilised to examine increase. From 1950-51 onwards, time-series data on major food grain crop area, production, and yield were available.

As a result, the analysis covered the years 1950-51 through 2018-19. Data for the study were gathered from a variety of written and digital sources at the Directorate of Agriculture in Uttar Pradesh. The area, production, and productivity increase of several crops were evaluated using the exponential function of the form:

$$Y = aB^t$$

logarithm  $Y = \log a + \log t + \log B$

Where  $Y = \text{Area/Production/Productivity}$  (Wheat, Gram, and Rice)

A stands for constant, while B stands for regression coefficient.

T = the time of year

Compound growth rate (percentage) =  $(B-1) * 100$

For estimation purposes, the equation was translated into log-linear form.

## **Results and Discussion**

### **Growth in wheat area, production and yield**

Between 1950-51 and 2018-19, the total area under wheat in Uttar Pradesh rose from 3316 thousand hectares to 9855 thousand hectares. The total growth trend indicates a substantial yearly growth rate of 1.57 percent. Except for the after reform periods, the compound growth trend analysis for the area under wheat reveals a downward tendency in the compound growth rate. In 1950-51, Uttar Pradesh produced 2721 thousand tonnes of wheat, which more than tenfold climbed to 38039 thousand tonnes in 2018-19. From 1950 to 2019, wheat production increased at a considerable pace of 3.84 percent. The reform periods growth trend analysis indicates that the growth rate was positive in all reform periods. Wheat yield per hectare in the state grew from 820 kg/ha to 3864 kg/ha between 1950-51 and 2018-19.

Wheat yield grew at a compound annual growth rate of 2.24 percent from 1950-51 to 2018-19, according to a growth trend study. In the reform-period study, yield shows a positive growth rate in the pre-reform period, but a negative growth rate of 1.94 percent in the post-reform period in compare to pre reform periods. Significant increase occurred during the pre-reform eras of 1950-1951 and 1990-91.

### **Growth in Rice area, production and yield**

The total area under rice in Uttar Pradesh increased from 3852 thousand hectares to 5924 thousand hectares between 1950-51 and 2018-19. The overall growth trend reveals a significant annual growth rate of 0.62 percent. With the exception of the pre-reform eras, the compound growth trend analysis for the rice region demonstrates a negative trend in the compound growth rate. Uttar Pradesh produced 1998 thousand tonnes of rice in 1950-51, which has more than eightfold increased to 16019 thousand tonnes in 2018-19. Rice output climbed at a significant rate of 3.02 percent between 1950 and 2019. The growth trend analysis for reform periods shows that the growth rate was positive in all reform periods. During 1950-51 and 2018-19, the state's rice yield per hectare increased from 519 kg/ha to 2704 kg/ha. According to a growth field of sentiment analysis, rice yield increased at a compound annual growth rate of 2.39 percent from 1950-51 to 2018-19. The yield indicates a positive growth rate in the pre-reform period, but a negative growth rate of 1.32 percent in the post-reform period compared to pre-reform periods. The reform-period analysis. Significant increases occurred prior to reform in the years 1950-51 and 1990-91.

### **Growth in Gram area, production, and yield**

From 1950-51 and 2018-19, the total area under gram in Uttar Pradesh rose from 2439 thousand hectares to 572 thousand hectares. Overall, the growth trend shows a strong yearly growth rate of --2.33 percent. The compound growth trend study for the gram area, with the exception of the pre-reform eras, shows a negative tendency in the compound growth rate. In 1950-51, Uttar Pradesh produced 1453 thousand tonnes of the gram, which has decreased by less than twice to 727 thousand tonnes in 2018-19. Between 1950 and 2019, gram output decreases at a substantial rate of -0.98 percent. According to the growth trend study for reform periods, the growth rate was negative in all periods. The state's gram yield per hectare grew from 596 kg/ha to 1272 kg/ha between 1950-51 and 2018-19.

According to a growing field of sentiment research, the yield climbed at a compound annual growth rate of 1.09 percent from 1950-51 to 2018-19. In the reform-period study, the yield suggests a positive growth rate in the pre-reform period but a reduced growth rate of 0.53 percent in the post-reform period. Prior to reform, significant rises occurred in the years 1950-1951 and 1990-91.

Agriculture performance in UP, as assessed by foodgrain production and yield, varies greatly over time and between areas. The increase in overall foodgrain production over the last decade and a half has been mostly driven by productivity, while the area under cultivation has remained static. Crop-by-crop analysis reveals a considerable rise in rice and wheat output due to significant increases in productivity and area, respectively, throughout the

whole research period. It is worth noting that the state's stagnating wheat yield growth would offer substantial issues in satisfying the key staple crop's future availability demands at the national level as well. As a result, a breakthrough in research and development for genetic advancement to increase the production potential of the wheat crop would be a desired governmental intervention in this area.

However, in order to increase productivity of major food grains, efforts should be made to increase the area under other major food grains (wheat, gram, and rice) with good quality seeds of improved varieties, improved technology for food grain production, price and marketing support, and effective extension mechanization. Strategies for dealing with poor yields of important food grains are also proposed.

**Table.1** Annual Compound Growth Rates of Wheat Area, Production, and Yield in Uttar Pradesh 1950-2019

Particular	Periods		
	Pre Reform Periods	After reform periods	Overall
Area	2.4	0.45	1.57
Production	4.92	2.41	3.84
Yield	2.46	1.94	2.24

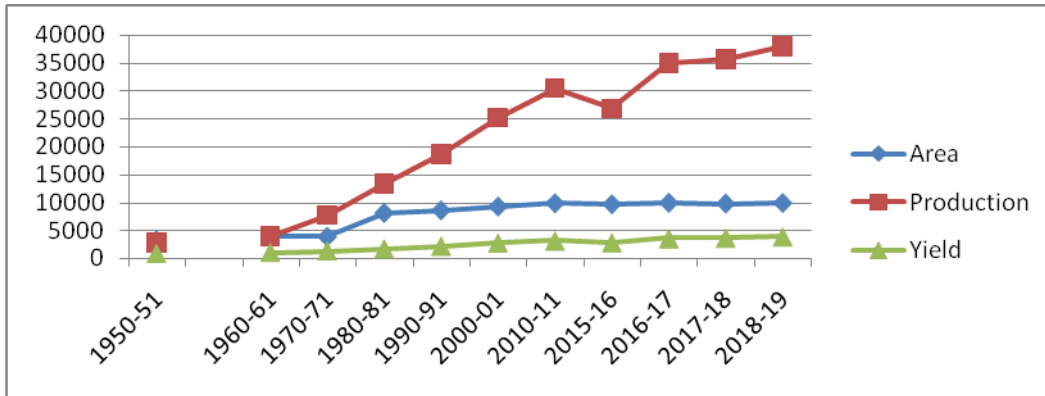
**Table.2** Annual Compound Growth Rates of Rice Area, Production, and Yield in Uttar Pradesh 1950-2019

Particular	Periods		
	Pre Reform Periods	After reform periods	Overall
Area	0.95	0.18	0.62
Production	4.17	1.15	3.02
Yield	3.2	1.32	2.39

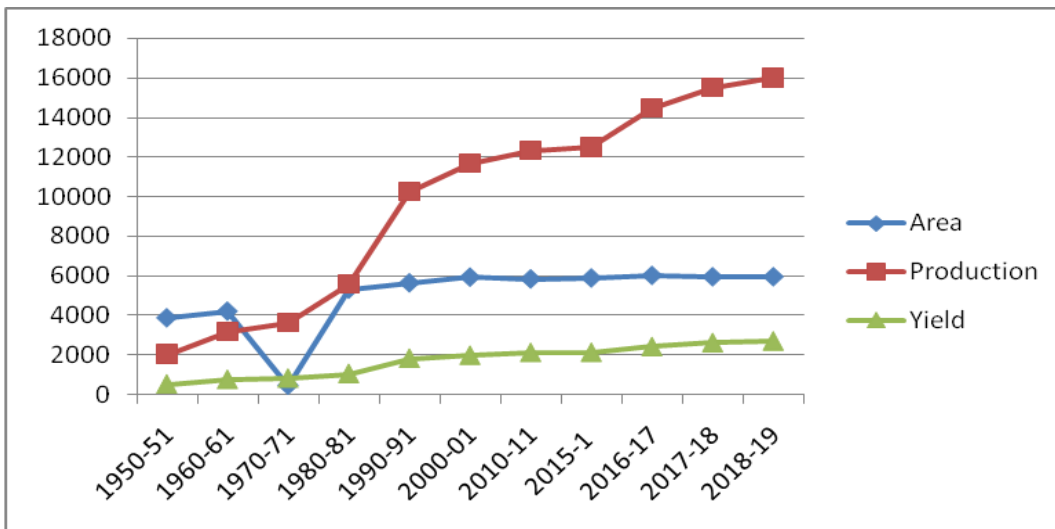
**Table.3** Annual Compound Growth Rates of Gram Area, Production, and Yield in Uttar Pradesh 1950-2019

Particular	Periods		
	Pre Reform Periods	After reform periods	Overall
Area	-1.61	-2.63	-2.05
Production	-0.65	-1.43	-0.98
Yield	0.98	0.53	1.09

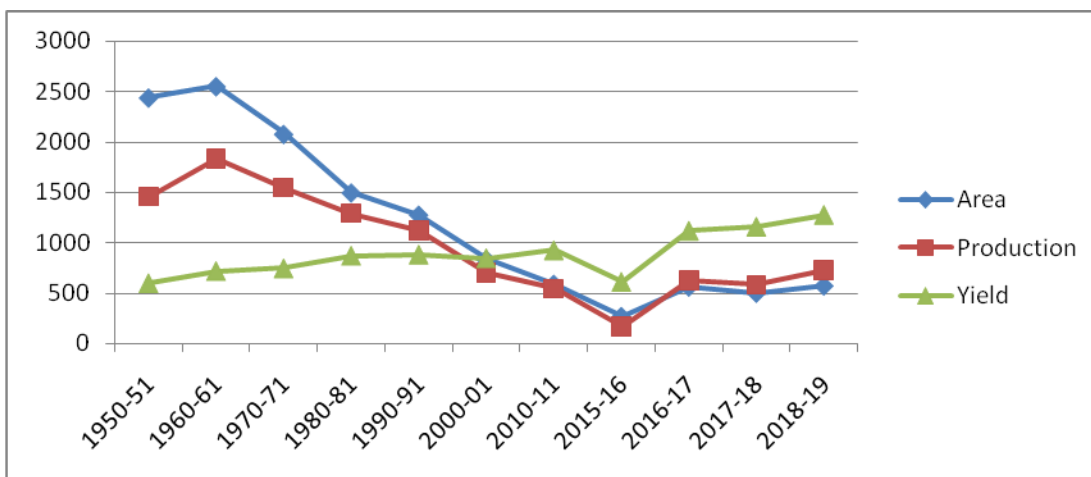
**Fig.1**



**Fig.2**



**Fig.3**



High-yielding, high-quality varieties of important food grains that are disease-resistant must be developed and made available to farmers. Farmers should be provided with appropriate extension services and training in modern food grain production technologies. Irrigation facilities must be properly established and upgraded so that farmers may embrace new technologies with assured irrigation facilities. It is necessary to use a production system strategy that connects production technology, credit, and marketing of main food grains. In other words the study's findings highlight the essential significance of rural literacy in increasing foodgrain yield. As a result, the state government must play a significant role in building rural educational infrastructure in order to capitalise on the latent potential of the rural labour. In order to enhance foodgrain productivity in the state, the government should prioritise practical, participative, and interactive models such as farmer field school programmes to teach farmers about current farm techniques, as well as effective extension services.

### Authors' contributions

This work was carried out in collaboration between all authors. Author AK has Conceptualized the study and taken expert opinion on the research matter. Author SAA has given the research methodology required for the study. All authors are collectively designed the review, performed the CAGR analysis and included the practical inferences. The first draft of the manuscript is written with due diligence of available literatures by all the authors. Authors SAA and AK managed the analyses of the study. Author SA managed the literature searches and given valuable inputs in the discussion part. All authors read and approved the final manuscript.

### References

Goup (2018): "Statistical Abstracts of Uttar Pradesh," Government of Uttar Pradesh, Lucknow. — (2009): "Integrated Watershed Management Programme (IWMP) in Uttar Pradesh: Perspective and Strategic Plan

2009–2027," Department of Land Development and Water Resources, Government of Uttar Pradesh.

- Goyal, Aloka Kumar and S Kumar (2013): "Agricultural Production Trends and Cropping Pattern in Uttar Pradesh: An Overview," *International Journal of Agriculture Innovations and Research*, Vol 2, pp 229–35.
- Gulati, Ashok, Ranjana Roy and Siraj Hussain (2017): "Getting Punjab Agriculture Back on High Growth Path: Sources, Drivers and Policy Lessons," Indian Council for Research on International Economic Relations (ICRIER), New Delhi.
- Holt, Janet K (2008): "Modeling Growth Using Multilevel and Alternative Approaches," *Multilevel Modeling of Educational Data*, A A O'Connell and D B McCoach (eds), Charlotte, NC: Information Age, pp 111–59.
- Kumar, A and Kannan Elumalai (2007): "Agricultural Growth and Productivity in India: An Inter-state Variations," *Economic Growth and Regional Balance: Recent Experiences and Implications in India*, T S Papola and A K Sharma(eds), Institute for Human Development, New Delhi.
- Kumar, Anjani and Rajni Jain (2012): "District Level Agricultural Productivity Analysis: Historical and Spatial Trends," Report Submitted to FAO, New Delhi.
- Mahadevan, R (2003): "Productivity Growth in Indian Agriculture: The Role of Globalization and Economic Reform," *Asia-Pacific Development Journal*, Vol 10, No 2, pp 57–72.
- Mathur, Archana S, S S Das and Surajit Das (2006): "Status of Agriculture in India: Trends and prospects," *Economic & Political Weekly*, Vol 41, No 52, pp 5327–36. <https://doi.org/10.1177/10659129211034572>
- Pandey, Lalmani and A Amarender Reddy (2012): "Farm Productivity and Rural Poverty in Uttar Pradesh: A Regional Perspective," *Agricultural Economics Research Review*, Vol 25, No 1, pp 25–35.

- <https://doi.org/10.2139/ssrn.2123783>
- Roy, A, N U Singh, D S Dkhar, A K Mohanty, S B Singh and A K Tripathi (2015): “Food Security in North-East Region of India—A Statewise Analysis,” *Agricultural Economics Research Review*, Vol 28, pp 259–66.
- Sharma, Amod (2013): “Trends of Area, Production and Productivity of Food grain in the North Eastern States of India,” *Indian Journal of Agricultural Research*, Vol 47, pp 341–46.
- Sharma, Vijay Paul (2012): “India’s Agricultural Development Under the New Economic Regime: Policy Perspective and Strategy for the 12<sup>th</sup> Five Year Plan,” *Indian Journal of Agricultural Economics*, Vol 67, No 1, pp 46–78.
- Singh, Gyanendra and H Chandra (2001): “Growth Trends in Area, Yield and Production of Food grains in Uttar Pradesh,” *Agricultural Situation in India*, Vol 58, pp 423–26.
- Tripathi, Amarnath and A R Prasad (2008): “Agricultural Productivity Growth in India,” *Journal of Global Economy*, Vol 4, No 4, pp 322–28,  
<http://dx.doi.org/10.1956/jge.v4i4.113>.
- Verma, Smriti, Ashok Gulati and Siraj Hussain (2017): “Doubling Agricultural Growth in Uttar Pradesh: Sources and Drivers of Agricultural Growth and Policy Lessons,” Working Paper 335, Indian Council for Research on International Economic Relations (ICRIER), New Delhi.
- Wooldridge, Jeffrey M (2002): *Econometric Analysis of Cross Section and Panel Data*, MIT Press.

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