CONCLUSIONS
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Agriculture is the most important sector of the Indian economy from the perspective of poverty alleviation and employment generation. Agriculture accounts for about 25 percent of India's national income. The linkages between agriculture and industrial sectors, widely recognised in the literature, focus on the role of agriculture as (i) supplier of wage goods to the industrial sector, (ii) provider of raw materials to agro-based industries. The decelerated growth rate in agricultural production seems to have impacted on growth of industrial production in the nineties. Oilseeds and pulses are grown essentially in the rain-fed or unirrigated areas. Even for rice, nearly 60 percent of the area is rain-fed. The recent experience, therefore, suggests that the disparities in growth between the irrigated and rain-fed or dry areas may not be as sharp as in the early years of the green revolution. It is also heartening to find that many of the states where poverty is widespread and where the growth of the foodgrains output had slowed down in the first decade of the green revolution, e.g., Assam, Bihar, Orissa, Madhya Pradesh and West Bengal have shown a much better performance in the last decade. Their performance is nearer, or even higher than, the all India average. All these states have experienced a step-up in the growth of rice during the last decade and some of them have recorded a higher growth than the national average. Although the growth rate in the foodgrains output seems to have improved because of the impact of new
technology, the growth performance has by no means been smooth. The instability or the year-to-year variation in the foodgrains output has increased in the post-green revolution period. The yield pattern in case of both foodgrains and non-foodgrains indicates that highest growth in yield levels occurred during the 1980s. Much of the growth in agricultural production in India is yield-driven as the growth in area is marginal; however, Indian agriculture suffers from lower yield levels vis-à-vis major agricultural producers in the world, despite of India being one of the largest producers of most of the major crops. One of the main reasons for the low levels of yield attained in India is the unsatisfactory spread of new technological practices, including cultivation of High Yielding Varieties (HYV) of seeds. The lower spread of new technological practices to a wide variety of crops, other than wheat and rice, as also across regions could be attributed to the higher yield risk associated with the cultivation of HYV seeds, caused by inadequate spread of irrigation facilities. One significant factor limiting the adoption of HYV seeds is the generally low level of irrigation cover for most of the crops as compared with rice and wheat. Nearly 64 percent of the total cultivated area in the country is rain-fed. In fact, as compared with 79.1 per of the total geographical area as drought prone, the irrigation coverage of 38.2 per cent is quite unfavourable. Under such a scenario, the technological development in terms of the adoption of HYV seeds is mostly limited to the cultivation of rice and wheat on account of higher yield risk imparted by these seeds. Another important factor affecting the dissemination of modern technology in general
and HYV seed technology in particular is the small size of average farms in India.

A great deal of variability was observed in fertilizer consumption during 2003-04 among the States. Amongst States in the plains, per hectare consumption was quite high in Punjab, Haryana and Andhra Pradesh. It was quite low in Rajasthan, Orissa and Madhya Pradesh, apart from the States in the North-eastern region. In view of the changing agriculture and on account of the change in scenario these technical coefficients need to be examined from time to time and in respect of place to place under different cropping systems prevailing in them. The study is aimed at bridging the vital gap in knowledge in respect of the above. The objectives of the study are as below:

1. To examine the features of economic regions of Uttar Pradesh.
2. To calculate the growth rates and variability of area, production and yield of principal crops.
3. To evaluate the relative contribution of various factors to the growth in crop production.
4. To estimate the response of farm productivity to the causal factors.

In economic studies area allocated to the crops define the importance accorded to the crop by the cultivators in view of its profitability, productivity in relation to competitive crops. Cultivation of crop in a particular period depends on climate and other ecological factors and economic considerations. Area under Paddy continuously increased during post independence period.

The average yield of Paddy in T.E. 1952-53 was 715 Kg. per hectare and reached 1949 Kg. yield in T.E. 2004-05. This tremendous rise in production of Paddy is spread over the country. West Bengal contributes 16.61 percent of production followed by Uttar Pradesh 14.75 percent, Punjab 10.94 percent, Andhra Pradesh 10.14 percent.

The focus of this study is on change in area, production and yield of Paddy and Wheat analysed on the basis estimates for two time spans of 1965-66 to 1988-89 and 1989-90 to 2000-01. The objectives of the study cover these periods. However, inclusion of pre green revolution period 1950-64 shall provide better understanding of the dimensions and directions of change in area, production and yield of Paddy in economic regions of Uttar Pradesh.

Area under Paddy in 1950-51 was 3633232 hectares, which inclined to 5904128 hectares in 2000-01. This incline was on account of incline in the crop in Western region from 666734 hectares in 1950-51 to 15667505 hectares in 2000-01, in Central region from 646657 hectares in 1950-51 to 1090799 hectare in 2000-01, in Bundelkhand region from 82378 hectare in 1950-51 to 98100 in 2000-01 and Eastern region from 2237463 hectares in 1950-51 to 3147724 hectares in 2000-01.

Production of Paddy in Uttar Pradesh in 1950-51 was 1755822 quintal, which inclined to 11672250 quintal in 2000-01. The sharp rise in production resulted from increase in Paddy
production in Western region from 380817 quintals in 1950-51 to 3382620 quintals in 2000-01, in Central region from 3374404 in 1950-51 to 18893258 in 2000-01, in Bundelkhand region from 42069 quintals in 1950-51 to 96040 quintals in 2000-01 and Eastern region from 995532 quintals in 1950-51 to 6300332 quintals in 2000-01. At the state level the yield of Paddy increased from 483 Kg. per hectare in 1950-51 to 1977 Kg. per hectare. It was caused by rise in Western region from 571 Kg/hectare in 1950-51 to 2158 Kg. in 2000-01 in central region from 522 Kg. per hectare in 1950-51 to 1736 Kg. per hectare in 2000-01, in Bundelkhand region from 511 Kg. per hectare in 1950-51 to 979 Kg. per hectare in 2000-01 and in eastern region from 445 Kg. per hectare in 1950-51 to 2002 Kg. per hectare in 2000-01.

Variability in area under Paddy in Uttar Pradesh and the economic regions therein show that though the mean area under Paddy cultivation during 1950-51 to 1964-65, 1965-66 to 1988-89 and 1989-90 to 2000-01 increased constantly over times respectively being 3749489.67 ± 8.40 c.v., 4574757.42 ± 9.77 c.v. and 5388363.42 ± 4.83 c.v. the state level variability was higher during 1965-66 to 1988-89.

It further shows that during 1950-51 to 1964-65 coefficient of variation (c.v.) ranged between ± 4.63 percent in Eastern region and ± 23.62 percent in Western region. During 1965-66 to 1988-89 the c.v. ranged between ± 8.60 percent in eastern region and ± 14.42 percent in Bundelkhand region. During 1989-90 to 2000-01 the coefficient of variation ranged between ± 2.90 in Eastern Uttar Pradesh region and 13.00 in Western region. Coefficient of variation was in reference to mean area under the crop. The coefficient of variation in
production of Paddy was ± 25.42 percent during 1950-51 to 1964-65, It reveals that the coefficient of variation in production of Paddy was ± 41.85 percent 1965-66 to 1988-89 and ± 11.97 percent during 1989-90. During 1989-90 to 2000-01 the variability in production of Paddy ranged between ± 10.32 percent in central and ± 26.62 percent in Bundelkhand. The variability in yield during 1950-51 to 1964-65 ranged between ± 14.10 percent in Central region and ± 22.37 percent in Bundelkhand region. During 1965-66 to 1988-89 the yield variability in Paddy ranged between ± 32.47 percent in central region and ± 125.52 percent in Bundelkhand region. During 1989-90 to 2000-01, the variability in yield ranged between ± 5.11 percent in Western region and ± 22.99 percent in Bundelkhand region.

The state level the percent per annum increase in area in state was 0.646 percent per annum during 1950-51 to 1964-65 followed by 0.446 percent per annum in 1965-66 and was only 0.184 percent per annum during 1989-90 to 2000-01. In western region the growth rate remained positive all along and was highest 1.224 percent per annum during 1989-90 to 2000-01. In central region the growth rate remained positive during the thrice time spans and was highest 1.024 percent per annum during 1950-51 to 1964-65. In Bundelkhand region the growth rate in area was negative (-) 0.231 percent per annum during 1965-66 to 1989-90. In East Uttar Pradesh the growth rate in area under Paddy remained positive throughout and was highest 2.018 percent per annum during 1989-90 to 2000-01. The compound growth rate of paddy production in Western region recorded highest 2.782 percent per annum during 1950-51 to 1964-65. In central region the growth rate in production of paddy recorded highest 2.070
percent per annum during 1965-66 to 1988-89. In Bundelkhand region the compound growth rate of production of recorded highest 2.692 percent per annum during 1950-51 to 1964-65. Compound growth rate of yield in Paddy in Uttar Pradesh recorded highest 1.512 percent per annum during 1965-66 to 1988-89. In Western region the compound growth rate in yield of Paddy recorded highest 1.699 percent per annum during 1965-66 to 1988-89. In Central region the growth in Paddy yield recorded highest 1.460 percent per annum during 1965-66. In Bundelkhand region growth rate in yield of Paddy recorded highest 1.546 percent per annum during 1989-90. In eastern region there seems that there has been a very high growth in yield, which recorded 3.047 percent per annum.

The area under wheat was 9.55 million hectares in T.E. 1952-53 and it increased to 25.09 million hectares in T.E. 2004-05. The production of wheat has also increased from 6.71 million tonnes in T.E. 1952-53 to 69.95 million tonnes in T.E. 2004-05. Uttar Pradesh, Punjab, Haryana and Madhya Pradesh are major wheat producing states in India. Area under wheat in Uttar Pradesh was 3088761 hectare in 1950-51, which inclined to 9239311 in 2000-01. This rise in the area under crop was due to increase of western region from 1491120 in 1950-51 to 3584091 in 2000-01, in central region from 537159 hectares in 1950-51 to 1666235 in 2000-01, in bundelkhand region from 317248 hectares in 1950-51 to 676634 hectare in 2000-01 and in eastern region from 743234 in 1950-51 to 3316351 hectare in 2000-01.

Production of Wheat in Uttar Pradesh during 1950-51 was 2527308 quintals, which increased to 25168332 quintals in 2000-01. During 1950-51 the average yield of wheat in Uttar
Pradesh was 818 kilogram per hectare resulted in very sharp rise as the average yield in 2000-01 recorded 2724 kg per hectare. In western region the yield per hectare was 858 kg in 1950-51 and it inclined to 3234 kg per hectare in 2000-01. In central region the 806 kg per hectare yield in 1950-51 inclined to 2554 kg per hectare in 2000-01. In Bundelkhand region the 1950-51 yield was 805 kg per hectare, which inclined to 1947 kg per hectare in 2000-01. In eastern region the per hectare yield was 754 kg and it inclined to 2417 kg in 2000-01.

The variability at state level in area under wheat was ± 7.13 percent during 1950-51 to 1964-65, ± 22.02 percent during 1965-66 to 1988-89 and ± 3.89 percent during 1989-90 to 2000-01.

In western region variability during 1950-51 was ± 5.72 percent followed by ± 15.37 and ± 4.27 percent during 1965-66 to 1988-89 and 1989-90 to 2000-01. Central region recorded highest variability ± 24.91 during 1965-66 to 1988-89. In Bundelkhand region highest variability recorded was ± 15.00 percent during 1950-51 to 1964-65. In eastern region recorded highest variability ± 34.54 percent during 1965-66 to 1988-89. During 1950-51 highest variability recorded was ± 15.00 percent in Bundelkhand in 1965-66 to 1988-89 the highest variability recorded was in eastern region ± 34.54. In the highest variability was ± 6.94 percent in 1989-90 to 2000-01 in area may arrive. During 1950-51 to 1964-65 variability in production of wheat was ± 16.35 in Uttar Pradesh in comparison to which it recorded ± 45.01 percent in 1965-66 to 1988-89 and 12.46 percent in 1989-90 to 2000-01. In 1950-51 to 1964-65 variability ranged between ± 14.54 percent in western region to ± 30.58 percent in Bundelkhand region, in 1965-66 to 1988-89 it ranged between ± 30.36 in Bundelkhand
region and ± 57.21 percent ± 12.11 percent in western region to ± 19.49 in Bundelkhand region.

During the period the maximum variability was recorded in ± 19.21 percent during 1965-66 to 1988-89 the variability in wheat yield ranged between ± 22.82 percent in Bundelkhand and 29.27 percent in western region. During 1989-90 to 2000-01 the variability in wheat ranged between ± 8.80 percent in western region and 13.35 percent in Bundelkhand region.

Area under crop in Uttar Pradesh grew by 0.476 percent per annum during 1950-51 to 1964-65, 1.184 percent per annum during 1965-66 to 1988-89 and 0.380 percent per annum during 1989-90 to 2000-01. Among regions the percent per annum growth in area of wheat ranged between 0.180 percent per annum in western region and 1.180 per annum in Bundelkhand region. During 1965-66 to 1988-89 the variability in area under wheat ranged between 0.498 percent per annum in Bundelkhand region and 1.920 percent per annum in eastern region, during 1989-90 the growth in area under wheat ranged between 0.335 percent per annum in eastern region and 0.642 percent per annum in Bundelkhand region.

Uttar Pradesh recorded 0.761 percent per annum growth during 1950-51 to 1964-65, 2.41 percent per annum during 1965-66 to 1988-89 and 1.244 percent per annum during 1989-90 to 2000-01. ranged between 0.572 percent per annum in Western region and 1.928 percent per annum growth in Bundelkhand region. During 1965-66 to 1988-89 the growth in production ranged between 1.236 percent per annum in Bundelkhand and 3.237 percent per annum in eastern region. During 1989-90 to 2000-01 the compound growth rate in area of wheat ranged between 1.207
percent per annum in western region and 1.898 percent per annum growth in Bundelkhand region. Compound growth rate in yield of wheat was 0.280 percent per annum during 1950-51 to 1964-65, 1.203 percent per annum during 1965-66 to 1988-89 and 0.861 percent per annum during 1989-90 to 2000-01.

During 1965-66 to 1988-89 the compound growth rate in yield of wheat ranged between 0.735 percent per annum in Bundelkhand and 1.288 percent per annum in eastern regions. During 1989-90 to 2000-01 the compound growth rate in yield of wheat ranged between 0.761 percent per annum in central and 1.247 percent per annum in Bundelkhand regions. Between 1988-89 and 1965-66 the production of Paddy in Uttar Pradesh increased by 6682498 metric tonnes. 8.85 percent of the addition to overtime production was contributed by increase in area and 71.93 percent by increase in yield. In western region 2027857 metric tonnes of additional production was contributed 9.49 percent by area and 84.31 percent by improvement in yield. In central region addition to production by 1488644 metric tonnes was contributed 22.31 percent by change in are and 70.23 percent by improvement in yield. In Bundelkhand region the increase in production by 52962 metric tonnes was contributed (-) 4.98 percent by increase in yield. In eastern region the addition to the production of 3113035 metric tonnes was shared 18.99 percent by improvement in yield.

In Uttar Pradesh decomposition analysis revealed that the increase attributed to area to area and 44.86 percent rise in productivity. In western region additional production of Paddy by 1005818 metric tonnes is attributed 102.27 percent area, (-) 1.588 percent to yield and remaining area yield interaction. The
250140 metric tonnes increase in production in central region is attributed 96.61 percent to area and 2.08 percent to improvement in yield. In Bundelkhand region the addition to production by 40238 metric tonnes was attributed 14.65 percent to increase in production and 60.68 percent to yield. In eastern region the additional production of 1431718 metric tonnes was attributed 14.65 percent to area and 81.81 percent to production. Between 1965-66 and 1988-89 Uttar Pradesh recorded increase of 15381699 metric tonnes of production which was contributed 27.07 percent to area, 33.84 percent to yield and 39.09 percent to area-yield-interaction. In western region the addition to production by 6900910 metric tonnes was attributed 23.36 percent to area and 40.60 percent to yield. The central region increase in production of 2718000 metric tonnes was attributed 23.68 percent to area and 36.62 percent to yield. The increase of 458960 metric tonnes recorded in Bundelkhand region was attributed 31.84 percent due to area and 20.01 percent to yield. In eastern region there was increase of 5303829 metric tonnes in production. It was attributed 31.63 percent to area and 22.90 percent to yield. The central region recorded increase of 1296416 metric tonnes production, which was attributed 34.41 percent to area and 56.99 percent to yield. The Bundelkhand region recorded increase of 554867 metric tonnes attributed 31.78 percent to area and 55.30 percent to yield. The eastern region recorded additional production of 2562467 metric tonnes attributed 21.47 percent to area and 71.32 percent to yield.

The basic postulate of traditional economic theory is that the motivating force behind man's action is the attempt to minimize his net income. Farm business decisions are undertaken with the
same objectives. Resources allocations to different enterprises and output. Inputs prices are key variables to by the farmer for his product associated with land use is of vital importance to him. The expected price for output to be produced in future concerns him.

Our interest lies on examination of farmer’s responsiveness to the various influencing factors. Therefore, in these exercise empirical estimates of two important crops i.e. Paddy and Wheat to the factors of lag year acreage, farm harvest price, yield, relative price to competing crop and lastly the current year rainfall were tested using the model for farmer’s responsiveness to the above factors developed by Marc Nerlove.

The model used were as under:

\[ A_t = a_0 + b_1 A_{t-1} + b_2 P_{t-1} + b_3 Y_{t-1} + b_4 W_t + U_t \]

Where,

- \( A_t \) = Area under the crop at time \( t \) (in acreage)
- \( A_{t-1} \) = Area under the crop lagged by a year \( t-1 \) in ha.
- \( P_{t-1} \) = Price of the crop lagged by a year \( (t-1) \) (farm harvest price deflected by whole sale price index of all crops index)
- \( Y_{t-1} \) = Yield per hectare of the crop lagged by a year \( (t-1) \) in qtl./ha.
- \( W_t \) = Rainfall in current year.

lag year acreage and farm harvest price have significant influence in farmer’s decision on current acreage under paddy in three regions of the state i.e. Western, Central and Southern but in the eastern region these two factors have either no effect are negligible.
By the large the picture explain that farmer’s responsiveness regarding paddy acreage apparently seems to be influenced more or less by all the factors considered in the analysis. But the insignificance of values of $b_i$s for most of the variables in the two regions of Eastern and Bundelkhand region put a doubt on the decisive role of these factors in Paddy acreage response.

Observing the coefficient of supply response we found that almost all the variables considered in the formulati