Analysis of Production and Productivity of Rice among the Major Rice Producing States of India

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Abstract- Productivity is one of the major aspects determines the income and profitability of agriculture. Likely, it is also true in the case of rice also. The present paper used secondary data with both descriptive and inferential statistical techniques like ANOVA and Scheffe tests. It has been found that the area of rice grown has been significantly increased in Telangana followed by WB and Odisha and significantly decreased in UP. It has been revealed that the area of rice grown significantly high in WB and UP and less in Telangana and Punjab. The rice production has been significantly increased in Telangana followed by Odisha and WB. It has been revealed that the rice production is significantly high in WB and UP and less in Telangana and Odisha. The rice productivity has been significantly increased only in Odisha. It has been revealed that the rice productivity is significantly high in Punjab and less in Odisha. Accordingly, for the development of agriculture and the economy of the state; the productivity should be high and it has been proved in the case of Punjab.

Keywords: Rice, Production, Productivity, Agriculture and Indian States

I.INTRODUCTION

There has been seen change in India's agricultural sector. Agriculture has been gradually shifted from traditional way to modern way of agriculture (Yingxu & Rong, 2025). There are different practices used in agriculture; organic, inorganic, sustainable, natural, traditional technology, modern technology, different irrigation facilities, amount of fertilizers used, information about the diseases, pesticides many more determine the productivity of rice in particular and agricultural productivity in general (Dixit, 2012).

The productivity is also known as yield and it refers to yield in kilogram (Kg) per hectare (Hec) of land. In India, during 2022-23, the yield of food grains was 2854 Kg/Hec, the yield of cereals was 3478 Kg/Hec, yield of pulses was 1118 Kg/Hec, the yield of rice was 3464 Kg/Hec, the yield of wheat was 3521 Kg/Hec and the yield of Jowar was 1086 Kg/Hec. Whereas, the yield of productivity of agriculture is much lower in India compared developed and agriculturally advanced countries (Cengiz Sayin.M. Nisa Mencet, 2005). At the same time, there are differences in paddy productivity among the major rice producing states of India. In this background, the present paper examines the status of rice production and productivity, and also change in productivity over the period of time.

II.REVIEW OF LITERATURE

Generally most of the previous studies have been focused on understanding the trends in the production of agriculture corps and also the production paddy (Thippeswamy, 2014). Some of the previous works also examined the productivity of agriculture (Bijesh, 2017). Few studies have discussed the price and market issues, use of technology (Chandra, 2021), government policies (V Basil, 2019) and sustainable agricultural development and linking the agriculture with development (Lin, 2025). Further studies have also discussed the inputs used in the agriculture (Somayeh, Shahrzad, & Jasemi, 2023), (Yingxu & Rong, 2025). However, the previous studies have hardly discussed variation in paddy productivity (A. Amarender, 2013). There are very limited studies on comparing the paddy productivity among the major paddy producing states of India (Amreen, Mohd, Bablu, Rajesh, & Shah, 2025). In this background the present article will examine change and variation in rice production and productivity among the major states of India.

III.METHODOLOGY

The present paper used secondary data collected from the website of Ministry of Agriculture and Farmers

Welfare for area of rice production, rice production and productivity. The data collected for the period from 2017-18 to 2021-22. For the analysis 5 major rice producing states of India namely; Odisha, Telangana, Uttar Pradesh (UP) Punjab and West Bengal (WB) are considered. Data processed and presented in the form of tables. The descriptive techniques like minimum, maximum and averages are used to explain the status of area, production and productivity. The Compound Annual Growth Rate (CAGR) computed to explain the growth of the variables. The ANOVA F test and Scheffe tests are used for multiple comparisons of variables.

Table 1: Status and Growth of Area of Rice Production in Major States of India

(In Thousand Hectares)

Year	Odisha	Telangana	Uttar Pradesh	Punjab	West Bengal	All India
2017-18	3766.39	1962.00	5814.00	3065.00	5115.80	43774.07
2018-19	3859.42	1932.00	5748.00	3103.00	5512.57	44156.45
2019-20	3940.71	2011.00	5737.00	2920.00	5490.98	43662.30
2020-21	4038.24	3186.40	5678.00	2928.00	5585.63	45768.69
2021-22	3947.75	3654.90	5703.00	2969.00	5585.75	46278.68
Minimum	3766.39	1932.00	5678.00	2920.00	5115.80	43662.30
Maximum	4038.24	3654.90	5814.00	3103.00	5585.75	46278.68
Average	3910.50	2549.26	5736.00	2997.00	5458.15	44728.04
CAGR	1.39	17.45	-0.51	-1.22	1.89	1.47
t-value	2.661	3.626	-3.444	-1.700	2.422	2.969
p-value	0.076	0.036	0.041	0.188	0.094	0.059
ANOVA F: 71.008, df: (4,20), Sig: 0.000						
Scheffe Test Created 3 subsets: 1. Telangana and Punjab, 2. Odisha and 3. WB and UP						

Source: Ministry of Agriculture and Farmers Welfare, GOI. Note: Subsets moves from lowest to highest.

Area of rice production in the major rice producing states of India is presented above. It is found that Odisha, Telangana, Uttar Pradesh, Punjab and West Bengal are the major states growing rice in India. The average area of rice production in Odisha is 3910.50 thousand hectares, it is 2549.26 in Telangana, 5736 in UP, 2997 in Punjab and 5458.15 hectares in WB. The total area of rice grown in India is 44728.04 hectares. The area of rice grown has been significantly increased in Telangana followed by WB and Odisha and significantly decreased in UP and at the same time; there is no change in the area of rice grown in Punjab. It has been revealed from ANOVA F-test and Scheffe multiple test that the area of rice grown significantly high in WB and UP and less in Telangana and Punjab.

Table 2: Status and Growth of Rice Production in Major States of India

(In Thousand Tonnes)

Year	Odisha	Telangana	Uttar Pradesh	Punjab	West Bengal	All India
2017-18	6551.31	6262.22	13273.99	13381.79	14967.04	112757.61
2018-19	7733.70	6670.01	15545.28	12821.60	16242.21	116477.82
2019-20	8360.37	7427.77	15517.80	11779.28	15881.44	118870.32
2020-21	8810.30	10217.13	15520.02	12783.65	16524.44	124368.32
2021-22	9290.76	12409.57	15271.54	12885.46	16728.66	129471.42
Minimum	6551.31	6262.22	13273.99	11779.28	14967.04	112757.61
Maximum	9290.76	12409.57	15545.28	13381.79	16728.66	129471.42

Average	8149.29	8597.34	15025.73	12730.36	16068.76	120389.10
CAGR	8.29	17.94	2.78	-0.78	2.39	3.42
t-value	6.231	6.552	1.450	-0.477	2.976	13.750
p-value	0.008	0.007	0.242	0.665	0.058	0.001
ANOVA F: 33.387, df: (4,20), Sig: 0.000						
Scheffe Test Created 3 subsets: 1. Odisha and Telangana, 2. Punjab 3. UP and WB						

Source: Ministry of Agriculture and Farmers Welfare, GOI. Note: Subsets moves from lowest to highest.

Rice production in the major rice producing states of India is presented above. The average rice production in Odisha is 8149.29 thousand tonnes, it is 8597.34 in Telangana, 15025.73 in UP, 12730.36 in Punjab and 16068.76 thousand tonnes in WB. The total rice production in India is 120389.10 thousand tonnes. The rice production has been significantly increased in Telangana followed by Odisha and WB and at the same time; there is no change in the rice production in UP and Punjab. It has been revealed from ANOVA F-test and Scheffe multiple tests that the rice production is significantly high in WB and UP and less in Telangana and Odisha.

Table 3: Status and Growth of Rice Productivity in Major States of India

(In Kg/Ha)

Year	Odisha	Telangana	Uttar Pradesh	Punjab	West Bengal	All India
2017-18	1739	3192	2283	4366	2926	2576
2018-19	2004	3452	2704	4132	2946	2638
2019-20	2122	3694	2705	4034	2892	2722
2020-21	2182	3206	2733	4366	2958	2717
2021-22	2353	3395	2678	4340	2995	2798
Minimum	1739.00	3192.00	2283.00	4034.00	2892.00	2576.00
Maximum	2353.00	3694.00	2733.00	4366.00	2995.00	2798.00
Average	2080.00	3387.80	2620.60	4247.60	2943.40	2690.20
CAGR	6.89	4.94	3.29	0.43	0.51	1.95
t-value	6.271	0.227	1.627	0.327	1.361	6.771
p-value	0.008	0.835	0.202	0.764	0.266	0.006
ANOVA F: 107.661, df: (4,20), Sig: 0.000						
Scheffe Test Created 4 subsets: 1. Odisha, 2. UP and WB, 3. Telangana and 4. Punjab						

Source: Ministry of Agriculture and Farmers Welfare, GOI. Note: Subsets moves from lowest to highest.

Rice productivity in the major rice producing states of India is presented above. The average rice productivity in Odisha is 2080 kilogram per hectare, it is 3387.8 in Telangana, 2620.6 in UP, 4247.6 in Punjab and 2943.4 kg/ha in WB. The rice productivity in India is 2690.20 kg/ha. The rice productivity has been significantly increased only in Odisha and at the same time; there is no change in the rice productivity in other states. It has been revealed from ANOVA F-test and Scheffe multiple tests that the rice productivity is significantly high in Punjab and less in Odisha.

IV.CONCLUSION

The present paper examined the area, production and productivity of rice in major rice producing states of India. It has been found that the area of rice grown has been significantly increased in Telangana followed by WB and Odisha and significantly decreased in UP. It has been revealed that the area of rice grown significantly high in WB and UP and less in Telangana and Punjab. The rice production has been significantly increased in Telangana followed by Odisha and WB. It has been revealed that the rice production is

significantly high in WB and UP and less in Telangana and Odisha. The rice productivity has been significantly increased only in Odisha. It has been revealed that the rice productivity is significantly high in Punjab and less in Odisha. Accordingly, for the development of agriculture and the economy of the state; the productivity should be high and it has been proved in the case of Punjab.

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