District wise Variation of Growth of Cropping Intensity in West Bengal

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Abstract

This paper attempts to examine the growth rate of cropping intensity in various districts of West Bengal during 1997-2017 with the help of semi log econometrics model. The rate of growth of cropping intensity in West Bengal is only 0.45 percent and it is significant. Out of 15 districts, the growth rate of cropping intensity of 11 districts is significant. The regression model explains the variation of cropping intensity in West Bengal by 74%.

Keywords: Cropping intensities, Growth rate, rainfall etc.

Introduction

Agriculture is the main source of livelihood in India as well as in west Bengal. As per 2011 census, around 68.3% of population of West Bengal still lives in rural areas for which agriculture continues to be the main source of livelihood. West Bengal is a state endowed with rich natural resources and climatic conditions favourable for agriculture. These include large areas of good alluvial soil, abundant surface water and groundwater resources, and good rainfall. The climate of the region (other than in the hill regions) is tropical, hot and humid. Annual rainfall is between 1,300 mm and 1,750 mm. Despite these favourable conditions, the State has witnessed wide fluctuations in the growth of agricultural production (Rawal and Swaminathan, 1998). West Bengal is divided into four agro-climatic sub-zones, viz., Barind Plains, Central Alluvial Plains, Alluvial Coastal Saline Plains, and Rarh Plains. The barind Plains zone covers two districts namely West Dinajpur and Malda, has a relatively high Rainfall and high Net Sown Area (NSA) but the irrigation facilities are not developed. On the other hand the zone of Central Alluvial Plains covers the districts of Murshidabad, Nadia, Burdwan, Hooghly, Howrah and Medinipur. In this zone about 68 percent of the land cultivated and over 60 percent of the cultivated land is irrigated resulting in a reasonably high cropping intensity. The alluvial coastal saline plains cover the districts of North and South 24-Parganas and also the metropolitan city of Calcutta. Only about 26 % of the Net Sown Area of this is irrigated. The zone of rarh plains that include Birbhum and Bankura districts. In this zone about two-thirds of the land is cultivated with 23 percent falling under forest cover. Poor irrigation facilities in this zone have resulted in a very low cropping intensity. The most disturbing feature of the State pertains to its high density of population. The population density of West Bengal

is 1028 per square km. as against 382 per square km. in India as per 2011 census. West Bengal predominantly an agrarian state. It has 52.05 lakh ha net cropped area comprising 68% of the total geographical area and cropping intensity is 176%. The State has a surplus production of rice, vegetables and potato but a huge gap exists between the requirement and production of pulses, oilseeds and maize. Deterioration of soil health due to imbalance in the use of chemical fertilizers, lack of suitable improved varieties of seed, inadequate farm mechanization, unorganized marketing structure etc. are major challenges to agricultural growth. Cropping intensity plays a vital role in agricultural growth. Agricultural production can be increased either the cultivation of more land or intensified agricultural land use. As the availability of land is limited, intensifying agricultural land use may be the only option. Higher intensity of cropping shows more the usages of land for agricultural purpose. There are crucial factors that significantly determined the level of cropping intensities such as quality of irrigation water, availability of surplus labour, occurrence of natural rainfall, high yielding seeds, farm size, machinery etc. Narayanamoorthy, Alli and Suresh (2015) stated that irrigation facility allows the farmers to use the land more intensively throughout the year with higher level of cropping intensity, which is not possible under un-irrigated land. They also stated that given the highly inelastic supply of land and reduced net sown area, the future growth of agriculture will have to heavily rely on irrigation facility as it allows for multiple cropping on the same piece of land. Now in the present day, the main problem is growing the pressure of population on land and increasing concern food security. So, food security is another aspect for enhancement of cropping intensity in various districts of West Bengal. Wu et al. (2011) argues that a significant number of people still live in an insecure food situation despite the remarkable growth in food production over the past half-century. If we are to meet targets of agricultural growth and poverty alleviation there is urgency to better exploit potential of rain-fed and other less competent areas. There are only two ways to meet the increasing demand for agricultural products and other demands of the country's growing population either increasing the net area under cultivation or intensifying cropping over the existing cultivable land. Within agriculture, croplands take a vital role by producing food and feed crops but it would be difficult to increase cropland area particularly in poor soil quality regions and high population density regions. In such regions, intensifying agricultural land use via increased cropping intensity may be the only option.

Objective of the study

Our main objective is to show the growth rate of cropping intensity in various districts of West Bengal from the period 1997-2017.

Review of Literature

We have presented here a few studies on growth and variation of cropping intensity to justify the relevance of our present study.

According to Patil &Sirohi, (1987) the use of tube well irrigation facilities and other related mechanical equipments helped the farmers in raising the cropping intensity of their farms.

Datta & Dhawan(1992) assess the actual impact of irrigation on cropping intensity and confirmed that there is a close relationship between the rise in cropping intensity and irrigation development at the all India level.

In a study in Tamil Nadu Karunakaran and Palanisami (1998) found a close positive relationship between cropping intensity and irrigation intensity. They also found that tube well and dug well irrigation had significantly positive impact on cropping intensity.

Magare, P.Y.& Suryawanshi, D.S. (2010) experienced that irrigation is the major input in the agricultural practices and it improve the cropping intensity. He also shows that where irrigation intensity is higher there cropping intensity is also higher and lowers the net sown area.

Kalaiselvi and Sundar (2011) have described the variations in cropping intensity in India and concluded that highest cropping intensity was found in states of northern region while lower cropping intensity were observed in dry regions depending on rainfall. In another study they also found the cropping intensity was dependent on irrigation facilities.

According to Jain et al. (2013) for smallholder farmers cropping intensity can be used as an effective measure of food security and also greatly affect net production in a region is largely dependent on it. In an another study Kumar and Jain (2013) examined the district wise disparity in agricultural productivity in India. They found that variations were due to differences in rainfall, the use of fertilizers, resources for irrigation and use of modern agricultural techniques.

Ahlawal and Renu (2016) have analysed the impact of irrigation on cropping intensity in Haryana. They revealed in their study that irrigation facility have a significant impact on cropping intensity across the districts. They also argues that enhancement of cropping intensity is possible by improved irrigation facilities, use of proper fertilizers, seeds and adoption of modern agricultural technology and by improving the cropping patterns. Thus improved irrigation facilities will enhance the cropping intensity as well.

Based on the study in Nepal, Kaini, et al. (2020) found that within an irrigated area, cropping intensity can be enhanced by the conversion of subsistence farming into commercial farming.

Tarun kr. Mondal& Santana Sarkar (2021) discussed the relationship between spatio-temporal variation in cropping intensity and irrigation intensity in North 24-pargana district in west Bengal from period 1996-97 to 2015-26. During the study period they found a low positive correlation between them for the entire district. Considering at agricultural block level, they observed two different trends in the relationship between cropping intensity and irrigation intensity.

Using secondary data and carrying out panel data regression technique Bidur Paria et. al. (2021) examined how irrigation along with crop diversification influence cropping intensity. They found that greater irrigation facilities, more use of technological inputs (most significantly chemical fertilizers and higher yield) and crop diversification enhances cropping intensity.

Data sources and Methodology

Our study is based on secondary data on cropping intensity from 1997-2017which have been collected from statistical abstract of West Bengal and District statistical handbook in west Bengal. For calculation the Cropping intensity we use the following formula

Cropping intensity = (Gross cropped are / Net cropped area)$\times$100

To estimate the district wise growth rate of cropping intensity we use semi-log econometrics model.

The exponential equation is given by

$LnY_t = a + bt + U_t$ Where Y_t = Cropping intensity at period t, a = Intercept, t = time, b= Growth coefficient, U_t = Error term in the regression line. The OLS (Ordinary Least Squares) technique has been used to estimate the parameter $a$and b.

Result and Discussion

Cropping intensity is conventionally defined as the ratio of gross cropped to net cropped area in any crop year, and multiplying the number by 100. The level of cropping intensity is determined by many factors for enhancement of agriculture productivity which is a good indicator about awareness of farmers and rectifies government policy in right way

Table-1

Growth rate of cropping intensity of West Bengal's Districts (19997-2017)

Districts	Intercept	GR	SE	t-value	R^2	p-value
BURDWAN	5.23	-0.42	0.00	-2.63	0.26	0.01
BIRBHUM	5.00	0.84	0.00	3.09	0.33	0.00
BANKURA	4.94	0.32	0.00	1.07	0.05	0.29
MIDNAPUR	5.06	0.94	0.00	13.18	0.90	0.00
HOWRAH	5.37	-0.51	0.00	-3.16	0.34	0.00
HOOGHLY	5.35	0.10	0.00	4.19	0.48	0.00
24PARGANA	5.08	0.34	0.00	2.98	0.31	0.00
NADIA	5.55	-0.49	0.00	-3.05	3.29	0.00
MURSHIDABAD	5.34	0.81	0.00	4.26	0.48	0.00

MALDHA	5.15	0.83	0.00	2.87	0.00	0.00
JALPIGURI	5.05	0.33	0.00	2.66	0.27	0.01
DARJEELING	4.80	1.1	0.00	4.45	0.51	0.00
COOCHBEHER	5.26	0.33	0.00	2.13	0.19	0.04
PURULIA	4.65	0.49	0.00	2.69	0.27	0.01
WEST DINAJPUR	5.13	0.30	0.00	2.18	0.20	0.04
WEST BENGAL	5.14	0.45	0.00	7.51	0.74	0.00

Source: Calculated by the author.

Table 1 reveals that districts wise growth rate of cropping intensity in West Bengal from 1977-2017. From table-1 we see that the growth rate of cropping intensity in west Bengal is 0.45 percent. The regression model has explained about 74 % of variation on cropping intensity. Among the 15 districts, the growth rate of 11districtsispositiveand significant except Bankura. The Bankura district growth rate of is positive but non- significant. The growth rate of Burdwan, Howrah and Nadia districts is negative and significant. The growth rate of many districts such as Birbhum, Midnapur, Murshidabad, Maldha, Darjeeling and Purulia are the above the state growth rate. Darjeeling, Midnapur, Birbhum, Maldha and Murshidabad have more than 0.80 percent the most cropping intensity growth rate.

Using the coefficient of variation the variability of cropping intensity of all the districts of West Bengal during 1997-2017 has been examined. The variability of cropping intensity is presented in Table 2. The Table shows that the highest variability is found in Darjeeling district. It is interesting to note that in Darjeeling district, the highest variability of intensity of cropping is associated with the highest rate of growth of cropping intensity. The least variability is found in West Bengal compared to other districts of the state.

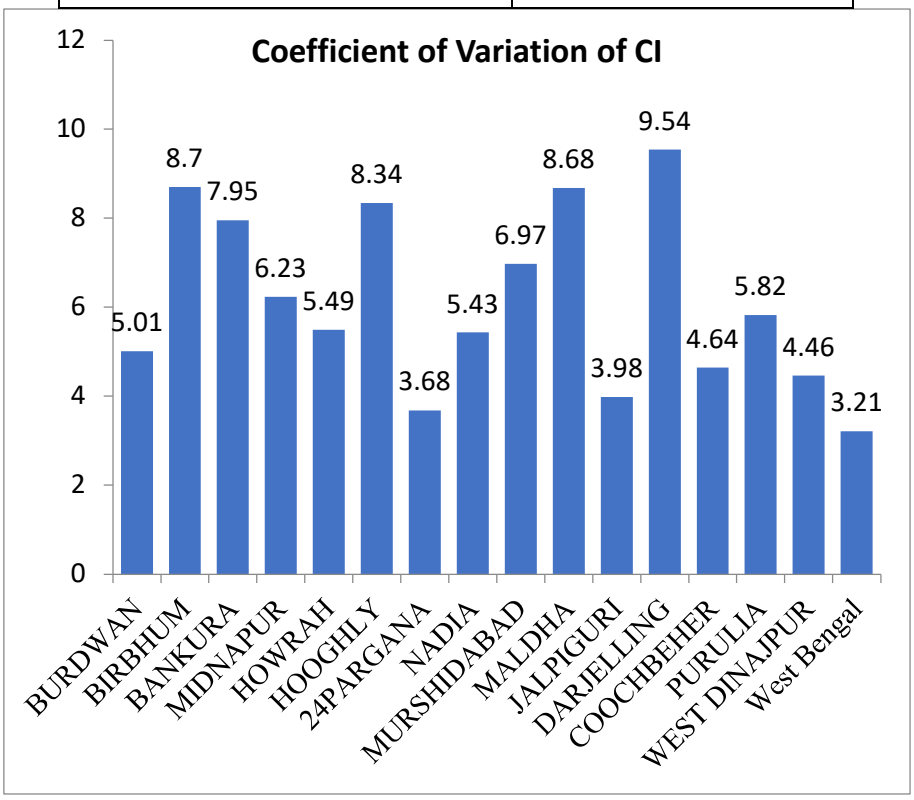
Table 2: Coefficient of Variation in Cropping Intensity

Districts	CV
BURDWAN	5.01
BIRBHUM	8.70
BANKURA	7.95
MIDNAPUR	6.23

HOWRAH	5.49
HOOGHLY	8.34
24PARGANA	3.68
NADIA	5.43
MURSHIDABAD	6.97
MALDHA	8.68
JALPIGURI	3.98
DARJELLING	9.54
COOCHBEHER	4.64
PURULIA	5.82
WEST DINAJPUR	4.46
WEST BENGAL	3.21

Coefficient of Cropping

Figure1: Variation in Intensity



Major Findings of the study

The major findings are

(1) The growth rate of cropping intensity in west Bengal is only 0.45 percent.
(2) Among the 15 districts, the 11 districts growth rate is positive and significant.
(3) The growth rate of Burdwan, Howrah and Nadia districts is negative but significant.
(4) The growth rate of six districts such as Birbhum, Midnapur, Murshidabad, Maldha, Darjeeling and Purulia are the above the state growth rate (0.45 percent).
(5) Among the fifteen districts, only five districts such as Birbhum, Midnapur, Murshidabad, Maldha and Darjeeling have more than 0.80 percent the most cropping intensity growth rate.
(6) It is interesting to note that in Darjeeling district, the highest variability of intensity of cropping is associated with the highest rate of growth of cropping intensity.

Conclusion

The study has concluded that the growth rate of cropping intensity in most of the districts in West Bengal is positive and significant. Darjelling, Midnapur, Birbhum, Maldha and Murshidabad districts performance in cropping intensity is much better than other districts. In West Bengal the growth rate of cropping intensity during the period under consideration was only 0.45 percent. The slow growth of cropping intensity might be because of the slow expansion of gross cropped area.

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