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Change in Area, Production and Productivity of Rice, Wheat and Pulses Through National Food Security Mission (NFSM)

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ABSTRACT

National Food Security Mission (NFSM) has been launched from 2007-08 to increase the area, production and productivity of rice, wheat and pulses. The study was undertaken to conduct trend analysis of change in area, production and productivity of rice, wheat and pulses through National Food Security Mission. To carry out the trend analysis, the growth in the area, production and productivity of rice, wheat and pulses in Uttar Pradesh was estimated using the compound growth function. The necessary secondary data were collected for a period of 6 years from 2007-08 to 2012-13 for rice and wheat and for pulse a period of five years data from 2007-08 to 2011-12 was used. The results of the study have shown that area under rice, wheat and pulses increased with compound growth rate of 7.81, 1.85, and 3.48 percent respectively. The growth in production of rice, wheat and pulses was 3.57, 3.46, and 9.11 percent respectively. Similarly productivity growth of rice, wheat and pulses was 3.55, 2.99 and 4.73 percent respectively. The growth in production and productivity of wheat was found to be significant. Similarly, the productivity of rice and production of pulse was found to be significant.

Key words: National Food Security Mission (NFSM), Growth Rate, Area, Production, Productivity, Rice, Wheat, Pulses

INTRODUCTION

Although agriculture, including allied activities, accounted for only 14.1 per cent of the GDP at constant (2004-5) prices in 2011-12, its role in the country's economy is much bigger with its share in total employment according to the 2001 census, continuing to be as high as 58.2 per cent. The declining share of the agriculture and allied sector in the country's GDP is consistent with normal development trajectory of any economy, but fast agricultural growth remains vital for jobs, incomes, and the food security. The growth target for agriculture in the Twelfth Five Year Plan remains at 4 per cent, as in the Eleventh Five Year Plan (Economic Survey, Government of India, 2012-13).

Food grains production in India has shown remarkable improvement in recent years. The production of food-grains in 2011-12 was at a record high of 259.32 million tonnes. This achievement comes at a time when it is generally recognized that inadequate attention to agriculture across many parts of the world led to food shortage and steep hikes in food prices. Moreover, the country faces the stiff challenge of feeding its growing population (Economic Survey, Government of India, 2012-13). The per capita net availability of cereals and pulses declined from 510 g per day in 1991 to 436 g per day in 2008 and then it marginally increased to 462.9 g per day in 2011. On the other hand the per capita net availability of pulses declined from 49.6 g per day in 1991 to 39.4 g per day in 2011 (Economic Survey, Government Of India, 2012-13). Such a situation is attributable to a host of important factors such as poor public investment, squeezing of cultivable area and rising food prices (Chatterjee and Giri, 2010).

To increase the area, production and productivity of rice, wheat and pulses, National Food Security Mission was launched from Rabi 2007-08 in 312 identified districts of 17 states in the country. NFSM has already completed five years and it is proposed to continue during the 12th Five-Year Plan with some modifications. Hence, the research was done to know the impact of National Food Security Mission (NFSM) on area, production and productivity of rice, wheat and pulses and the present paper was focused on trend analysis of change in area, production and productivity of rice, wheat and pulses through National Food Security Mission.

METHODOLOGY

The study on growth in area, production and

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productivity of rice, wheat and pulses was purposively taken up in Uttar Pradesh state of India, since the state is one of the leading states in production of targeted crops under National Food Security Mission (NFSM). The maximum numbers of districts identified under NFSM to meet project activities are from Uttar Pradesh (39 districts for wheat, 27 districts for paddy and 72 districts for pulses), according to the recent data available in the national portal of India, India Development Gateway (2012). The secondary data on area, production and productivity of rice, wheat and pulses through NFSM were used to analyze the trends. The time series data on area, production, productivity of rice and wheat through NFSM was available from 2007-08 to 2012-13.Hence the analysis was covered for the period from 2007-08 to 2012-13 for rice and wheat but for pulses, data were available from 2007-08 to 2011-12. Data used for the study were collected from the web site of NFSM.

The trend analysis in the area, production and productivity under rice, wheat and pulses was done by calculating the compound growth rate with formulae:

$$Y = A(1+r)t$$

Where,

Y= Dependent variables like area, production, yield, for which growth rate is estimated

A= Constant

r = Rate of annual increment

t = Time element which takes the value of 1, 2, 3… n

After transforming the model into a linear form by taking logarithms to base 'e',

$$\ln Y = \ln A + t \ln(1+r)$$

Let, $\ln A = a$

$\ln(1+r) = b$

So, $\ln Y = a + bt.$

$(1+r)$ = Anti ln of b

r = (Anti ln of b) - 1

The semi log function is linear in parameters (linear relationship between Y and t), and hence, it can be fitted by the method of Ordinary Least Squares (OLS) Technique.

The compound growth rate (r) is obtained by the following formula and generally expressed in terms of percentage.

$$r = [(\text{Anti ln of } b) - 1] \times 100$$

The significance of growth rate was tested by applying student-'t' test statistic (Laxmanan *et al.,* 2005)

$$t = r / \text{S.E.}(r) \text{ with } (n-2) \text{ df}$$

where,

$$\text{S.E.}(r) = 100\, b \times \text{S.E.}(\log b) / \log 10e$$

r = the Compound growth rate

n = number of year

S.E.(r) = Standard error

Df = Degrees of freedom

$t = r / \text{S.E.}(r)$ follows student 't' distribution with n-2 degrees of freedom

According to log base rule, lne10 is worked out to be 2.3025 which follows 't' distribution with (n-2) degrees of freedom, n is the number of years considered under study. Pattern of growth rates over the years was identified using the 'b' coefficient.

If coefficient is statistically significant and positive, then growth of the estimated parameters over the years is accelerating. If it is negative, it implies that the growth is decelerating over the years. If it is around zero, it implies that the growth is stagnant, over the years. In the present study the compound growth rates and coefficient of variation have been computed from 2007-08 to 2012-2013 for all variables such as area, production and productivity of rice and wheat, for pulse the compound growth rates and coefficient of variation have been computed from 2007-08 to 2011-2012 for all the above said variables.

RESULTS AND DISCUSSION

Compound Growth Rate and Coefficient of Variation estimation of increase in area of rice, wheat and pulses through NFSM in Uttar Pradesh

The average area under rice, wheat and pulses in the state during the study period was 7041.05, 9743.48, and 2359.03 thousand hectares respectively (Table 1). The

fluctuation in the area under wheat and pulses in the state appeared to be low as the coefficient of variation was 6.61 and 6.87 per cent respectively. The growth rate of area in wheat in the state was found to be low with 1.85 percent annual increment where as the growth rate of area in pulses was 3.48 percent. The growth in the rice area in the state is around 7.81 per cent per annum with a very high fluctuation of 47.48 per cent.

Table 1: CGR and CV of area of rice, wheat and pulse

Crop	Mean area (thousand ha)	C. V. (%)	CGR (% pa)
Rice	7041.05	47.48	7.81
Wheat	9743.48	6.61	1.85
Pulse	2359.03	6.87	3.48

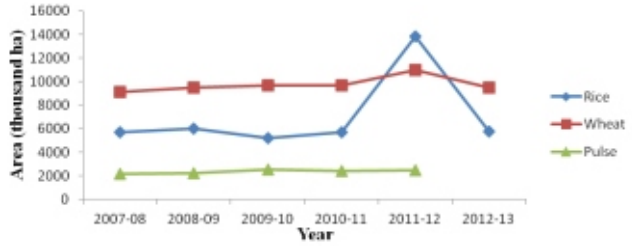

Figure. 1: Trend line of Area of Rice, Wheat and Pulse

Compound Growth Rate and Coefficient of Variation estimation of increase in production of rice, wheat and pulses through NFSM in Uttar Pradesh

During the period 2007-08 to 2012-13, the growth rate of production in rice in the state was found to be 3.57 percent per annum and the fluctuation in the grain output was found to be 10.51 per cent. Again during the same period, the growth rate of wheat production was found to be significant with 3.46 percent increment per annum and the coefficient of variation was found to be 7.00 per cent. Pulse production during the period 2007-08 to 2011-12 in the state is growing at around 9.11 per cent per annum at 5 per cent level of significance and its coefficient of variation was 15.34 per cent. The mean production level of rice, wheat and pulses through NFSM was 12646.66, 28845.58, 1983.83 thousand tonnes respectively Table 2.

Table 2: CGR and CV of production of rice, wheat and pulse

Crop	Average production (thousand tonnes)	C. V. (%)	CGR (% pa)
Rice	12646.66	10.51	3.57
Wheat	28845.58	7.004	3.46*
Pulse	1983.83	15.34	9.11*

*Significant at 0.05 level of probability

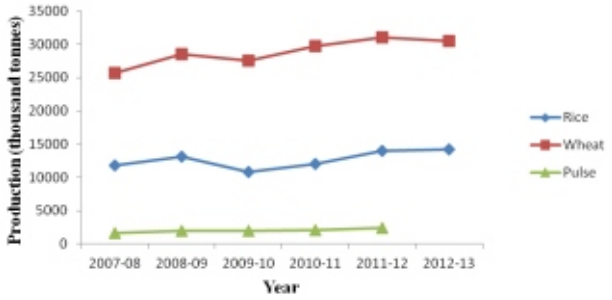

Figure. 2: Trend line of Production of Rice, Wheat and Pulse

Compound Growth Rate and Coefficient of Variation estimation of increase in productivity of rice, wheat and pulses through NFSM in Uttar Pradesh

The average productivity of rice, wheat and pulses in the state through NFSM was found to be 2136.5, 2984, and 885.6 kg/ha respectively. The growth rate of pulse was found to be 3.55 and per cent per annum respectively. There is a significant increment in the growth of the rice and wheat *i.e.,* 3.55 and 2.99 per cent per annum. The fluctuation in the productivity of pulse was little bit higher than that of rice and wheat *i.e.,* the coefficient of variation of pulse, rice and wheat was found to be 10.67, 7.89 and 6.18 per cent respectively (Table 3).

Table 3: CGR and CV of productivity of rice, wheat and pulse

Crop	Average productivity (kg/ha)	C.V. (%)	CGR (% pa)
Rice	2136.5	7.89	3.55*
Wheat	2984	6.18	2.99*
Pulse	885.6	10.67	4.73

*Significant at 0.05 level of probability

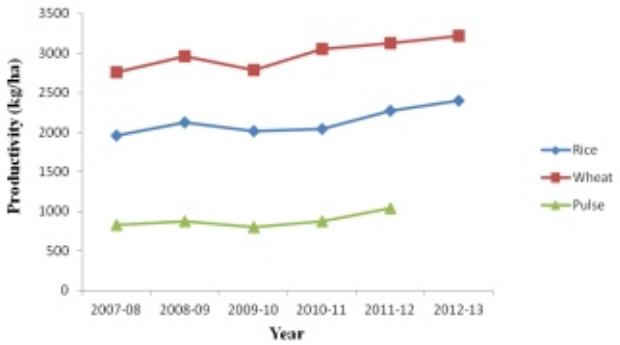

Fig. 3: Trend line of Productivity of Rice, Wheat and Pulse

CONCLUSION

NFSM was launched in 2007-08 with an aim to bridge the yield gap and increase the production of rice, wheat and pulses up to 20 million tonnes. In the above study in Uttar Pradesh state of India, we found that there is a positive annual increment in area, production and productivity of rice, wheat and pulses. However the growth rate in production of pulse and wheat and productivity of rice and wheat was found to be significant at 5 percent level of significance. Again the area under rice in NFSM in the state shows very high fluctuation over the study period. The major reasons for rise in area, production and productivity of cereals and pulses in the study area could be various facilities extended to the farmers under the programme. The success of the NFSM mainly depends upon availability of the required funds and thereby ensuring timely availability of physical inputs for production.

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