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A statistical analysis among the intensity of cropping with other parameters of jalpaiguri districts West Bengal

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Abstract

The main objective of this study are to analyses the extent of intensification of agriculture in Terai-Doors region of Jalpaiguri district, to find out the extent of agriculture and find out the factors responsible for increasing the intensity of cropping. The analysis reveals that there is a block wise variation in the intensity of cropping and it is high where density of population is high, but a whole it is found to be low in the whole region. Therefore, all kinds of efforts should be made to increase the intensity of cropping in the region in order to achieve higher level of agricultural production and productivity.

Key words: 1.Intensity of cropping, 2.Irrigation, 3.Agricultural worker, 4.Production, 5.Population.

Objectives

- To analyses the existing condition of agriculture spatially.
- To analyses the factor responsible for increasing the intensity of cropping.
- To measure the level of efficiency of agriculture in the region.
- To analyses the community wise level of agriculture efficiency in the region
- To find out to what extent of agriculture in the region can be further intensified.

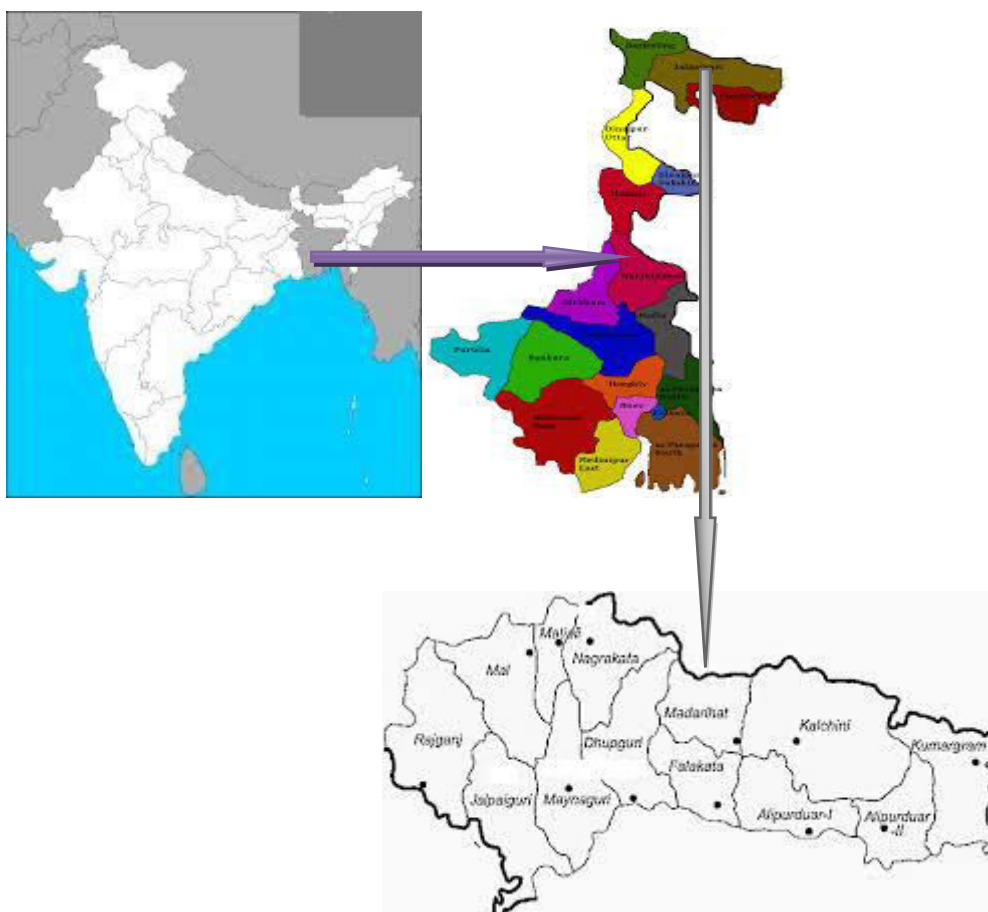
Methodology

The entire information and data are taken mainly from District Statistical Handbook (2008) and District Census Handbook (2001) with also office of the Revenue circle, Department of Irrigation (Jalpaiguri). For measuring the intensity of cropping, very simple mathematical tools have been used and for finding out the factors responsible for increasing intensity of cropping the correction co – efficient techniques has been used. The basic formula for the derivation of co-efficient of correlation is –

$$r = \frac{\sum xy}{\sqrt{\sum x^2 \cdot \sum y^2}}$$

Study area

Jalpaiguri is a district of west Bengal in northern part of the state, lies in between 26⁰16' and 27⁰00' N parallels of latitude and between 88⁰04' and 89⁰53' E longitudes, formed in 1869 A.D. It has 13 blocks with 688139 house-holds. The district situated in the northern part of West Bengal has international borders with Bhutan and Bangladesh in the north and south respectively and district borders with Assam and the Darjeeling hills in the east, west and northwest.



Location Map

Introduction

Intensity of cropping refers to the number of crops raised on a field during an agriculture year and thus it indicates the level of efficiency of agricultural land use. In the Terai-Doors region of jalpaiguri district most of the cultivable land has already been brought under cultivation. Thus the physical expansion of cultivable land being limited, that's why double or multiple cropping is necessary for satisfaction of increasing population. The Productivity of single crop can also be increased with the help of modern method of cultivation. But there is always a limit to the maximum productivity of crops as after a certain level of productivity, the law of diminishing return operates in the production function in fact, marginal productivity is decreased and afterwards it even becomes negative. Therefore, intensive utilization of the net sown area for more than one crop is beneficial for increasing agricultural production.

Intensity of cropping

The index of intensity of cropping in the region as a whole was 117.67 in 2007-2008. Table 1 shows that the intensity of cropping was highest in the Mal blocks followed by the Metiali blocks. From the census report of 2001, it is found that both blocks has highest growth of population, the peasants of these blocks were compelled to cultivate the same plot of land twice and thrice a year. The intensity of cropping was medium in the Dhupguri, Falakata blocks where the production of kharif-rabi crops are high due to fertile land.

The intensity of cropping is found to be lowest in Rajganj(102.25), jalpaiguri(101.08), Maynaguri(105.00), Kalchini(109.79), Alipurdwar II(105.19).

These blocks are the indigenous rural and urban population. The spatial variation in the intensity of cropping as it is evident in this figure may be due to number of known and unknown factors.

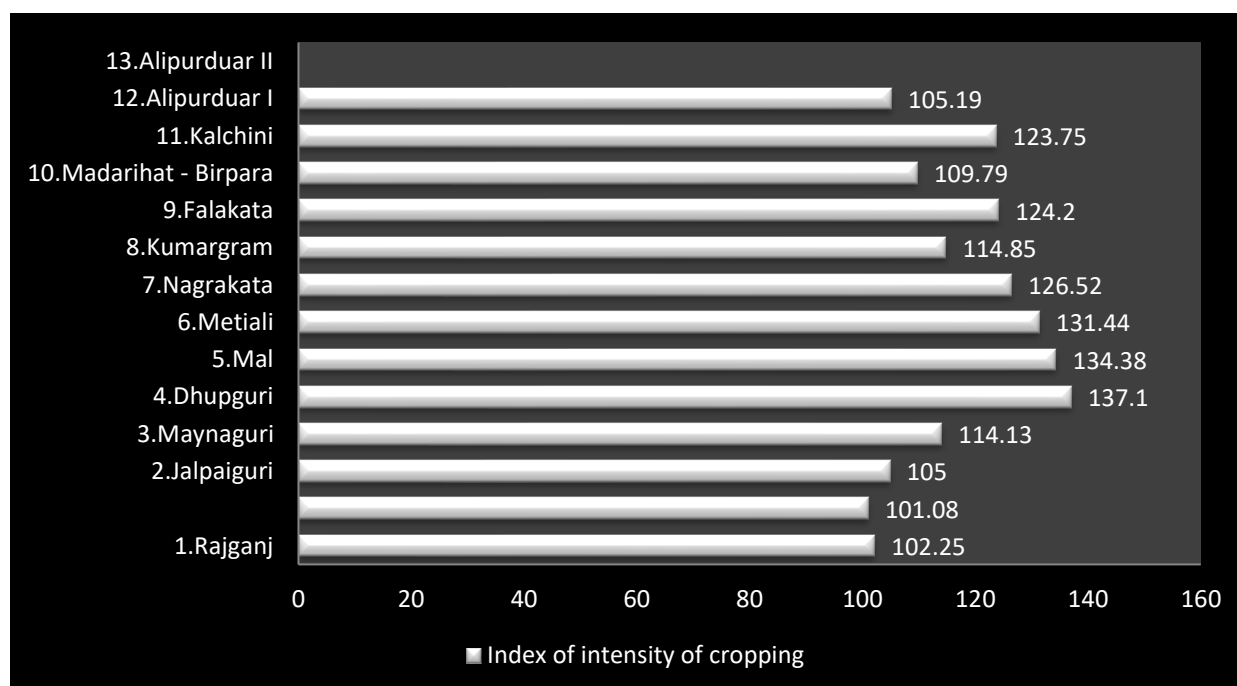
Table-1
Block-wise intensity of cropping in the year of 2007-2008

| Blocks | Net sown area in sq.k.m. | Total cropped area in sq.k.m. | Index of intensity of cropping |
|------------------------|--------------------------|-------------------------------|--------------------------------|
| 1.Rajganj | 601.29 | 614.82 | 102.25 |
| 2.Jalpaiguri | 495.30 | 500.65 | 101.08 |
| 3.Maynaguri | 505.3 | 530.60 | 105.00 |
| 4.Dhupguri | 495.12 | 565.10 | 114.13 |
| 5.Mal | 398.19 | 545.90 | 137.10 |
| 6.Metiali | 152.48 | 204.90 | 134.38 |
| 7.Nagrakata | 302.41 | 397.48 | 131.44 |
| 8.Kumargram | 409.17 | 517.68 | 126.52 |
| 9.Falakata | 308.18 | 353.93 | 114.85 |
| 10.Madarihat - Birpara | 303.35 | 376.75 | 124.20 |
| 11.Kalchini | 648.16 | 711.61 | 109.79 |
| 12.Alipurduar I | 305.92 | 378.59 | 123.75 |
| 13.Alipurduar II | 303.18 | 318.92 | 105.19 |

Source: Data for net sown area and total cropped area are collected from the officers of the revenue circle and the index of intensity of cropping is calculated by the formula = $\frac{\text{Total cropped area}}{\text{Net sown area}} \times 100$

Net sown area

Some of the known factors, such as density of rural population, irrigation, agricultural workers, scheduled caste and Scheduled tribe people are assumed to be responsible for spatial variation in the level of intensity of cropping.



Density of population and intensity of cropping

It has been attempted here to test the hypothesis that there exists a positive correlation between population pressure and intensity of cropping. The hypothesis is based on the assumption that as the increase in population leads to the decrease in per capita production, the peasants are compelled to grow a number of crops from the same plot of land during an agricultural year in order to increase the total volume of outputs, so that per capita production does not fall. Table 2 shows the block-wise population density per kilometer and intensity of cropping. The correlation coefficient between the two variables (density and Intensity of cropping) is found to be only-0.32 which is very much insignificant.

Table-02
Block-wise population pressure (2001) and intensity of cropping

| Blocks | Area Sq.k.m. | Population | Density sq.k.m. | Intensity of cropping |
|-------------------------|--------------|------------|-----------------|-----------------------|
| 1.Rajganj | 614.82 | 283967 | 462 | 102.25 |
| 2.Jalpaiguri | 500.65 | 280927 | 561 | 101.08 |
| 3.Maynaguri | 530.60 | 281700 | 531 | 105.00 |
| 4.Dhupguri | 565.10 | 418461 | 741 | 114.13 |
| 5.Mal | 545.90 | 265392 | 486 | 137.10 |
| 6.Metiali | 204.90 | 105906 | 517 | 134.38 |
| 7.Nagrakata | 397.48 | 115907 | 292 | 131.44 |
| 8.Kumargram | 517.68 | 178067 | 344 | 126.52 |
| 9.Falakata | 353.93 | 254273 | 718 | 114.85 |
| 10.Madarihat Birpara | 376.75 | 185470 | 492 | 124.20 |
| 11.Kalchini | 711.61 | 252571 | 355 | 109.79 |
| 12.Alipurduar I | 378.59 | 197331 | 521 | 123.75 |
| 13.Alipurduar II | 318.92 | 196984 | 618 | 105.19 |

Source: Census of India 2001 and District Statistical Handbook-Jalpaiguri 2008 Intensity of cropping collected from table no-1

This is proved that there is no correlation between population pressure and intensity of cropping such a condition has been prevailing in the region because of a number of reasons:

- I. Population density is not very much high where intensity of cropping is also low due to the reason of unfertile land and cover of tea garden.
- II. In the tribal-dominated foot hill area, the tribal people who are traditionally subsistence-oriented do not feel the necessity of growing more than one crop in their farms.
- III. The intensity of cropping is not comparatively high in the fertile area where transport and communication are developed and small towns and market canters have sprung up here. There are many educational institutions and educational levels are high. However, there is ample potentiality in the region as a whole for the increase of intensity of cropping, of adequate infrastructure; inputs and incentive are provided to the people.

Block-wise irrigation and Intensity of cropping

Intensity of irrigation is another factor for increasing the intensity of cropping in a region. Intensity of irrigation has volitional command over the intensity of cropping and is the primary influent (Singh, 1976). An attempt is, therefore made here to find out the correlation between the two variables such as intensity of cropping and intensity of irrigation.

Table-3
Block-wise irrigation (2007-2008) and intensity of cropping

| Blocks | Area under irrigation in hectare | Intensity of cropping |
|-------------------------|----------------------------------|-----------------------|
| 1. Rajganj | 25810 | 102.25 |
| 2. Jalpaiguri | 18866 | 101.08 |
| 3. Maynaguri | 8313 | 105.00 |
| 4. Dhupguri | 9074 | 114.13 |
| 5. Mal | 5204 | 137.10 |
| 6. Metiali | 2205 | 134.38 |
| 7. Nagrakata | 2215 | 131.44 |
| 8. Kumargram | 3685 | 126.52 |
| 9. Falakata | 7285 | 114.85 |
| 10. Madarihat - Birpara | 5946 | 124.20 |
| 11. Kalchini | 2400 | 109.79 |
| 12. Alipurduar I | 5221 | 123.75 |
| 13. Alipurduar II | 4373 | 105.19 |

Source: Computed on the basis of the data given in the table 1 and Department of Irrigation, Jalpaiguri.

Table 3 shows that block-wise irrigated areas and intensity of cropping. The correlation coefficient between the two variables is found to be -0.63 which is insignificant. The hypothesis of correlation between irrigation and intensity of cropping is not valid in the study region. This might be happening due to the reason that in the fertile blocks where the intensity of cropping is comparatively high, irrigation is insignificant, where as in the unfertile blocks intensity of cropping is comparatively low, irrigation is significant. Irrigation in the study region leads to mono-cropping rather than multiple cropping as the peasants remain satisfied with higher yield of a single principle crop (paddy) with the help of irrigation. So they do not feel the necessity of growing more crops. Thus the subsistence nature is not yet given up by the indigenous peasants.

Agricultural workers and intensity of cropping

Density of agricultural workers of net sown area is also assumed to be responsible for increasing the intensity of cropping. Therefore the hypothesis postulated here is that there is positive correlation between the density of agricultural workers of net shown area and intensity of cropping. The Bock-wise percentage agricultural worker of net sown area and intensity of cropping has been shown on table no.4. The correlation coefficient between the two variables is found to be -0.18 but is found to be very insignificant.

Table-4
Block-wise distribution of agricultural worker (2001) and intensity of cropping

| Blocks | Agricultural worker in Number | Percentage of total worker | Intensity of cropping |
|--------------------------|-------------------------------|----------------------------|-----------------------|
| 1. Rajganj | 20436 | 19.21 | 102.25 |
| 2. Jalpaiguri | 33595 | 27.97 | 101.08 |
| 3. Maynaguri | 42018 | 37.82 | 105.00 |
| 4. Dhupguri | 33358 | 20.93 | 114.13 |
| 5. Mal | 18921 | 17.74 | 137.10 |
| 6. Metiali | 3581 | 8.26 | 134.38 |
| 7. Nagrakata | 5042 | 10.91 | 131.44 |
| 8. Kumargram | 21758 | 28.74 | 126.52 |
| 9. Falakata | 28475 | 29.72 | 114.85 |
| 10. Madarihata - Birpara | 8840 | 12.54 | 124.20 |
| 11. Kalchini | 8306 | 9.27 | 109.79 |
| 12. Alipurduar I | 22824 | 28.97 | 123.75 |
| 13. Alipurduar II | 22407 | 29.93 | 105.19 |

Source:-Data for agricultural workers has been collected from the district census Handbook of Jalpaiguri District 1999-2001 and for intensity of cropping the source is as given in table No-01

Thus it is clear that there is a very weak association between the percentage of agricultural workers and intensity of cropping. Such a negative correlation coefficient is found due to the fact that density of agricultural workers is comparatively high in the fertile land where intensity is also high. But the condition is reverse in the indigenous peasants dominated built up plain. So the coefficient of correlation is very weak.

Block-wise production of rice and intensity of cropping

There is a general possibility of positive correlation between the production of major crops and intensity of cropping because of the tendency of production close related with intensity of cropping. Production of any region is dependent on fertilizer use, status of irrigation, demand of land use, farm mechanization and also fertility of the land.

From the table no-5 we found production rice (Aus, Aman, Boro) and intensity of cropping of the district. The coefficient of correlation between the two variables is found to be -0.72 which is very much insignificant. Thus it is proved that the production of rice or major crops is closely related with intensity of cropping and it is high where production of rice high and it is found to be low where production of rice is low. But it is not valid in this district.

Table -05
Block-wise production of rice and intensity of cropping 2007-2008

Production in thousand Metric Tons

| Name of the block | Production | Intensity of cropping |
|-------------------|------------|-----------------------|
| 1. Rajgunj | 54.366 | 102.25 |
| 2. Jalpaiguri | 46.835 | 101.08 |
| 3. Moynaguri | 50.185 | 105.00 |
| 4. Dhupguri | 47.78 | 114.13 |
| 5. Mal | 22.581 | 137.10 |
| 6. Metiali | 4.397 | 134.38 |
| 7. Nagrakata | 4.943 | 131.44 |

| | | |
|-----------------------------|--------|--------|
| 8.Kumargram | 19.65 | 126.52 |
| 9.Falakata | 41.32 | 114.85 |
| 10.Madarihat-Birpara | 6.693 | 124.20 |
| 11.Kalchini | 2.499 | 109.79 |
| 12.Alipurduar-I | 28.224 | 123.75 |
| 13.Alipurduar-II | 42.688 | 105.19 |

Source: Data of production (Rice) collected from district statistical Handbook – Jalpaiguri 2008 and data for intensity of cropping collected from table no.1

Conclusion

From the above discussion, we find that there is weak association between intensity of cropping and population pressure but the hypothesis is increase in rural population of area leads to the decrease in per capita production, the presents are compelled to grow a number of crops from the same plot of land during an agricultural year in order to increase the total volume of output so that per capital production does not fall. On the other hand, other factors like irrigation, agricultural worker do not have any correction with the intensity of cropping in the study region. There is strong relation between productions of rice with intensity of cropping. It is also found from the discussion that the irrigation dominated blocks posses the lower intensity of cropping and overall agricultural efficiency in the region is very high due to few positive factors .All other factors are found to be insignificant in influencing intensity of cropping . Therefore, there is a tremendous scope for the increase in intensity of cropping in the region if adequate measures are taken in the proper perspective for agricultural development.

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