International Journal of Food, Agriculture and Veterinary Sciences ISSN: 2277-209X (Online)
An Open Access, Online International Journal Available at http://www.cibtech.org/jfav.htm
2014 Vol. 4 (3) September-December, pp. 5-9/Roy and Barman
Research Article

CROP CONCENTRATION AND DIVERSIFICATION IN JALPAIGURI DISTRICT OF WEST BENGAL: A CASE STUDY

***Basu Roy P. and Barman U.K.**
Department of Geography, Alipurduar College, West Bengal,
**Author for Correspondence*

ABSTRACT
The present study is an attempt to explain the crop concentration and diversification in agriculture of Jalpaiguri district of West Bengal. Here, a detail study has been done to know the dominating crop as well as ranking of the crops in the cropping pattern of the study area. The study is based on secondary data sets that have been collected from district statistical handbook 2008. Using Bhatia's method, the crop concentration indices for all blocks of the district have been calculated for crops like paddy, wheat, jute, potato and mustard. Crop diversification indices have been calculated by using Gibbs and Martin's index for all the blocks of the district.

Keywords: *Crop Concentration, Diversification, West Bengal*

INTRODUCTION
Crop concentration and crop diversification are the two fundamental elements of agricultural geography because these two indices help to know cropping pattern of a region in a very detail way. Consequently, knowledge about concentration and diversification in a region may be considered very useful in proper agricultural land use planning. Crop concentration refers to the spatial density of individual crop or it may be stated as the variation in the density of any crop in a region at a fixed time span. On the other hand, crop diversification means cultivation of various crops from the soil. Thus, it refers to growing of varieties of crops either in a region or in the same agricultural field. Basically, during the period of the green revolution in the late sixties, there was a surge for diversified agricultural system to rejuvenate agricultural economy and for that purpose, it became necessary to diversify cropping pattern to country's growing demand and to increase income by earning foreign exchange. Therefore, crop concentration and diversification do not only provide the idea of a region dominated by particular crop but also play a role of guide to strengthen agricultural economy and land use planning.

Study Area
Jalpaiguri district is one of the largest districts of West Bengal covering an area of 6,245 km^2. It is situated between 26° 16' and 27° 0' North latitudes and 88° 4' and 89° 53' East longitudes. The district was established in 1869. Jalpaiguri is part of monsoon climate zone of South-eastern Asia. May is the hottest month of this region with average maximum temperature of about 32°C whereas January is coldest with 11°C. The average annual humidity in the district is of 82%. The annual average rainfall is 3160mm. The entire topography is crisscrossed with rivulets, rivers and hills. Veined by mighty rivers like the Teesta, Torsa, Jaldhaka, Raidak, Dyna, Neora, Sankosh etc., this piece of land has been aptly named as the land of 'Tea, Timber and Tourism'. A major stretch of the area is bordered in the north by Bhutan and hence the name – 'Dooars' which mean - Door of Bhutan has come. According to the 2011 census, Jalpaiguri district has a population of 3,869,675 with population density of 621 inhabitants per square kilometre. Jalpaiguri has a sex ratio of 954 females for every 1000 males and a literacy rate of 73.79%.

Objectives
The objective of the present study is to explain the spatial variation and concentration of selected crops in Jalpaiguri district and to show spatial diversification of crops.

MATERIALS AND METHODS
The entire study is based on secondary data that has been taken from Jalpaiguri district statistical handbook 2008. The crop concentration has been calculated first in the study using Bhatia's method and

in order to measure the crop diversification, Gibbs and Martin's (1962) formula has been used. Here, it should be mentioned that higher index values represent high concentration and vice versa. On the other hand, if value of diversification comes close to 1, the diversification will be higher.

Crop Concentration

Crop concentration refers to the variation in the density of crops cultivated in an area at a given point of time. It is remarkably influenced by the nature of terrain, rainfall and soil characteristics. In the study of cropping pattern, it is essential to know the areas where different crops dominate. This helps to take decision in future agricultural planning. For this purpose, a comparison of the relative strength of various crops is made by ranking them (Bhatia, 1965). In term of types of concentration, crops may be identified by a single or multiple nuclei of concentration and to more widespread low density distribution (Singh and Dhillon, 2004). Thus demarcation of crop concentration region helps in ascertaining the areas where a particular crop grows well even with the help of minimum inputs, and thus great role for agricultural development and planning (Raju, 2012). The following formula has been used to delineate crop concentration areas of the study area-

$$C_x(\ Crop\ Concentration\ Index) = \frac{x/y}{x'/y'}$$

Where,

x is the area of particular crop in the unit area

b is the total cropped area in the unit area

a' is the area of particular crop in the region

b' is the total cropped area in the region

Here, the high index values represent high concentration and low values show lower level of concentration. Using the mentioned method, the crop concentration indices for all blocks have been calculated for major crops like paddy, jute, wheat, potato and mustard.

Table1: Crop concentration in Jalpaiguri district

Sl.No.	Name of Blocks	Paddy	Jute	Wheat	Potato	Mustard
1	Rajganj	0.563	0.013	0.001	0.004	0.000
2	Jalpaiguri	0.466	0.022	0.002	0.007	0.000
3	Maynaguri	0.431	0.024	0.002	0.010	0.000
4	Dhupguri	0.419	0.016	0.003	0.016	0.001
5	Malbazar	0.516	0.011	0.002	0.010	0.000
6	Metiali	0.570	0.005	0.002	0.006	0.001
7	Nagrakata	0.554	0.006	0.002	0.006	0.001
8	Kumargram	0.524	0.007	0.004	0.005	0.001
9	Falakata	0.423	0.012	0.003	0.015	0.001
10	Madarihat-Birpara	0.541	0.013	0.001	0.003	0.001
11	Kalchini	0.550	0.010	0.002	0.003	0.001
12	Alipurduar-I	0.489	0.013	0.003	0.008	0.001
13	Alipurduar-II	0.507	0.006	0.003	0.008	0.001

Source: Computed by Researcher

Figure 1 show that paddy is the leading crop of the district and paddy cultivation is highly concentrated in all the blocks of the district. Paddy concentration is mostly found in blocks like Metiali, Rajganj, Nagrakata, Kalchini, Madarihat-Birpara. Malbazar, Alipurduar II and Kumargram blocks belong to second highest zone of paddy concentration. Moderate concentration is found in Jalpaiguri, Maynaguri, Falakata and Alipurduar I block. Lowest concentration is found in Dhupguri block.

Jute is the second important crop of the district although if compared with paddy concentration, it is too low. Highest concentration of jute cultivation is found in Maynaguri block followed by Jalpaiguri. Dhupguri ranks second highest in this field whereas Rajganj, Madarihat-Birpara Alipurduar I, Malbazar,

and Falakata have moderate jute concentration. Comparatively lower concentration is found in Kumargram and Kalchini block (figure 2).

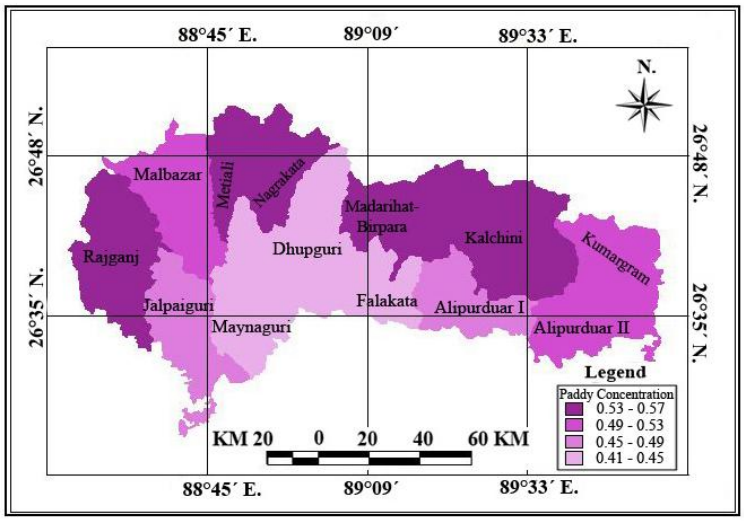

Figure 1: Paddy Concentration in Jalpaiguri District

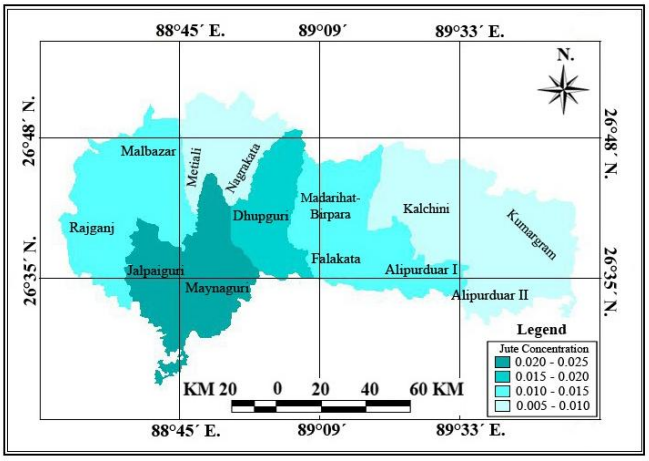

Figure 2: Jute Concentration in Jalpaiguri District

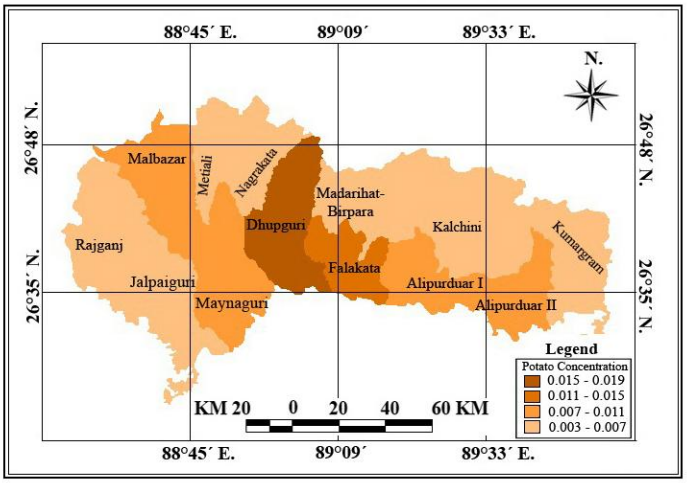

Figure 3: Potato Concentration in Jalpaiguri District

Potato is another important crop of the district and its concentration is confined into Dhupguri block. Falakata ranks second highest in potato concentration (figure 3). Moderate concentration is observed in Alipurduar I, Alipurduar II, Malbazar and Maynaguri block. Rest of the blocks has low concentration of potato cultivation.

The wheat concentration is very meager if compared with paddy, jute and potato cultivation. All the blocks of the district maintain almost uniform parity in wheat concentration that ranges from 0.001 to 0.004.

A few concentration of Mustard is almost uniformly found in Dhupguri, Metiali, Nagrakata, Kumargram, Falakata, Madarihat-Birpara, Kalchini, Alipurduar I and II block.

Crop Diversification

Crop diversification is a scientific method that deals with spatial relationship of crops in association with each other. Thus, crop diversification simply refers rising of various crops. It leads to a movement of low value agriculture to high value agriculture and this is an important way to enhance agricultural output (Dutta, 2012). Crop diversification is largely controlled by both physical and socio-economic conditions of a region. In common, higher the level of agricultural technology, lesser will be the degree of diversification (Raju, 2012). For the measurement of crop diversification, Gibbs and Martin developed the following formula that has been used here-

$$\text{Index of diversification} = 1 - \frac{\sum x^2}{(\sum x^2)}$$

x = percentage of total cropped area occupied by each crop

If the index of value goes towards 1, the diversification is relatively high and vice versa.

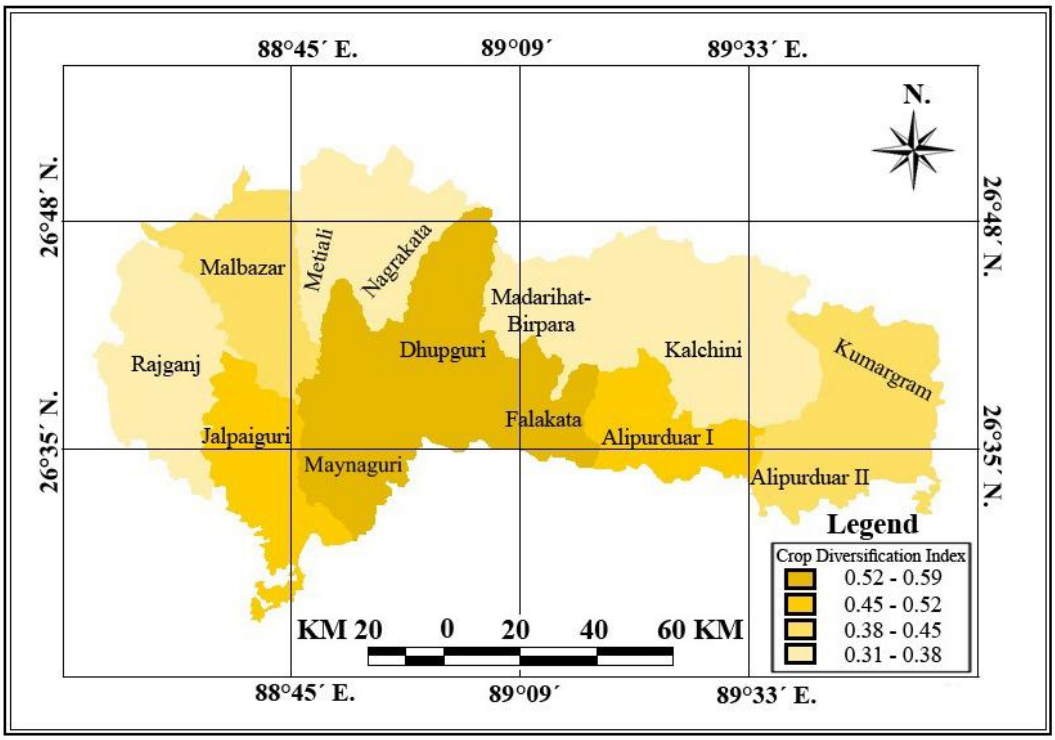

Figure 4: Crop Diversification Region of Jalpaiguri District

Based on index values, the blocks have been grouped into very high, high, medium and low diversification levels. Very high level of crop diversification is found in Dhupguri, Falakata and Maynaguri block; whereas Alipurduar I and Jalpaiguri block come under second highest category. Medium diversification is observed in Alipurduar II, Kumargram and Malbazar block.

Table 2: Crop Diversification Index in Jalpaiguri District

Sl.No.	Name of Blocks	CDI*
1	Rajganj	0.32
2	Jalpaiguri	0.50
3	Maynaguri	0.55
4	Dhupguri	0.57
5	Malbazar	0.42
6	Metiali	0.31
7	Nagrakata	0.34
8	Kumargram	0.39
9	Falakata	0.57
10	Madarihat-Birpara	0.34
11	Kalchini	0.35
12	Alipurduar-I	0.47
13	Alipurduar-II	0.41

Source: computed by Researcher
**CDI = Crop Diversification Index*

Other blocks namely Rajganj, Metiali, Nagrkata, Madarihat-Birpara and Kalchini belong to low diversification zone (figure 4).

Conclusion

The cropping pattern of Jalpaiguri district is paddy oriented as rice is the main staple food of the district. High concentration of paddy is found in all the blocks of the district. Although a number of crops like paddy, wheat, jute, potato, mustard, sugar cane, maize, etc are cultivated in the district but the area bears the tradition of cultivation of paddy throughout the year. However, there is spatial variation in the degree of crop concentration which is the result of varied physiographic, hydrological, pedological and socio-economic factors.

ACKNOWLEDGEMENT

All maps in this paper have been prepared by Bikash Das, Guest Teacher, Dept. of Geography, Alipurduar College, without which the paper would remain hard to understand easily.

REFERENCES

Bhatia SS (1965). Patterns of Crop Concentration & Diversification in India. *Economic Geography* **41** 40-56.

Dutta S (2012). A Spatio temporal Analysis of Crop Diversification in Hugli District. West Bengal. *Geo-Analyst* **2**(1).

District Statistical Handbook (2008). Jalpaiguri District, Bureau of Applied Economics and Statistics, Govt. of West Bengal.

Raju A (2012). Patterns of *Crop Concentration* and Diversification in Vizianagaram District of Andhra Prades. *Transaction* **34**(2).

Singh J and Dhillon SS (1984). *Agriculture Geography* (Tata McGraw Hill Publishing Company Limited) New Delhi 43.