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A Study of Agricultural Productivity and Agricultural Intensity in Kaimur District, Bihar

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ABSTRACT

Agricultural development and agricultural productivity have been increased after the introduction of green revolution. In the present paper an attempt has been made to analyse the agricultural productivity and agricultural intensity in Kaimur district of Bihar for two time periods that is 2001 and 2011. Productivity and intensity has increased tremendously due to the use of modern equipments, application of high yielding varieties (HYV) of seeds, chemical fertilizers, pesticides etc. From the foregoing results it is clear that cropping intensity has increased with the use of modern agricultural inputs. There is a wide regional disparity exists in productivity and intensity for both time periods. Blocks which have good irrigation facility, use HYV seeds in agriculture have high cropping intensity and productivity. On the other blocks having less.

Keywords: Agricultural productivity, intensity, Kaimur, Bihar

Sustainable growth of the Indian economy depends on the agriculture sector. Even today, agriculture plays a very important role in the economic development as nearly half of the rural population depends on agriculture for their livelihood. But over the years, Indian agriculture sector is exhibiting sluggish growth rate due to various risks challenging the sector (Bhovi and Savadatti, 2017).

Agriculture is the main occupation of rural population and major source of their livelihood. Agricultural development and agricultural productivity has been increased with the changes in traditional agricultural practices. Agricultural productivity is influenced by physical, socio-economic, institutional and organisational factors. Thus, agricultural productivity is a function of interaction of physical and cultural variables and it reveals itself through per hectare productivity and total volume of production (Kendall, 1939). In other words agricultural productivity is a relationship between input and output. In spite of this fact, prior to the independence of the country there could not be given proper emphasis on aspects of agricultural planning. Although the significance of the issue was realised as early as 1926, when the Royal Commission on Agriculture made a large number of recommendations for agricultural development, but it was only in 1946, that a food and agricultural policy was formulated to move the country away from the menace of famine to a new vigour and prosperity (Rai, 1988, National Commission on Agriculture, Government of India, 1976). The present policy of the government of India is, no doubt, wider in perspective and it intends to ensure intensive utilisation of land resources, creation of ample productive employment and reduction in socio-economic disparity (Rai, 1988, National Commission on Agriculture, Government of India, 1976).

New methods of agricultural techniques are being adopted but still it is largely dependent on environmental conditions and presents wide variations in different blocks of the districts. Population is increasing rapidly, while the existing resource is limited. Thus, there is a growing demand of food to feed the timing million. Various

steps have been taken both by the state as well as central governments for agricultural development. To improve agricultural productivity the modern techniques are being used in agriculture. Since the 1950s, the drastic growth of world population has highlighted the limits of the agricultural expansion model capacity to provide sufficient food, more intensive agricultural practices were adopted during the green revolution (Borlaug, 2000). The main characteristics of modern agriculture are the application of high yielding varieties (HYV) of seeds, chemical fertilizers, pesticides, machinery etc. with the availability of water or improved irrigation facilities.

Study Area

The present Kaimur district was formed out of the Rohtas district in 1991. The district covers an area of about 3,40,447 hectares (2,830 km^2) (Sinha *et al.*, 2013). Geographically, the district can be divided into two parts viz. (i) Hilly area and (ii) Plain area. The hilly area comprises of Kaimur plateau. The plain area on the western side is flanked by the rivers, the Karmanasha and the Durgawati. The Kudra river lies on it eastern side. The district of Buxar of Bihar State and the district of Ghazipur of U.P. state bound it on the north. On the south is the district of Garhwa of Jharkhand State and on the West is the district of Chandauli and Mirjapur of the U.P. state. On the east is district of Rohtas of Bihar State. The district has close linkage with the history of Shahabad, which was its parent district also. The old district of Shahabad had four subdivisions of which Bhabua was one. The present district of Kaimur has been formed from the whole of this Bhabua subdivision. The climate of the district is of moderately extreme type. It becomes quite hot during summer and fairly cool during the winter. The district gets maximum rains during month of July and August, being the rainy months of the year. There is a slight rainfall in October. Some winter rain occurs in January and February. The month of July gets the maximum rainfall. Average rainfall is 777mm.

METHODS

The present study is entirely based on secondary data and major source of data is District Statistical Patrika, 2001 and 2011, comprehensive district agriculture plan, 2012 and *Khatian* for year 2001 and 2011. Land-use pattern related information are collected from *Khatiyan*, Statistical Department, District Head Quater. *Khatiyan* is the register of all persons cultivating or otherwise occupying land in a village. It contains entries regarding ownership, cultivation and various rights in land. It is revised in every 6 years. Subsequently this information is cross-checked by personal survey, discussion with District Statistical Officer, District Agriculture Officer and modified to some extent. Information regarding the yield of major crops are collected from Krishi Vigyan Kendra, located at Bhabua and Bikramganj.

For calculating cropping intensity, the following formula has been used:

$$\text{Croppping intensity} = \frac{\text{Gross cropped area}}{\text{Net sown area}} \times 100$$

$$y = \frac{\sum_{I=1}^{n} Q_1}{\sum_{I=1}^{n} A_1}$$

Where,

Y = Agricultural productivity

Q = Agricultural production of various crops

A = Area under production of various crops

Productivity has been calculated on the basis of data available for 1981 and 2001.

AGRICULTURE CALENDAR

Agricultural seasons are identified on the basis of sowing and harvesting of particular crops. Virtually agricultural seasons are crop seasons. Four agricultural seasons have been identified in the study area, viz., *Bhadai, Aghani, Rabi* and *Garma*. The *Kharif* season includes the *Bhadai* and *Aghani* crops starting with the advent of the monsoon, generally in the second week of June. The principal *Kharif* crops are rice, maize, ragi, tur, sugarcane. These crops are generally produced with the help of irrigation. *Rabi* is known as the season of winter crops which are sown in October and harvested in March and April. The crops of this season are wheat, gram, linseed, rapeseed and mustard. As during this season the rainfall is meagre and highly variable, most of the

Rabi crops rely either on the moisture available in the soil after the monsoon rains or irrigation from various sources. The fourth one is *Garma*, it is sown in between the *Kharif* and *Rabi* crops. It generally covers onion and vegetables. Cropping pattern of the area is primarily determined by the four natural elements viz. physiography, climate, soil and availability of water resources.

RESULTS AND DISCUSSION

Agricultural development and productivity is influenced by physical, socio-economic, institutional and organisational factors. It has been certainly influenced with the changes in traditional agricultural practices. Thus, agricultural productivity is a function of interaction of physical and cultural variables and it reveals itself through per hectare productivity and total volume of production. It is generally agreed that the yield per hectare may be considered to represent the agricultural productivity in a particular area which is partly the result of natural circumstances and partly of economic, cultural, technical and organisational variables.

Agricultural productivity largely depends upon climate, terrain and soil, socio-economic condition such as size of holding, farming efficiency, capital, government policies and technological operation, like irrigation and mechanization etc. Three conventional categories of inputs land, labour and capital are the best partial productivity measures. On account of the population explosion and limited land resources, agricultural productivity got special attention to increase crop production per hectare.

From time to time, considerable efforts have been made to increase the productivity level. The measurement of agricultural productivity level helps in assisting the relative performance of areas and comparing their output. By delimiting the areas of low, medium and high productivity, agricultural plans may be formulated to remove and minimize the regional inequalities; it also provides an opportunity to ascertain the ground reality and to assess the causative factors behind agricultural backwardness of a region.

Productivity of study area has been calculated on the basis of data available for 2001 and 2011 and displayed in Table 1. The results obtained have been grouped into three productivity groups.

High Productivity/yield (150+)

According to 2001 data only two blocks come under this category. They were Ramgarh (153.67) and Mohania (162.21). Whereas according to 2011 data there are three blocks came under this category namely Ramgarh (169.25), Mohania (172.14), Bhabua (158.41). Higher yield of crops in these blocks is attributed to mechanised farming, use of better quality of seeds, and most importantly the availability of assured irrigation facilities through

Table 1: Productivity and Cropping Intensity of Food Grains in Kaimur District

Blocks	2001		2011	
	Productivity (yield/ha)	Cropping Intensity	Productivity (yield/ha)	Cropping Intensity
Adhaura	61.02	102	76.25	121
Bhabua	141.32	164	158.41	198
Bhagwanpur	63.48	92	81.14	112
Chainpur	93.12	171	114.30	184
Chand	74.09	160	86.24	178
Durgawati	116.41	221	121.50	242
Kudra	122.02	201	129.25	222
Mohania	162.21	234	172.14	262
Nuon	135.29	210	147.10	238
Ramgarh	153.47	151	169.25	169
Rampur	84.45	142	93.33	154

Source: Comprehensive District Agriculture Plan, 2012.

tube-wells and diesel engine pump sets installed by most of the farmers of the blocks. The locational factors are also playing important role. The villages of these blocks are near to its district headquarter. There is also significant number of fertilizer, seed and pesticide depots in these blocks. Paddy is the first ranking crop and wheat is the second one. Bhabua is well-known for its pulses cultivation, having better yield than rest blocks.

Medium Productivity/yield (100-150)

Under this range of productivity there are four blocks. They are Bhabua (141.32), Nuon (135.29), Kudra (122.02), Durgawati (116.41). Whereas according to 2011 data the blocks under this category are Nuon (147.10), Kudra (129.25), Durgawati (121.50), Chainpur (114.30). These blocks are identified as developed blocks. Irrigation, banking facilities, high rate of availability of per head geographical land and other infrastructural facilities etc., help a lot for the better yield here.

Low Productivity (below 100)

According to 2001 data blocks came under this category are, Adhaura (61.02), Bhagwanpur (63.48), Chand (74.09), Rampur (84.45), Chainpur (93.12). While in 2011 only four blocks came they are Adhaura (76.25), Bhagwanpur (81.14), Chand (86.24), Rampur (93.33). The reason for high number of blocks in this category is that a large proportion of the area is elevated land or in other words it can be said that, these blocks are sandwiched between plateau and plain area. Blocks having less fertile soil with inadequate irrigation facility show low level of productivity.

Agricultural Intensity/Cropping Intensity

Cropping intensity means raising a number of crops from the same field in the same agricultural year. It is defined as the extent to which the net area sown is cropped or resown (Singh, 1976). In other words, intensity of cropping refers to the number of crops raised on a field during an agricultural year. In the 'new agricultural strategy' priority has been given to the intensification of crop land use for checking the widening gap between increasing human population and food production (Sinha, 1968). Because, that in the present circumstances, when fragmentation and encroachment has reduced the culturable area and pressure of population has increased on soil, only high cropping intensity can solve the basic food problem or the intensification of farming is an effective means of increasing the food production in the area (Singh, 2012). While the net cropped area expanded in study area, farmers adopted new agricultural management practices i.e., double or multiple cropping systems to intensify the production process. During the study period double cropping system and even in some blocks triple cropping system is much prominent in the area.

High Cropping Intensity (>250)

In 2001, none of the block falls under this category. While in 2011 Mohania occupy this category with having cropping intensity of 262%. The reason is again coterminous with fertile soil, proper irrigation facility, availability of market, active participation of KVK personnel etc.

Medium Cropping Intensity (200-250)

According to 2001 census, four blocks occupy this category. They are Mohania, Durgawati, Nuon, Kudra. Whereas in 2011 blocks came under this category are Kudra, Nuon, Durgawati.

Low Cropping Intensity (<200)

In 2001 more than half of the blocks came under this category. They are Chainpur, Bhabua, Chand, Ramgarh Rampur, Adhaura, Bhagwanpur. Whereas in 2011 blocks under this category are Bhabua, Chainpur, Chand, Ramgarh, Rampur, Adhaura, Bhagwanpur.

CONCLUSION

The results reveal that many socio-economic as well as physical factors are responsible for existing regional disparity in blocks in agricultural productivity. Productivity and intensity has increased tremendously due to the use of modern equipments, application of high yielding varieties (HYV) of seeds, chemical fertilizers, pesticides etc. From the foregoing results it is clear that cropping intensity has increased with the use of modern agricultural inputs. It is also reflected at block level analysis for two periods i.e. 2001 and 2011. Mohania, Bhabua and all blocks located in western portion of the region shows more than 250% of agricultural

intensity, owing to fertile soil, assured of wide spread irrigation facilities from Karmanasa canal system, tube-wells and other irrigation projects. The surrounding blocks have about 200-250% of the cropping intensity. Blocks located on rugged terrain and few blocks located on eastern portion of the region show less than 200% of agricultural intensity. Blocks located on highland area, where these facilities are not available have low agricultural intensity and productivity.

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