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Status of Rice production in Jammu and Kashmir: An Economic Analysis

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Abstract

Jammu and Kashmir is well acknowledged for both agricultural and horticultural, and has maintained a first-rate status in all the States of India, but at the equivalent time rice being a staple food for almost intact population is losing its status. Present study was based on the secondary data in which linear multiple regression model used to understand the impact of area and irrigation on the production of rice in Jammu and Kashmir, the data has revealed that both the variables has shown 85% of variation caused in the rice production Jammu and Kashmir, but at the same time area under the rice production in Jammu and Kashmir is declining as there is continuously land diversion taking place from rice to horticultural one as a result every year government has to import at a large scale from the central pool.

Keywords: Rice, Jammu & Kashmir, Production, Multiple Regressions.

Introduction

Jammu and Kashmir's economy is predominantly dependent on agriculture and allied activities. The Kashmir valley is known for its sericulture and cold-water fisheries. Agricultural exports from Jammu and Kashmir include apples, barley, cherries, corn, millet, oranges, rice, peaches, pears, saffron, sorghum, vegetables, and wheat, while manufactured exports include handicrafts, rugs, and shawls. Horticulture plays a vital role in the economic development of the state. With an annual turnover of over 3 billion (US\$51 million), apart from foreign exchange of over 800 million (US\$14 million), this sector is the next biggest source of income in the state's economy ^[1].

Rice production in the Jammu and Kashmir is predominantly a mono cropped activity with a very high consumption and most important staple food than other states of India. The area under the rice is distributed by both the regions in which about 40 percent of area is with Jammu division while as 60 percent of the area is with Kashmir division. Rice play an important role in the livelihood of the people in the state, although the area under the crop is very small as compared to other states of the India with only 0.27 m ha ^[2], but at the same time plays an important role in the state economy.

Research Methodology

Present study was based on secondary data which has been collected from the Directorate of Economics and statistics government of Jammu and Kashmir (Annual Publication 2011 - 12) and consists time duration of fifteen years in which multiple regression models used to find out the impact of area and irrigation on the production of rice in Jammu and Kashmir. Due to lack of data simple compound growth rate was used for to find out the area, irrigation and production for the year 2013 and 14.

Objectives of the study

1. To find out the Status, production and Productivity of Rice in Jammu and Kashmir from last one and half decade.
2. To find out the influence of area and irrigation (as variables) on the production of and productivity of rice in Jammu and Kashmir.

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Status of Rice in the Jammu and Kashmir

Jammu and Kashmir has a unique distinction of introducing the land reforms. At that time about 1.82 lakh hectares of the land has been distributed. Out of which about 0.94 lakh hectares were distributed free of cost among the peasants with no much effort to be done. The state has abolished the absence of landlordism. Over the years a neo – land holders have come into existence which are comparable to absentee of land owners if not landlords holding large “jagirs”. The reform period in the Jammu and Kashmir has got twin objective of giving the cultivators his rightful place in the social system and also ensure more efficient utilization of state resources with an objective to achieve the self-sufficiency in terms of rice production, although leaped forward from mere few lakh tones to 0.89 million tonnes. Rice productivity in the state is very high with 2.2 t/ha compared with the national average productivity of about 1.9 t/ha, although with the passage of time the Area under rice in J&K is continuously decreasing. Rice in Jammu and Kashmir is grown only once in a year because of the extreme climatic conditions, further it can be said that the diversity in the agro climatic which when coupled with farmers preferences give rise to wide range of grain preferences from bold, coarse grains in temperature regions to fine, aromatic and basmati in subtropical areas. At the same time the Jammu region represents almost all the zones ranging from the subtropical one to mid hills extending to high hills constituting the temperature zone. Basmati rice is grown on more than 32000

(2010-11) hectares of the area of Jammu division particularly in the R.S Pora belt which is famous in the world for its famous for its high aroma. The business from basmati rice annually fetches more than forty five (45) crores of rupees. Thus the cultivation of the rice in this region offers a great potential for its improvement, but at the same time there is a much worry to the State of J&K in terms of food grain deficiency as it has already touched to 40 percent which will grow in the future as the deficiency is the process which cannot be stopped, it is bound to happen as the farmers in the cash economy are more concerned about the benefits which derive them from investment in rice production to horticultural sector, it will be not surprising to see Kashmir growing Apples only and Bihar cultivating rice. The deficiency in food grains (Rice) can be revealed from the fact that the production of Rice in J&K is only seven (7) lakh metric tons whereas the demand is eleven (11) metric tonnes hence there is a miss match in demand and supply which ultimately results in the inflation. The deficiency in the food grains has been attributed to rampant conversion of agricultural land and depleting efficiency of the land, as in Kashmir alone more than two lakh Kanals of agricultural land of the net sown area has been converted for commercial and other purposes, the only thing to cheer for the people of Jammu and Kashmir is that the net production of rice is increasing despite the land diversion as the methods of cultivation of rice has been shifted from traditional practices to the modern ones.

Table 1: Production, productivity of rice Jammu and Kashmir with growth rates in terms of area and production from 1999-00 to 2013-13.

Year	Production (000) lakh tonnes	Area (000) lakh hectares	Productivity	Growth rate In production	Growth rate in Area
1999-00	3915	250.63	15.62064	8.633461	-2.62538
2000-01	4253	244.05	17.42676	-0.70538	2.356075
2001-02	4223	249.8	16.90552	-0.21312	-5.44436
2002-03	4214	236.2	17.84081	19.79117	10
2003-04	5048	259.82	19.42884	-2.37718	-3.76414
2004-05	4928	250.04	19.70885	13.10877	3.587426
2005-06	5574	259.01	21.5204	-0.50233	-2.50569
2006-07	5546	252.52	21.96262	1.334295	4.249168
2007-08	5620	263.25	21.34853	0.302491	-2.13485
2008-09	5637	257.63	21.88022	-11.1052	0.877227
2009-10	5011	259.89	19.28123	4.490122	0.561776
2010-11	5236	261.35	20.03444	1.699771	0.309929
2001-12	5325	262.16	20.31202	3.286385	-0.72856
2012-13	5500	260.25	21.13353	4.727273	-0.35735
2013-14	5760	259.32	22.21194	-100	-100

Source ¹³: Directorate of Economics & Statistics government of Jammu and Kashmir [Digest of Statistics (2010 – 11)].

As has already being mentioned that with the passage of the time the production of rice in Jammu and Kashmir is increasing at an increasing rate as the Table 3.1 gives a clear idea behind that during the year 1999-00 the production of rice was 3915 lakh tonnes which has now increased to 5760 in 2013 – 14. But at the same time there is a continuous decline in the area under the rice in Jammu and Kashmir. Out of all twenty two (22) the districts in Jammu and Kashmir, only twelve (12) districts are suitable for rice production in J&K in which four districts are coming under the high productivity group yielding more than 2,500 kg/ha under the triennium average of 1.03 lakh hectares whereas the average production of rice under these districts is 3.16 lakh tonnes which was 55.3 percent of average triennium average production 5.72 lakh tonnes of rice in the state. The triennium average productivity of all the high productivity

districts (4) is 3,068 kg/ha as against 3,068 as against 2,241 kg/ha triennium average productivity of the state. The average productivity of the medium productivity districts which are yielding 2000 – 2500 kg/ha comprising only one district with an area of 0.293 lakh hectares which is 11.5% of the average area of the state. The total production of the district is 1.74 lakh tonnes which is 11.5% of the average production of the state where as the total productivity of the district is 2,239 kg/ha as against 2,241 kg/ha average productivity of the state. The third group comes into the heading of medium low productivity which yields 1,500 – 2000 kg/ha which consists of five districts under the area off 1.09 lakh hectares which is 42.7% of the average area under the state (2.55 lakh hectares). Whereas the production of rice under the group was 1.74 lakh tonnes which was 30.4% of the average production of rice under the state, the

productivity of the rice under this group was 1,596 kg/ha as against the 2,241 kg/ha of the average production off the state.

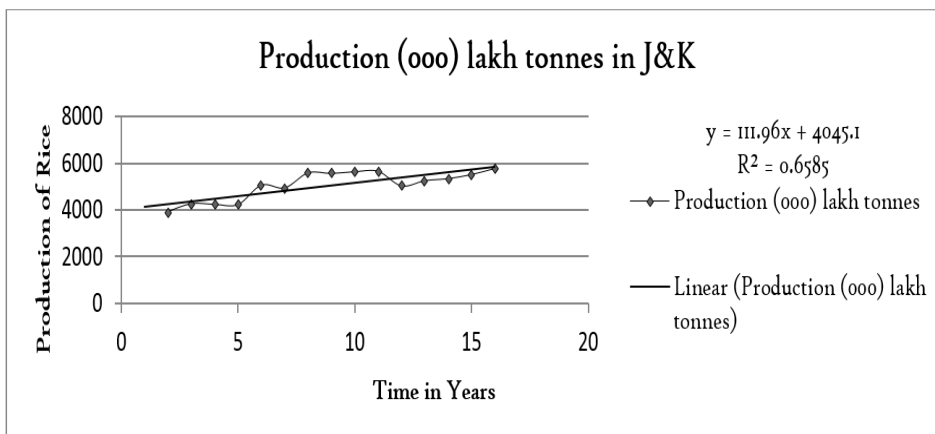
High Productivity group. (>2500 kg/ha) [Four districts] Pulwama (3,418 kg/ha), Anantnag (3,418 kg/ha), Srinagar (3,207 kg/ha) and Budgam (2,617 kg/ha). Medium Productivity group. (2000 – 2500) [One district] Baramula (2,239kg/ha). Medium low productivity Districts (1,500 – 2000 kg/ha) [five districts] Poonch (1,750 kg/ha), Jammu (1,620 kg/ha), Kupwara (1,556 kg/ha), Kathua (1,547 kg/ha) and Kulgam (1,496 kg/ha). Low productivity Districts (1,000 – 1500 kg/ha) [one District] Udhampur (1,235 kg/ha). Very low productivity Districts (< 1000 kg/ha) [one district] Doda (992 kg/ha).

About 40% rice area in Jammu and Kashmir is concentrated in high productivity group accounting more than 55% production of total rice production in the state. The productivity of high productivity group of Jammu and Kashmir is 3,068 kg/ha which is about 58% higher than the national average productivity of 2,747 kg/ha. Besides this the average productivity (2,241kg/ha) of the state is also higher than the national average of 2,747kg/ha.

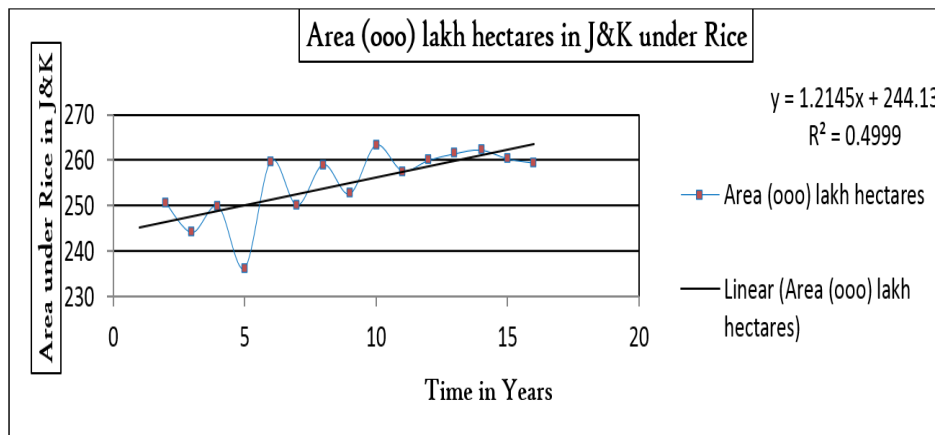
Anantnag and Srinagar are the only districts in Jammu and Kashmir whose production is large as compared to the remaining districts of J&K, whereas Baramula when added to the former confirms the greater productivity districts of the state. Anantnag and Pulwama is called the rice Bowl of J&K as these districts are provided with rich natural and water resource management, apart from this both the districts of the

valley has got the large area under the cultivation of rice and at the same time the productivity in these districts as greater as compared to other districts of the State. According to the above table 40375 ha is the area under the rice production in Anantnag and the total production is 105726t with a productivity of 2.62 t/ha coupled with the Pulwama District in the same ratio. It is being observed that with the passage of time the production of rice in these districts is declining as the land used under the rice is continuously is converted into commercial purposes which in turn has decreased the production of Rice in J&K state. The problem that lies in decreasing of land area under the rice is that there is a continuous land diversion taking place and the area under the rice is used for the commercial purposes and horticultural purposes. Still the productivity of rice in Jammu and Kashmir can be improved by tapping the uncultivated land, including the waste land and fallow land as there is a large untapped land that needs to be addressed. At the same time there is a worst case that degrades the production of rice in the valley is that the farmers face the problem of dry and dismal picture owing to lack of rain and non^[4] availability of water for irrigation. Due to a major and most essential food staple in the valley there is a continuous rising problem of lack of rice production in the valley. The problem of land diversion and lack of timely availability of necessary inputs in the valley causes the mismatch in the demand and supply which results in inflation and hence the poverty class and middle class are deeply infected.

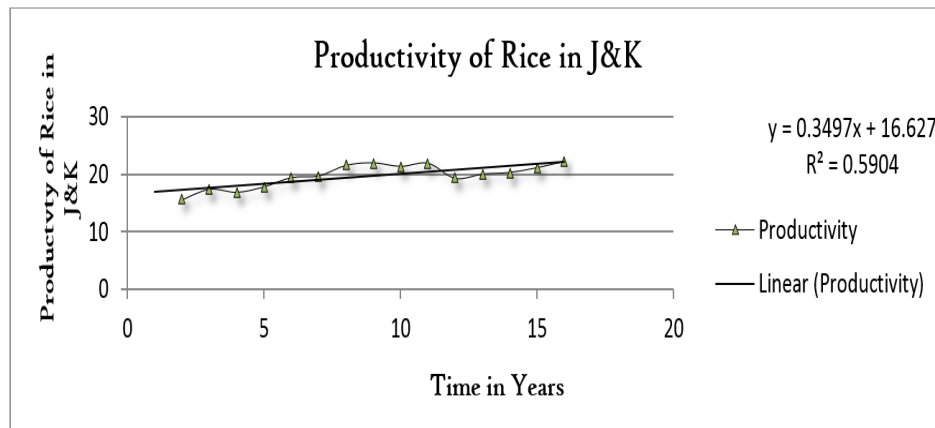
Calculation of trend line in the Production, Productivity and Area in Jammu and Kashmir From last fifteen (15) years



Trends line in the production of Rice in Jammu and Kashmir (1999-00 to 2013-14)



Trends line in the area under Rice in Jammu and Kashmir (1999-00 to 2013-14).



Multiple Regression model explaining the influence of different variables on the production of rice in Jammu and Kashmir

The production function is a statement of the functional relationship between inputs and outputs, in which an input is any good or service that goes into production and an output is any good or service that come out of production process. Thus the term Production function refers to the physical relationship between firm’s inputs and/or resources and its output of goods or service that comes out of production process. In economic terminology production implies the creation of utility for sales [5]. The act of creating utility is possible by transforming inputs into outputs. In the context of agricultural it is of great importance as because of the peculiar nature of business itself. In finding out the effect of different variables (inputs) on the production of rice, we have employed the production in which we have taken area, irrigation and prices as the inputs and production of rice as output. The logic behind taking these variables into the process is explained as under.

Area: Area is an important variable which influence the production of rice to a large extent as we know that with the increase in area the production is bound to increase, weather it has also happened in the production of rice we have taken it.

Irrigation: As we know that like Indian, Jammu and Kashmir agricultural is also a gamble of monsoons; irrigation is growing to play an important role in the output of any agricultural process. So we have also taken this variable to explain the effect of irrigation in the production of rice so our production function becomes as $P = f(\text{Area, and Irrigation})$. Production is the function of Area and Irrigation $P = f(X_1, X_2)$
 X_1 is Area and X_2 is irrigated area under rice.

The equation becomes $Y = \alpha + \beta_1 X_1 + \beta_2 X_2$
 The above equation can be solved by the following three normal equations

$$\sum Y = n\hat{\alpha} + \hat{\beta}_1 \sum X_2 + \hat{\beta}_3 \sum X_3 \tag{1}$$

$$\sum X_2 Y = \hat{\beta}_1 \sum X_2 + \hat{\beta}_2 \sum X_2^2 + \hat{\beta}_3 \sum X_2 X_3 \tag{2}$$

$$\sum X_3 Y = \hat{\beta}_1 \sum X_3 + \hat{\beta}_2 \sum X_2 X_3 + \hat{\beta}_3 \sum X_3^2 \tag{3}$$

For calculating the value of β_2 β_1 and α we use the following three equations.

$$\hat{\alpha} = \bar{Y} - \hat{\beta}_2 \bar{X}_2 - \hat{\beta}_3 \bar{X}_3 \tag{4}$$

$$\hat{\alpha} = 511.8467 - 0.01815 \times 255.0613 - 8.09734 \times 2.3063$$

$$\hat{\alpha} = 488.3904$$

$$\hat{\beta}_1 = \frac{\sum X_2 y \cdot \sum X_3^2 - \sum X_2 X_3 \cdot \sum X_2 y}{\sum X_2^2 \sum X_3^2 - (\sum X_2 X_3)^2} \tag{5}$$

$$\hat{\beta}_1 = 1.01875$$

$$\hat{\beta}_2 = \frac{\sum X_3 y \cdot \sum X_3^2 - \sum X_2^2 \cdot \sum X_2 X_3 \cdot \sum X_2 y}{\sum X_2^2 \sum X_3^2 - (\sum X_2 X_3)^2} \tag{6}$$

$$\hat{\beta}_2 = 8.09734$$

$$R^2 = \frac{\hat{\beta}_1 \sum X_2 y + \sum \hat{\beta}_2 \sum X_3 y}{\sum y^2} \tag{7}$$

$$R^2 = \frac{0.01875 \times 4483.130 + 8.09734 \times 39.6224}{59234.437}$$

For estimating the standard errors of $\hat{\beta}_1$ and $\hat{\beta}_2$ we need to estimate of σ_u^2

$$R^2 = 1 - \frac{\sum ei^2}{\sum yi^2} \text{ where } \sum ei^2 = \sum yi^2 (1 - R^2)$$

$$R^2 = 1 - \frac{8759.32}{59234.437} = 0.852123.$$

The standard errors of the estimates are

$$SE(\hat{\beta}_1) = \sqrt{\text{variance of } \hat{\beta}_1} \tag{8}$$

$$SE(\hat{\beta}_1) = 0.487$$

$$SE(\hat{\beta}_2) = \sqrt{\text{variance of } \hat{\beta}_2} \tag{9}$$

$$SE(\hat{\beta}_2) = 2.345$$

Ho = there is no relationship between the production of rice and Area.

Ho = there is no relationship between the production of rice and net irrigated area of rice.

To prove the null hypothesis we have used the Students t - test as:

$$t^* = \frac{\hat{\beta}_1}{SE(\hat{\beta}_1)} \tag{10}$$

$$t^* = \frac{1.01875}{0.487} = 2.0918$$

$$t^* = \frac{\hat{\beta}_2}{SE(\hat{\beta}_2)} \tag{11}$$

$$t^* = \frac{8.09734}{2.345} = 3.4530$$

If $t^* > t$ (tabulated), we reject the null hypothesis and accept that the alternative one, which follows the t – distribution with (n - k) degree of freedom $\hat{\beta}_1$ is statistically significant thus greater the value of t^* the stronger the evidence that $\hat{\beta}_1$ is statistically significant.

S.E (($\hat{\beta}$))	0.487	2.2345
t*	2.0918	3.4530

Hence we can conclude that there is a significant relationship between production of rice and Area under rice in Jammu and Kashmir at (15 – 3 =1.782) degree of freedom, and there exists a significant relationship between production of rice and total irrigated area under rice in Jammu and Kashmir at (15 – 3 =1.782) degree of freedom.

Conclusion

Rice production in Jammu and Kashmir has virtually come down from last one and half decade, even though the government has taken some of the appropriate procedures in increasing it. Even though the green revolution has helped the state in increasing the production of rice but at the same time looking for the future of rice in Jammu and Kashmir will come under additional pressure from the intense competition of land and water due to changing climatic condition, high price for fertilizers. This requires a careful analysis for the current scenario and perspective with a view to identify researchable issues and the appropriate strategies

to address them. However there is still a scope for improving rice production in this handicapped ecology through proper scientific intervention and policy decision

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