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Scenario of fertilizer consumption in different agro-climatic zones of eastern Uttar Pradesh

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Abstract

Eastern Uttar Pradesh is the most populous and an important place in fertilizer consumption in the state. It covers 25 districts over in three –climatic zone viz. North Eastern plain zone (NEPZ), Eastern Plain zone (EPZ) and Vindhyan Zone (VE). The study is based on secondary data which was produced from Directorate of Agricultural Statistics and Crop Insurance covering the period 1970-71 to 2004-05. This paper has been prepared to study the aspect of fertilizer consumption during and post green revolution period along with growth rate of fertilizer consumption. The different growth curves were used for growth rate of fertilizer consumption. The trend of fertilizer is very aggressive due to awareness of farmers.

Keywords: fertilizer consumption, agro-climatic zone, growth rate and secondary data

Introduction

Eastern Uttar Pradesh is the most popular and occurs an important place in fertilizer consumption in Uttar Pradesh. The Eastern Uttar Pradesh covers 25 Districts. The Eastern Uttar Pradesh covered different three Agro-climatic zones viz., North Eastern Plain Zone, Eastern Plain Zone and Vindhyan Zone. North Eastern Plain Zone constitute 11 Districts, Eastern Plain Zone constitute 12 Districts. Vindhyan Zone constitutes two Districts. The Eastern Uttar Pradesh has been divided in three different agro-climatic zones, which includes North Eastern Plain Zone, Eastern Plain Zone, and Vindhyan Zone. Uttar Pradesh has total geographical area of 29.44 million hector out of which cropped area covers 24.24 million hector with cropping intensity of 148.6% The average fertilizer consumption of Eastern Uttar Pradesh 1521.85 kg /ha during 1970-71 to 2004-05. The North Eastern Plain Zone of Uttar Pradesh, India covers a geographical area of 33.49 thousand km² consisting of 11 districts. Rice and wheat are important food crops of the zone, covering are of 13.42 and 13.26 lakh /ha. The Eastern Plain Zone covers a geographical area of 45.33 thousand km² consisting of 12 districts. Gross irrigated area of the zone is largest (1808495 ha) among other zones of Eastern Uttar Pradesh. This constitutes 52% of the total area of land utilization as compared to 39% of North Eastern Plain Zone and 13% of Vindhyan Zone. Rice and wheat are important food crops of the zone.

The Vindhyan Zone out of the all three zones is the smallest zone having the geographical area of 11.33 thousand km² consisting of 2 districts. The irrigation potential in the zone is very poor i.e. 13% of the total area of land utilization and 42% of the cropped area, hence irrigation facility is to be developed in the zone to increase the large area under irrigation.

Materials and Methods

The investigation was carried out during 1970 – 71 to 2004-05. The study is based on secondary data. The data time series of 35 years on fertilizer consumption in districts of Eastern Uttar Pradesh. The data were collected from the report of Director Agriculture, Statistics and crops Insurance, Government of Uttar Pradesh, Krishi Bhawan Lucknow Uttar Pradesh. The data is classified in two parts 1970-71 to 1989-90 is during green revolution and 1990-91 to 2004-05 is Post Green revolution. Further the entire 25 districts under consideration are classified in three Agro-climatic zones viz. North Eastern Plain Zone Eastern Plain Zone and Vindhyan Zone respectively. North Eastern Plain Zone constitute 11 Districts viz. Basti, Bahraich, Balrampur, Deoria, Gorakhpur, Gonda, Mahrajganj, Kushinagar, Siddharth Nagar, Sant Kabeer Nagar and Shravsti, Eastern Plain Zone constitute 12 Districts viz. Azamgarh Ambedkar Nagar, Barabanki, Ballia, Chandauli, Faizabad, Ghazipur, Mau, Jaunpur, Sant Ravidas Nagar, Sultanpur and Vanarasi. Vindhayan Zone constitutes 2 Districts viz., Mirzapur and Sonbhadra.

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The techniques employed are described as follow

Growth rates of fertilizer consumption during green revolution and post green revolution. Along with different agro-climatic zones.

$$Y_t = a(1+r)^t$$

Where

Y= Time series data on fertilizer consumption

t = Year (t =1, 2,.....35)

a = Intercept.

r = Average Compound growth rate.

To obtain annual compound growth rate, the function was first linearised by taking natural log both side, i.e.

$$\text{Log } Y_t = \text{log } a + t \text{ log } (1+r)$$

$$\text{or } Y_t^* = a^* + bt$$

Where $\text{log } Y_t = Y_t^*$, $a^* = \text{log } a$ and $b = \text{log } (1+r)$

The above linearised function was fitted by least square method and estimate of b as \hat{b} was obtained.

The annual compound growth rate is then computed as

$$r = (\text{anti log of } \hat{b} - 1) \times 100$$

All growth rates are expressed in percentage. The best-fitted function was judged on the basis of R^2 (Coefficient of determination) and root mean square error (RMSE) both.

This equation separately fitted for during green revolution, Post green revolution and overall fertilizer consumption in three different agro-climatic zones viz. North Eastern Plain

Area, Eastern Plain Area and Vindhyan area Along with show the growth rate of some equation of the separately all districts of the Eastern Uttar Pradesh.

Result and Discussion

To get idea about the growth rate of fertilizer consumption in Eastern Uttar Pradesh, we have proposed to calculate Simple and compound growth rate. The growth rate of fertilizer consumption has also been studied for the entire period covering eastern Uttar Pradesh in three agro climatic Zones, North eastern plain Zones (NEPZ) Easter Plain Zone (EPZ) and Vindhyan Zone (VZ) respectively. Growth rate of Vindhyan Zone have been found simple growth rate and compound growth rate was highest. Zone wise growth rate of Eastern Uttar Pradesh show in Table no. 1.

Table 1: Growth rate fertilizer consumption of Eastern Uttar Pradesh

Zones	S.G. R.	C. G. R.
North Plain Zone	6.44** $R^2=0.83$	7.29** $R^2=0.93$
Eastern plain Zone	6.27** $R^2=0.87$	7.51** $R^2=0.94$
Vindhyan Zone	6.45** $R^2=0.90$	8.34** $R^2=0.90$
Eastern Uttar Pradesh	6.35** $R^2=0.87$	7.45** $R^2=0.95$

*Significant at $p \leq 0.05$, ** Significant at $p \leq 0.01$, S.G. R. (Simple Growth Rate)

C. G. R (Compound Growth rate)

The table 2 show reveals fertilizer consumption for North eastern plain zone the simple growth rate 7.17 and compound growth 8.82 of Vindhyan zone during green revolution were positive growth rate which significant the growth and shows of the fertilizer increasing pattern of growth there has been Growth rate in North Eastern Plain Zone post green revolution was highest.

Table 2: Growth rate of Fertilizer consumption of Eastern Uttar Pradesh during Green Revolution and Post Green Revolution

Zones	During Green Revolution		Post Green Revolution	
	S.G. R.	C. G. R.	S.G. R.	C. G. R.
North Plain Zone	6.51** $R^2=0.85$	7.79** $R^2=0.83$	8.44** $R^2=0.89$	9.35** $R^2=0.88$
Eastern plain Zone	7.17** $R^2=0.91$	8.68** $R^2=0.87$	6.51** $R^2=0.84$	7.13** $R^2=0.84$
Vindhyan Zone	6.48** $R^2=0.73$	8.82** $R^2=0.71$	3.88* $R^2=0.79$	4.01* $R^2=0.82$
Eastern Uttar Pradesh	6.89** $R^2=0.91$	8.34** $R^2=0.86$	7.16** $R^2=0.88$	7.86** $R^2=0.87$

Conclusion

The growth rate of fertilizer consumption in different agro-climatic and eastern Uttar Pradesh during green and post revolution was evaluated and a comparative conclusion is obtained. Growth rate was higher in Vindhyan Zone and during green revolution followed by lowest Vindhyan Zone, similar the growth for post green revolution highest in Vindhyan Zone followed by lowest Eastern plain zone

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