ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 13, Issue, 01, pp.15993-15997, January, 2021

DOI: https://doi.org/10.24941/ijcr.40675.01.2021

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

AN ANALYSIS OF CROP COMBINATION REGIONS– A CASE STUDY OF COOCHBEHAR DISTRICT BASED ON JOHN CARRIER WEAVER'S METHOD

[1,*]Abdul Halim Miah, [2]Bishnu Barman and [3]Ranjan Roy

[1]Research Scholar, Department of Geography and Applied Geography, University of North Bengal, Siliguri, West Bengal, India
[2]State Aided College Teacher, Department of Geography, Dinhata College, West Bengal, India.
[3]Professor, Department of Geography and Applied Geography, University of North Bengal, Siliguri, West Bengal, India

ARTICLE INFO

Article History:
Received 22nd October, 2020
Received in revised form
14th November, 2020
Accepted 28th December, 2020
Published online 30th January, 2021

Key Words:

Agricultural, Crop Combination,
National Economy,
Crop Concentration, Regionalization.

ABSTRACT

Agricultural is one of the important occupations for the Indian farmers. The Indian half of the populations is directly engaged in this occupation. The agricultural sector is a play vital role for development of the Indian national income, also this sector providing works to three fourth of the total national population. It is also development the social status, human being and per capita GDP; it also will continue to be life line of the National economy. It is the largest private enterprise and it is contributes nearly one fourth of the national GDP, sustains of livelihood and it is backbone of agro based industry. Agriculture or cultivation is still shapes the backbone of our present national economy and it is play crucial role of a human being. It is also will still to be the life line of the national economy. The fields of agriculture in India subscribe almost one half of the Indian National income and it is also giving job three fourth of the total national population. There are many of population working in this sector, but the cultivator's economic level or status is very poor. The crop combination discusses method or technique which defines location areas, cropping pattern, crop concentration, cropping variation and crop diversification of a given area. The present day cultivation is one of the most important economic activities of inhabited region peoples in Coochbehar district. One of the methods of agricultural regionalization useful for discuss of farming practices and planning of the Coochbehar district in the state of West Bengal. In the present research paper attempted has been made to impress crop combination regions in Coochbehar district of West Bengal by using the Rafiullah's (1956) maximum positive deviation method. This district is one of the important agricultural regions in the state as well as North-East India.

Citation: ***Abdul Halim Miah, Bishnu Barman and Ranjan Roy.*** "An Analysis of Crop Combination Regions– A Case Study of Coochbehar District Based on John Carrier Weaver's Method.", *International Journal of Current Research*, 13, (01), 15993-15997.

INTRODUCTION

Agriculture is one of important occupation on earth surface peoples. Agriculture is an important and the biggest field of the country as well as of our state West Bengal. It gives that more one-fourth GDP, provides subsistence and shelter to more than sixty percent of peoples and service nearly 69 percent of the total workforce population (Ranganathan, 2003). World as well as Indian maximum peoples engaged in this occupation. It is also the lifeline and backbone of our present Indian economy. The coochbehar district is an agrarian area and most of the peoples are engaged in agricultural activities.

***Corresponding author: Abdul Halim Miah,**
Research Scholar, Department of Geography and Applied Geography, University of North Bengal, Siliguri, West Bengal, India.

The main idea of crop combination comprise rising various crops in a particular time period from the same field. The model or type of crop combination defender regional predominance of particular crops become in the uprising of crop regions like this analysis would finally minimize the variation of oversimplified generalization (Ali, Mohammad, 1978). Crop combination is a technique used to establish the boundaries of agricultural region based on statistical comparison of acreages (Siddhartha et al.2003). Regional and temporal model of crop combination gives learn how for the contemporary and the changing type of inter crop fight. The Coochbehar district maximum peoples are engaged in various cultivation related activities, the present crop combination technique is helpful to the designers as it sustain dirigible economic agricultural planning over prodigal cropping method.

The different physical and cultural factors like that rainfall received, soil fertility, working peoples, labours etc also affected crop combination in the study area.

Review of Literature

Husain (2014) in his book title "Systematic Agricultural Geography" described the Agricultural Efficiency and Productivity in details. To measure the agricultural efficiency, he used the methods proposed by S.S. Bhatia (1967).Parihar (2018) also applied a new technique for analysis of crop combination and crop diversification in north-west India. The study of agricultural productivity, intensity, crop regional distribution has been attempted byChakraborty (2012) and developed a crop combination region for Murshidabad district of West Bengal. Jose (2016) analysed a detail economic study of paddy cultivation in Kanyakumari district. Dutta (2012) compared different input such as farm-farmers, different farm type and different geographical regions by measuring agricultural productivity in his paper "Assessment of Agricultural efficiency and productivity- A study of Hugli district, west Bengal, India". Mane & Gaiward (2020) measured by crops concentration and productivity of crops per unit area. He analysed the study of crop combination in mashers tehsil based on Rafiullah's method. Husain (1976) explained and measured by cash price of agricultural crop productivity per unit area. Sapre- Deshpande (1964) & Bhatia (1967) explained that the providing weight age to the ranking order of the output per unit area with the total percentage share below every crop have calculated the productivity.

Study Area: The study area Koch Bihar District (also known as Coochbehar) lies in the North Eastern part of the state of west Bengal. Geographically, Cooch Behar district is surrounded by district Alipurduar and Jalpaiguri to the North and West, State of Assam (Kokrajhar and Dhubri Districts) to the East and International Boundary with Bangladesh towards south, south-East and South-West. The location of the district is spread over from 26°32'20" N to 25°57'40'' N Latitude and 89°54'35" E to 88°47' 40''E longitude. According to 2011 census total population was 2.819,086 and population density 830/sqkm and total area 3,387 sqkm. Literacy rate is 76.78% and sex ratio is 942. The district comprised with 12 blocks.

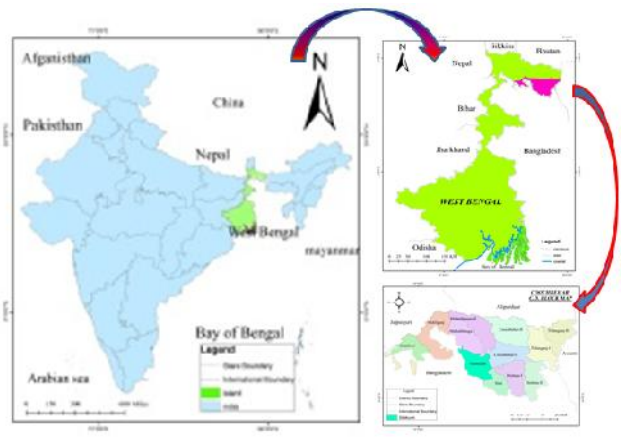

Figure 1. Location Map of the Study Area

Objectives

- To find out the major crop combination region of the Cooch Behar District.
- To assess the regional differentiation of the cropping pattern of the Cooch Behar district
- To find out the agriculture backwardness of the district.
- To find out the degree of specialization of crops in the different block of Cooch Behar

Data Sources & Methodology: A systematic approach has been applied for the present research. The present study is entirely based on secondary data sources. The data has been taken from the following secondary sources:

- Census of India 2011
- Primary Census Abstract 2011 (India & State)
- District Statistical Hand book of Cooch Behar (2013)
- Agricultural Annual Plan, Office of the Principal Agricultural Officer, Cooch Behar
- Bureau of Applied Economics & Statistics, Cooch Behar.

To find out the agriculture regions in the district of Cooch Behar block has been taken as the unit of the study. The agricultural regions of the Cooch Behar district have been identified by the J.C.Weaver method of crop combination. There have been different types of crops grown in Cooch Behar District like Paddy ((Aus, Aman & Boro), Jute, Wheat, Maize, Potato, Masur, Til, Maskalai, Khesari, Mustard and Sugarcane. All the crops are step wise arranged after that crop combinations are taken. In this purpose to crop combination regions comfort of these method is so very plainness and simplicity in crops combination calculation of any region. These quantitative methods are more precise, accurate and scientific than the qualitative method.

Crop Combination of Cooch Behar District: John Carrier Weaver is one of most important agricultural geographer in U.S.A. The J.C Weaver was the first agricultural geographer who applied the modern statistical technique to perform the agriculture crop combination of the United States of America. Weaver in his field calculated deviation of actual percentage of agricultural crops for all the probable summation in the element areal units in opposition to a theoretical standard. For the delineation of crop combination regions in Cooch Behar districtJohn Carrier Weaver (1904) method has been applied.

The theoretical curve for the standard measurement was engaged as follows:

- Monoculture = 100 % of the total harvested crop land in one crop.
- 2-crop combination = 50 % in each of two crops
- 3-crop combination = 33.33 % in each of three crops
- 4-crop combination = 25 % in each of four crops
- 10-crop combination = 10% in each of ten crops

For the determination of minimum deviation the SD method was used

The expression is SD=$\sqrt{\sum d\,2/n}$

Where, 'd' is the different between the actual crop percentage in a given areal unit and the appropriate percentage in the theoretical and 'n' is the number of crops in a given combination.

RESULT AND DISCUSSION

Cooch Behar is one of the most populated district of West Bengal.

Table 1. Area of the Principle Crops in the blocks of Coochbehar for year 2011-2012

Sl No	Name of the Blocks	Area in Hectare					Total area
		Paddy (P)	Jute (J)	Wheat (W)	Potato (M)	Oil seed (O)	
1	Cooch Behar-I	24001	10258	3497	3242	1411	42409
2	Cooch Behar-II	29011	11557	227	3097	424	44316
3	Dinhata-I	30985	8170	111	2265	1101	42632
4	Dinhata-II	25078	10094	632	2109	1540	39453
5	Haldibari	10864	2677	138	707	281	14667
6	Mathabhanga-I	22524	6667	124	2370	683	32368
7	Mathabhanga-II	25879	6722	147	7050	2619	42417
8	Mekhiliganj	14246	2506	1235	1470	2526	21983
9	Sitai	11763	2835	1062	1097	1303	18060
10	Tufanganj-I	24539	3477	2870	2508	3831	37225
11	Tufanganj-II	20877	2804	1606	724	1819	27830
12	Sitalkuchi	28508	10589	09	504	183	39793

Source: Directorate of Agriculture, Govt. of West Bengal

Table 2. Percentage of Cropped Area to Total Cropping Area of the Block of Cooch Behar District

Sl No	Name of the Blocks	Percentage of Cropped Area.						Total Cropped area
		Paddy (P)	Jute (J)	Wheat (W)	Potato (M)	Oil seed (O)	Total %	
1	Cooch Behar-I	56.59	24.19	8.25	7.65	3.33	100	42409
2	Cooch Behar-II	65.46	26.08	0.51	6.99	0.96	100	44316
3	Dinhata-I	72.68	19.16	0.26	5.31	2.58	100	42632
4	Dinhata-II	63.56	25.58	1.60	5.35	3.90	100	39453
5	Haldibari	74.07	18.25	0.94	4.82	1.92	100	14667
6	Mathabhanga-I	69.59	20.60	0.38	7.32	2.11	100	32368
7	Mathabhanga-II	61.10	15.85	0.35	16.62	6.17	100	42417
8	Mekhiliganj	64.80	11.40	5.62	6.69	11.49	100	21983
9	Sitai	65.13	15.70	5.88	6.07	7.21	100	18060
10	Tufanganj-I	65.92	9.34	7.54	6.74	10.29	100	37225
11	Tufanganj-II	75.02	10.08	5.77	2.60	6.54	100	27830
12	Sitalkuchi	71.64	26.61	0.02	1.27	0.46	100	39793

Source: Directorate of Agriculture, Govt. of West Bengal

Table 3. Block Wise Crop Combination by J.C. Weaver Method in Coochbehar District, 2011-12

Sl. No	Name of the Blocks	Crops Regions	Name of the Crops
1	Cooch Behar-I	Five Crops	Paddy,Jute,Wheat,Potato&Oil Seeds
2	Cooch Behar-II	Two Crops	Paddy,Jute
3	Dinhata-I	Two Crops	Paddy,Jute
4	Dinhata-II	Two Crops	Paddy,Jute
5	Haldibari	Mono Crops	Paddy
6	Mathabhanga-I	Two Crops	Paddy,Jute
7	Mathabhanga-II	Five Crops	Paddy,Jute,Wheat,Potato&Oil Seeds
8	Mekhiliganj	Five Crops	Paddy,Jute,Wheat,Potato&Oil Seeds
9	Sitai	Five Crops	Paddy,Jute,Wheat,Potato&Oil Seeds
10	Tufanganj-I	Five Crops	Paddy,Jute,Wheat,Potato&Oil Seeds
11	Tufanganj-II	Five Crops	Paddy,Jute,Wheat,Potato&Oil Seeds
12	Sitalkuchi	Two Crops	Paddy,Jute

Source: Directorate of Agriculture, Govt. of West Bengal

The population in this region mainly depend on agricultural. Agriculture is their main economic backbone of the district population. According to various block in this district, the regional distribution of the crops are shown on the basis of the total production crop area of the District. From the above table it can be seen that the block wise percentage of the distribution of the crops shown on the basis of the total crop producing area of the block.

- **Cooch Behar-I Block:** Cooch Behar –I block belongs to the Headquarter of the Cooch Behar District. Table-2 shows that the crops are mainly grown on 42409 hectares in this block. In this block, 56.89% of the total crop area is concentrated in paddy cultivation, 24.19% is under jute cultivation, 6.25% is under wheat cultivation, 6.75% is under potato cultivation and only 3 .33% areas is under oil seed cultivation.
- **Cooch Behar-II Block:** From the above table-2 shows that Cooch Behar-II block has 44316 hectares net cultivated area. Among these 65.46% is under the paddy cultivation, 26.08% is under jut cultivation, 0.51 % is under wheat cultivation, 6.99% is under potato cultivation and only 0.96% area is under the oil seed cultivation.
- **Dinhata-I Block:** Dinhata-I block is the sub divisional block of Dinhata. From the table-2, it is observed that the total cultivated area of this is 42632 hectares. Out f the 42632 hectares of the cultivated area, 72.68% are concentrated with the paddy cultivation, 19.16% is under the jute cultivation, 5.31% is under potato cultivation, 2.58% areas is under oil seed cultivation and only 6.25%

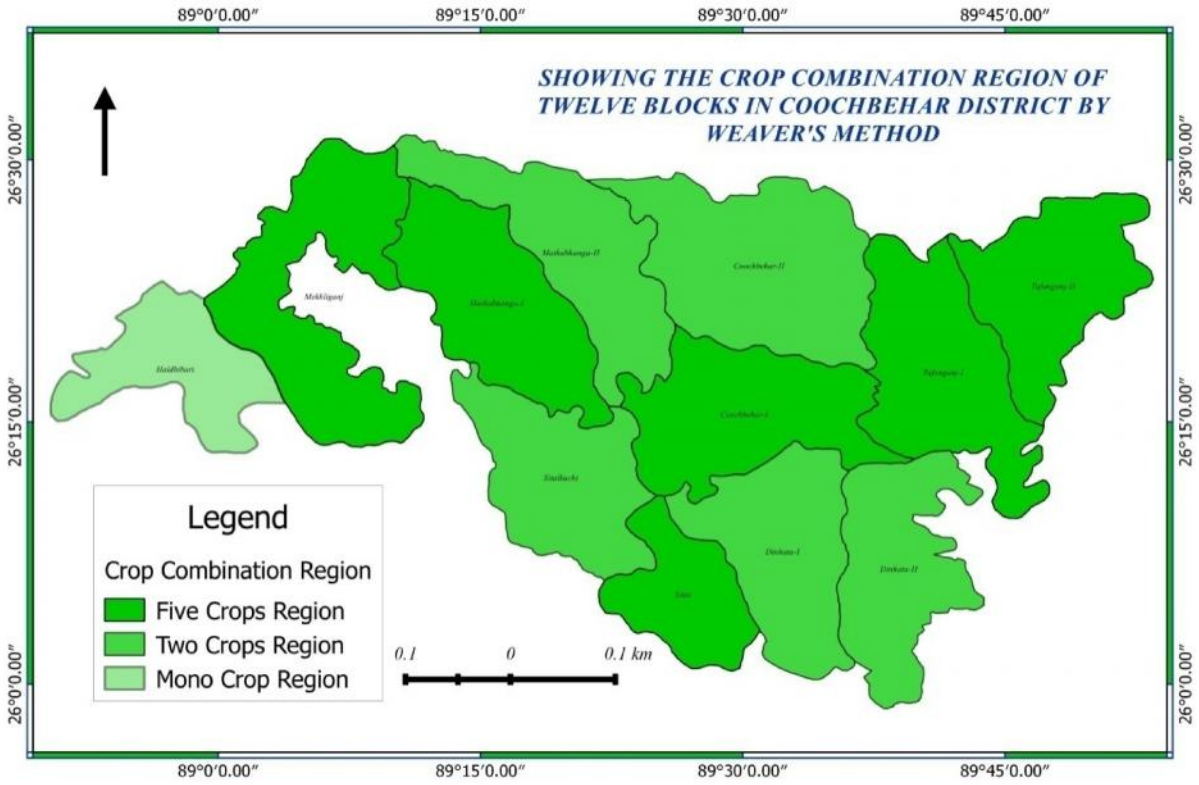

Figure 1. Showing the Block Wise Crop Combination Region in Coochbehar District By Weaver's Method

is under wheat cultivation, The major crop of this blocks are paddy, and jute.

- **Dinhata-II Block:** Dinhata-II block is the community development block of Cooch Behar District. From the table-2, it is observed that the total cultivated area of this is 39453 hectares. Out f the 39453 hectares of the cultivated area, 63.56% are concentrated with the paddy cultivation, 25.58% is under the jute cultivation, 5.35% is under potato cultivation, 3.90% areas is under oil seed cultivation and only 1.60% is under wheat cultivation. Paddy and juteare the major crop of this block.
- **Haldribari Block:** Haldibari block is the community development block of Cooch Behar District. From the table-2, it is observed that the total cultivated area of this is 14667 hectares. Out f the 14667 hectares of the cultivated area, 74.07% are concentrated with the paddy cultivation, 18.25% is under the jute cultivation, 4.82% is under potato cultivation,1.92% areas is under oil seed cultivation and only 0.94% is under wheat cultivation. Paddy and jute are the major crop of this block.
- **Mathabhanga-I:** Mathabhanga –I block is the community development block of Cooch Behar District. From the table-2, it is observed that the total cultivated area of this is 32368 hectares. Out f the 32368 hectares of the cultivated area, 69.59% are concentrated with the paddy cultivation, 20.60% is under the jute cultivation, 7.32% is under potato cultivation,2.11% areas is under oil seed cultivation and only 0.38% is under wheat cultivation. Paddy and jute are the major crop in this block.
- **Mathabhanga-II:** Mathabhanga –II block is the community development block of Cooch Behar District. From the table-2, it is observed that the total cultivated area of this is 42417 hectares. Out f the 42417 hectares of the cultivated area, 61.10% are concentrated with the paddy cultivation, 15.85% is under the jute cultivation, 16.62% is under potato cultivation,6.17% areas is under oil seed cultivation and only 0.35% is under wheat cultivation. Paddy, jute, potato are the major crop of this block.
- **Mekhiliganj Block:** Mekhiliganjblock is the community development block of Cooch Behar District. From the table-2, it is observed that the total cultivated area of this is 21983 hectares. Out of the21983 hectares of the cultivated area, 64.80% are concentrated with the paddy cultivation, 11.40% is under the jute cultivation, 6.69% is under potato cultivation,11.49% areas is under oil seed cultivation and only 5.62% is under wheat cultivation. Paddy, jute, potato, oil seed are the major crop of this block.
- **Sitai Block:** Sitaiblock is the community development block of Cooch Behar District. From the table-2, it is observed that the total cultivated area of this is 18060hectares. Out of the 18060 hectares of the cultivated area, 65.13% are concentrated with the paddy cultivation, 15.70% is under the jute cultivation, 6.07% is under potato cultivation, 7.21% areas is under oil seed cultivation and only 5.88% is under wheat cultivation. Paddy, jute, potato are the major crop of this block.
- **Tufanganj-I:** Tufanganj-Iblock is the community development block of Cooch Behar District. From the table-2, it is observed that the total cultivated area of this is 37225 hectares. Out of the 37225hectares of the cultivated area, 65.92% are concentrated with the paddy cultivation, 9.34% is under the jute cultivation, 6.74% is under potato cultivation,10.29% areas is under oil seed cultivation and7.54% is under wheat cultivation. Paddy, jute, wheat and oil seed are the major crop of this block.
- **Tufanganj-II:** Tufanganj-IIblock is the community development block of Cooch Behar District. From the

table-2, it is observed that the total cultivated area of this is 27830 hectares. Out of the27830 hectares of the cultivated area, 75.02% are concentrated with the paddy cultivation, 10.08% is under the jute cultivation, 2.60% is under potato cultivation,6.54% areas is under oil seed cultivation and only 5.77% is under wheat cultivation. Paddy, jute, wheat and oil seed are the major crop of this block.

- **Sitalkuchi Block:** Sitalkuchiblock is the community development block of Cooch Behar District. From the table-2, it is observed that the total cultivated area of this is 39793 hectares. Out of the 39793 hectares of the cultivated area, 71.64% are concentrated with the paddy cultivation, 26.61% is under the jute cultivation, 1.27% is under potato cultivation,0.46% areas is under oil seed cultivation and only 0.02% is under wheat cultivation. Paddy, jute, potato are the major crops of this block.

In this study, has taken into account the percentage of crop area to total cropped area and has calculated the deviation of real percentage for all the possible combinations in the component areal units against a theoretical standard. On the basis of Weaver crop combination model, Cooch Behar District has occupied with three zone of crop combination region. The study area absent with the two crop combination, three crop combinations, six crop combination and absent of others. The 12 blocks of the study area having with the one crop combination, two crop combinations and five crop combination.

- **Monoculture (One crop combination):** Out of the 12 block of Cooch Behar district, only Haldibari block has one crop combination. Paddy is the monoculture crop of this block.
- **Two Crop Combinations:** From the above table-3 it has been shown that Cooch Behar-II, Dinhata-I & Dinhata-II, Mathabhanga-I and Sitalkuchi block has the two crop combination region of the district of Cooch Behar. Paddy and Jute are the two crop combination of these blocks.
- **Five Crop Combinations:** The pattern of three crop combination and the pattern of four crop combination are absent of the study area. The five crop combination is observed in the blocks of Cooch Behar-I, Mathabhanga-II, Mekhiliganj, Sitai, and Tufanganj-I and Tufanganj-II. The five crops include Paddy,Jute,Wheat,and Potato&Oil Seeds.

Conclusion

From the above discussion it can be concluded that the main agricultural crop of Cooch Behar is paddy, the second major agricultural crop is jute, besides potato, wheat and other oilseeds are cultivated in different blocks of the district. Reviewing the grain production of various blocks in Cooch Behar based on Weaver's crop combination model, it is seen that Cooch Bihar district basically belongs to three crop combinations zones. These are monoculture, two crop combination and five crop combination. Among the 12 blocks of the district only Haldibari is under the monoculture or one crop combination region of the district. Cooch Behar-II, , Dinhata-I & Dinhata-II, Mathabhanga-I and Sitalkuchi block have the two crop combination region of the district of Cooch Behar. Paddy and Jute are the two crop combination of these blocks. Cooch Behar-I, Mathabhanga-II, Mekhiliganj, Sitai, Tufanganj-I and Tufanganj-II are under the five crop combination region of the district. The five crops include Paddy, Jute, Wheat, Potato& Oil Seeds.

REFERENCES

Agricultural Statistics at a Glance 2018.Government of India Ministry of Agriculture & Farmers Welfare Department of Agriculture, Cooperation & Farmers Welfare Directorate of Economics and Statistics.

Agrawal, A.N. 1986. Indian agriculture: Problems, Progress and prospects. Vikas Publication House, Technology & Engineering. Delhi.

Annual report, 2018-2019. Department of Agriculture, Cooperation & Farmers Welfare. Government of India, Krishi Bhawan, New Delhi-110001.

Agricultural Marketing: Problems and Alternatives: a Series of Ten Articles Contributors Colorado. Dept. of Agriculture

Blende, Asha A. and Kanitkar, T. 2000. Principle of Population Studies. Thirteenth Revised Edition, Himalaya Publishing House, Mumbai.

Barman, B. & Roy, R. 2018. Regional Disparities of Health Care Infrastructure in Koch Bihar District. West Bengal. Research Journal of Humanities and Social Sciences, 94, 949-959.

Barman, B. & Roy, R. 2019. Nature and Characteristics of Rural Labour Out-Migration: A Case Study of Sitalkuchi Block in Koch Bihar District. West Bengal. Thematic Journal of Geography, 84, 725-737.

Bureau of Applied Economics & Statistics, Govt. of West Bengal compiled

Census of India 2011. Indian Census in Perspective, Office of the Registrar General, Government of India, New Delhi.

Chandna, R.C. 2016. Geography of Population. Twelfth Edition, Kalyani Publishers, New Delhi.

District Census Hand Book, 2011, Series 20, Part-XII-A, Koch Bihar. Retrieved from https://censusindia. gov.in/2011census pdf Accessed on 02th June, 2020.

Goutam, A. 2016. Agricultural Geography. Sun shines Book Store. New Delhi.

Hussain, M. 2004. Systematic Agricultural Geography. Rawat Publication, New Delhi.

Varshneya, M.C. 2006.Textbook of Agricultural Meteorology. Published by Indian Council of Agricultural Research, New Delhi.

****