

Analyze the Changing Scenario of Cropping Intensity and Crop Combination (1990-91 to 2010-11) in Nadia District, West Bengal

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ABSTRACT

The agricultural production of any region is composed in the gross by nature of topography, number of soils and climatic parameters as well as socio-economic factors. The present paper is an attempt to analyze the changing scenario of cropping intensity and crop combination in Nadia district, West Bengal and also to explore the intensity of crop and crop combination with different natural and socio-economic parameters for sustainable yield. Based on the block wise secondary data obtained from the Statistical Abstract of Nadia, I prepared the cropping intensity mapping of the study area by taking the value gross cropped area and net cropped area and also I prepared the crop combination mapping of the study area. The results show that the cropping intensity in 1990-91 in Nadia District was 230.34% that rose to 243.07% in 2000-01 and 249% in 2010-11. Weaver's method of crop combination reveals that five crop combinations are dominant in the study area. Only Nabadwip block experienced two crop combinations. It is also observed that number of crops has been increased during the study period which creates very high cropping intensity zone. However, a planned crop pattern is suggested considering demographic change of the region.

INTRODUCTION

The intensity of cropping refers to the number of crops raised in a field during an agricultural year. It is a measure of land use efficiency, which is defined as 'extent to which the net sown area is cropped or resown'. Crop combination is a process of cultivating multiple crops in the same field. This practice helps farmers to harvest more than one crop in different seasons. Crop combination also nurtures the soil and increases its fertility. And importantly, crop combination offers the highest returns in farming. Crops are generally grown in combinations (Weaver, 1954). Crop combination and cropping intensity are closely related for the verities of crop grow in this time of the study area. Different types of crop grown avoid the risk of crop damages. Present day crop combination is a great influence of agricultural production as well as cropping intensity. In the point of agricultural view after 'Agricultural Revolution' in world growth of crop and number of crop increasing day by day. So verities of crop creates high cropping intensity zone in any area as well as in our study area. Different number of crop production raised the crop combination. Crop combination is most important for cropping intensity. Intensity of crop is very important of crop production. The cropping system comprises all comprises all components required for the production of a particular crop and the interrelationships between them and an environment by Gautam (2015) "Cropping Pattern in India". To understand the proportion of area under different agricultural production in Nadia district in 1990 - 91 and 2010 - 11 time periods and to analyze and present the cropping intensity and crop combination in the Nadia district for the years 1990-91 to 2010-11.

METHODS

STUDY AREA

Nadia district is a district in the state of West Bengal in eastern India. Nadia district is situated between 22°53' N and 24°11' N latitude and 88°09' E and 88°48' E longitude, this district is irregular linear in shape with orientation of North-South. The district is Approximately 46 feet or 14 metres above the mean sea level. The Tropic of cancer divides the district in two parts. The geographical boundary of Nadia district comprises Bangladesh in East, Bardhaman and Hoogly district in West, Murshidabad district in North and North West and North 24 Parganas towards South and South East. The district has 17 blocks and covered an area about 3927 sq. km (1,516 sq mile).

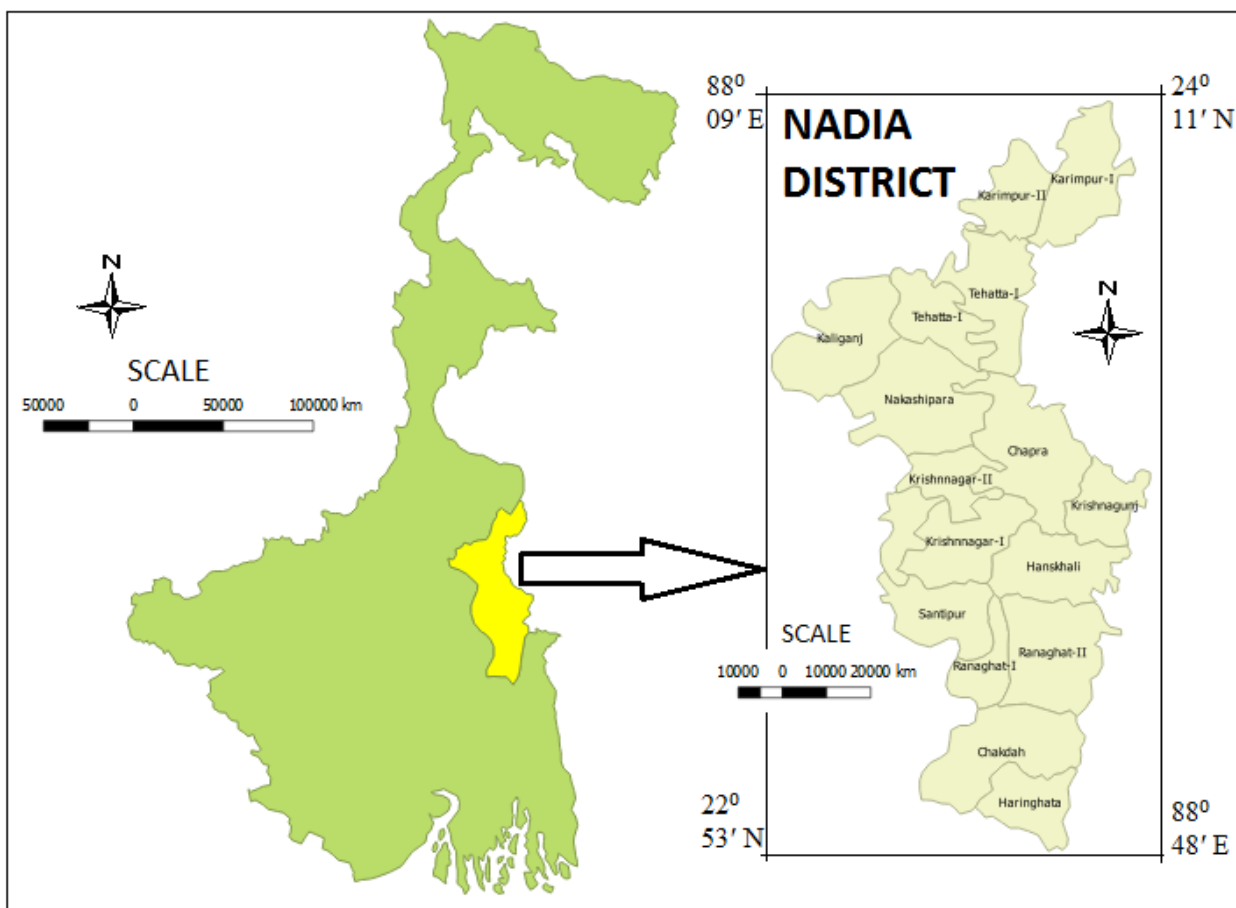


Figure 1: Location of study area

DATA ANALYSIS

The study is based on the secondary data obtained from Principal Agricultural Office, Krishnagar, Nadia District, Government of West Bengal, West Bengal, India and Statistical handbooks, Nadia district. Block is taken as a unit of study, for analysis and mapping purpose. Data thus collected, interpreted and represented cartographically by using choropleth technique. Here, represent the choropleth map of the study area in block wise for analysis the intensity of crop in Nadia district. The formula for the cropping intensity is done by

$$\text{Cropping Intensity} = \frac{\text{Gross cropped area}}{\text{Net cropped area}} \times 100$$

Also represent the choropleth map technique of the study area in block wise for analysis the crop combination in Nadia district on the basis of net shown area or total harvested crop land and hypothetical percentage value of agricultural land Statistical handbooks, Nadia district, 2011. The combination is done by follow the law of Scientist J.C. Weaver (1954) first statistically applies combination method.

This law is $CC = \sum d^2/n$

Where, CC = Crop Combination, d = Net Shown Area or Total Harvested Crop Land and

n = No. of Crops

The main data source of this study is Principal Agricultural Office, Krishnagar, Nadia District, Government of West Bengal, West Bengal, India and Statistical handbooks, Nadia district, 2011. The data taken from Statistical handbooks and used MS Excel and Geographical Information System (GIS) Software for analysis the cartographical presentation the block-wise percentage of cropping intensity and crop combination of different agricultural production and also the data has been calculated to show the change that is taken place from 1990-91 to 2010-11 time of periods.

RESULT AND DISCUSSION

- **Cropping intensity in Nadia District**

The intensity of cropping is a distinct reflection of agricultural development because it truly reveals how intensely a unit area produces crops with increasing use of inputs. Thus the adoption pattern of technology use also becomes clear from this.

Cropping intensity influence on a number of inputs: (a) the land should be level and fertile, (b) goods quality of seeds particularly HYV of seeds should be available, (c) assured supply of water, (d) measures to save the crops from pests, and (e) facility for complete or partial marketability by Shafi (2006) Agricultural Geography, Delhi, Dorling Kindersley (India) Pvt. Ltd. 111-112. The cropping intensity has direct correlation with assured irrigation which enables farmers to go for multiple cropping and use higher dose of fertilizers and HYV seeds. Cropping system in irrigated areas can be developed to make the best use of all the resources available in a particular situation by Shafi (2006) Agricultural Geography, Delhi, Dorling Kindersley (India) Pvt. Ltd. 111-112.

Table No.1: Block wise Net cropped area (in hectares), Gross cropped area (in hectares) and Cropping intensity (%) of Nadia District (1990-91 and 2010-11).

Name of agricultural blocks	1990-91			2010-11		
	Net cropped area	Gross cropped area	Cropping intensity	Net cropped area	Gross cropped area	Cropping intensity
Krishnagar -I	18644	42841	229.78	18664	46230	247.70
Krishnagar -II	10281	23352	227.14	10280	24541	238.73
Nabadwip	8174	17482	213.87	8174	19074	233.35
Chapra	21365	50013	234.09	21372	54512	255.06
Krishnaganj	9880	22172	224.41	9858	24573	249.27
Tehatta- I	19752	40978	207.46	19752	46022	233.00
Tehatta- II	15256	32182	210.95	15256	37232	244.05
Karim pur	32385	74138	228.93	32385	78431	242.18
Nakashipara	23089	55059	238.46	23092	58387	252.85
Kaliganj	19175	45289	236.19	19170	48423	252.60
Santipur	13746	31235	227.23	13746	33375	242.80
Hanskhali	17698	40734	230.16	17696	43759	247.28
Ranaghat-I	10718	25380	236.80	10718	26944	251.39
Ranaghat-II	17396	39695	228.18	17398	43978	252.78
Chakdaha	22414	55462	247.44	22414	60390	269.43
Haringhata	12160	30813	253.40	12160	32211	264.89

Source: Principal Agricultural Office, Krishnagar, Nadia District, Government of West Bengal, West Bengal, India.

High Intensity Zone

In this district cropping intensity (CI- above 253 %) block area in 1990-91 is Haringhata with 253.40% (Figure 2). But in 2010-11 high cropping intensity block areas are Chapra, Chakdaha, Haringhata (Figure 2). Among these three blocks highest cropping intensity arises in Chakdaha block with 269.43 % . All these blocks are under high cropping intensity zone, because of very high fertile land use of the modern agricultural technology, use hybrid seeds with irrigation facilities; develop transport system, high educated farmers and uses chemical fertilizer (Table 1).

Medium cropping intensity zone

In 1990-91, Chapra, Nakashipara, Kaliganj, Ranaghat-I, Chakdaha blocks are cropping intensity (CI- 234%—253%) of this district medium intensity zone (Figure 2). In 2010-11, Krishnagar –I, Krishnagar –II, Krishnaganj, Tehatta- II, Karimpur, Nakashipara, Kaliganj, Santipur, Hanskhali, Ranaghat-I, Ranaghat-II blocks are under the medium zone (Figure 2). Among these 11 blocks highest cropping intensity found in Nakashipara block with 252.85 % cropping intensity. In these region intensity of crop is medium because medium fertile land, lack of irrigation system, lack of crop conservation facilities and lack of high transport facilities (Table 1).

Low Intensity Zone

In 1990-91, in this district low cropping intensity (CI below 234 %) blocks are Krishnagar –I, Krishnagar –II, Nabadwip, Krishnaganj, Tehatta- I, Tehatta- II, Karim pur, Santipur, Hanskhali, Ranaghat-II (Figure 2). In 2010-11 low cropping intensity (CI below 234 %) blocks are Nabadwip, Tehatta- I (Figure 2). All these blocks are low cropping intensity zone for high temperature and humidity unfertile land, soil matter, size of land, labour, lack of operation efficiently lack of transport communication and poor irrigation facilities (Table 1).

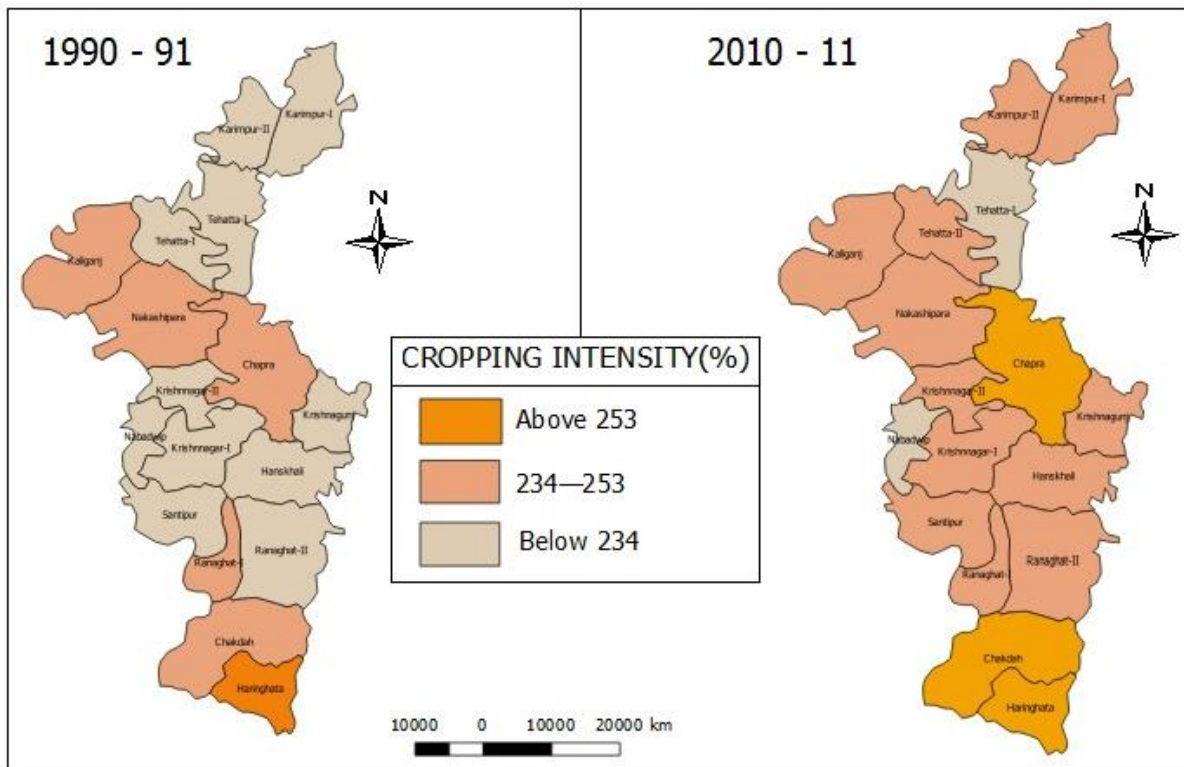


Figure 2: Cropping Intensity Zone in Nadia District

- **Change in land use pattern in Nadia District from 1990 – 91 to 2010 - 11**

Table No.2: Net cropped area (in hectares), Gross cropped area (in hectares) and Cropping intensity (%) of Nadia District (1990-91 to 2010-11).

year	Net cropped area	Gross cropped area	Cropping intensity
1990-91	272133	626825	230.34
2000-01	272135	661491	243.07
2010-11	280200	697700	249

- Source: Principal Agricultural Office, Krishnagar, Nadia District, Government of West Bengal, West Bengal, India.

It has been found that the cropping intensity in 1990-91 in Nadia District was 230.34% that rose to 243.07% in 2000-01 and 249% in 2010-11. The reason for the immense increase of the intensity index is attributed to the noteworthy progress in the use of irrigation and large- scale use of high yielding variety of seeds, chemical fertilizers and pesticides. When analysed from the Block wise variations in the cropping intensity of the study area, a notable increase in the cropping intensity in all Blocks of this District has been marked during the study period (1990-91 to 2010-11). This increase is mainly due to the development of irrigation facilities, increasing use of high yielding seeds, chemical fertilizers and implements. In both time periods (1990-91 and 2010-11) the cropping intensity above 235% are observed only in Haringhata block, below 234% are observed only in Tehatta-I block and 234% to 253% are recorded in the remain blocks of Nadia district.

- **Crop Combination Region In Nadia District**

The study of crop combination in the region constitutes an important aspect of agriculture. Out of the many approaches to combinational study, Weaver’s method used in crop combination has been applied largely by geographers. Some have followed this method in demarcating crop and livestock combinations by Scott (1957) and Coppock (1964) .Where a region grown in different types of crops, the crops are generally grown in

combination. In India, Weaver's method as modified by Doi when applied by Siddiqui (1972) in the Deficiency Disease Combinations in Utter Pradesh.

Table 3: Crop Combination and Hypothetical Percentage of Nadia District (J.C. Weaver Method)

Crop combination	Hypothetical percentage
Single Crop (One Crop)	$(100 / 1) = 100 \%$
Double Crop (Two Crop)	$(100 / 2) = 50 \%$
Three Crop (Three Crop)	$(100 / 3) = 33.33 \%$
Four Crop (Four Crop)	$(100 / 4) = 25 \%$
Fifth Crop (Five Crop)	$(100 / 5) = 20 \%$

Table 4: Net Shown Area in Hectometres in Different Blocks of Nadia District.

Sl. No.	Name of Block	Jute	Wheat	Paddy	Mustard	Musur
1	Karimpur-I	14127	8268	2902	3160	3650
2	Karimpur-II	10323	6324	2139	5180	563
3	Tehatta-I	10868	6231	875	6182	4371
4	Tehatta-II	9792	3896	2038	3794	3897
5	Krishnaganj	8428	2923	9361	1560	2543
6	Nakashipara	13416	2712	2813	1539	485
7	Chapra	7489	871	20658	8641	432
8	Kaliganj	3808	415	991	2197	707
9	Krishnanagar-I	7069	1241	15162	12992	414
10	Krishnanagar-II	4172	1070	3426	4485	1161
11	Nabadwip	3632	4307	888	952	641
12	Santipur	3913	1435	4672	12539	968
13	Hanskhali	5423	1464	690	5626	354
14	Ranaghat-I	3230	93	3810	950	791
15	Ranaghat-II	5438	1388	342	3919	1780
16	Chakdaha	6644	316	1297	845	621
17	Haringhata	2383	1315	24942	2592	2224

Source: Statistical handbooks, Nadia district, 2011

Table 5: Percentage Value of Land

Sl. No.	Name of Block	% of Jute	% of Wheat	% of Paddy	% of Mustard	% of Musur
1	Karimpur-I	43.9998	25.75139	9.038527	9.842091	11.36824
2	Karimpur-II	42.0849	25.78173	8.72029	21.11786	2.295242
3	Tehatta-I	38.0972	21.84247	3.06727	21.6707	15.32233
4	Tehatta-II	41.8158	16.63749	8.703079	16.2019	16.64176
5	Krishnaganj	33.9633	11.77917	37.72315	6.28652	10.24783
6	Nakashipara	63.9924	12.93585	13.4176	7.340806	2.313379
7	Chapra	19.6608	2.286629	54.23328	22.68515	1.134126
8	Kaliganj	46.9081	5.112097	12.20744	27.06332	8.709042
9	Krishnanagar-I	19.1686	3.36515	41.11394	35.22968	1.122621
10	Krishnanagar-II	29.1463	7.475199	23.93461	31.33296	8.11094
11	Nabadwip	34.856	41.33397	8.522073	9.136276	6.151631
12	Santipur	16.632	6.099375	19.85804	53.29621	4.114422
13	Hanskhali	40.0015	10.79885	5.089622	41.49886	2.611197
14	Ranaghat-I	36.3985	1.048005	42.93442	10.70543	8.91368
15	Ranaghat-II	42.2632	10.78729	2.657962	30.45776	13.83384
16	Chakdaha	68.3328	3.250026	13.3395	8.690733	6.386918
17	Haringhata	7.12279	3.930536	74.55165	7.747489	6.647537

Table 6: Crop Combination in Nadia District

Sl No.	Name of Blocks	One Crop Combination	Two Crop Combination	Three Crop Combination	Four Crop Combination	Five Crop Combination	No. of Crop Combination
1	Karimpur-I	3136.028	311.999	253.7849	211.5215	181.3822	Five
2	Karimpur-II	3354.161	324.5869	246.4207	143.151	192.622	Four
3	Tehatta-I	3831.952	467.2611	356.8409	168.4092	128.4588	Five
4	Tehatta-II	3385.404	590.0193	319.0445	173.9245	128.1117	Five
5	Krishnaganj	4360.842	859.0033	161.3797	191.8011	171.9662	Three
6	Nakashipara	1296.55	784.7688	584.202	527.9869	500.3261	Five
7	Chapra	6454.385	1598.516	529.1616	351.0868	369.7855	Four
8	Kaliganj	2818.749	1012.242	475.5925	260.8502	236.7592	Five
9	Krishnanagar-	6533.714	1562.692	386.3423	216.5943	262.3013	Four

	I						
10	Krishnanagar-II	5020.248	1121.618	258.0825	91.38795	105.1584	Four
11	Nabadwip	4243.735	152.2197	227.2752	221.78	223.4762	Two
12	Santipur	6950.231	1520.346	400.6085	313.5933	313.1161	Five
13	Hanskhali	3599.823	818.3503	449.8934	273.8381	294.3222	Four
14	Ranaghat-I	4045.155	1290.65	381.2625	307.4003	272.6742	Five
15	Ranaghat-II	3333.543	798.7477	509.583	257.2429	205.7309	Five
16	Chakdaha	1002.81	1260.826	843.2074	688.1885	594.8402	Five
17	Haringhata	8626.176	1980.425	1083.457	879.133	745.669	Five

According to weaver method use for standard measurement, as follows.....

Mono crop category

In Nadia district, there was no blocks had mono crop combination (Figure 3).

Two crop category

In this district double crop cultivation block is Nabadwip (Figure 3). In this block all farmers are grown two crops in a year. Crops are mainly jute and wheat.

Three crop category

In this district three crop cultivation block is Krishnaganj (Figure 3). Under this block all farmers cultivated three crops in a year. Crops are mainly jute, wheat and paddy.

Four crop category

In this district four crop cultivation blocks are Karimpur-II, Chapra, Krishnanagar-I, Krishnanagar-II and Hanskhali (Figure 3). In these blocks all cultivators are grown four crops in a year. Crops are mainly jute, wheat, paddy and mustard.

Five crop category

In this district numbers of five crop cultivation blocks are 10. Name of these blocks are Karimpur-I, Tehatta-I, Tehatta-II, Nakashipara, Krishnaganj, Santipur, Ranaghat-I, Ranaghat-II, Chakdaha and Haringhata (Figure 3). Under these blocks all farmers cultivated five crops in a year. Crops are mainly jute, wheat, paddy, mustard and musur.

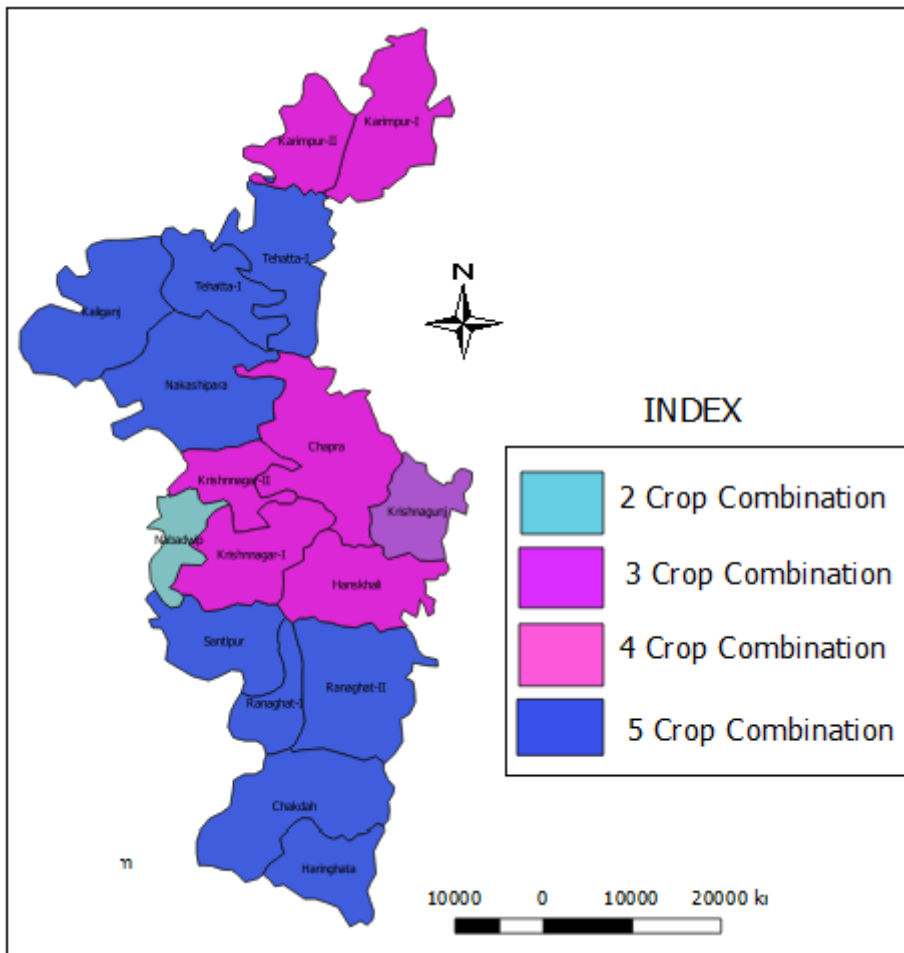


Figure 3: Crop Combination Zone in Nadia District

CONCLUSION

Crop combination and cropping intensity is very important for agricultural production. From the agricultural point of view for the crop combination farmers achieves many viable options to grown different type of crops on their agricultural field in year. Cropping intensity creates for the crop combination as for cropping intensity mainly depend on crop combination. At different season of a year different types of crop are grown and avoid risk to crop damages. Presently block wise Nadia district analyze changing scenario of cropping intensity and crop combination. Nadia district shows that high crop combination creates very high cropping intensity zone. Cropping intensity is a most significant thing for the agriculture. Changing agricultural practices produce verities of crop as well as increasing cropping intensity. Cropping intensity is most essential role of play for agriculture, agricultural practices and agricultural production. As high crop combination creates high cropping intensity zone, then high cropping intensity zone produce very high percentage of agricultural product. Others have shown its weakness or have tried to present and use it after suitable modification Husain (1976) "A New Approach to the Agricultural Productivity Regions of the Sutlej-Ganga Plains of India", Geographical Review of India. So, cropping intensity and crop combination are most significant for agriculture and agricultural production.

REFERENCES

1. Athawale, A.G. (1966): "Some New Methods of Crop-combination", Geographical Review of India, Kolkata, December, Pp. 28-34.
2. Bhatia, S.S. (1965) : "Pattern of Crop-combination and Diversification in India". Economic Geography, Vol. 41, No. 1, pp. 38-50.
3. Bhatia, C.S. (1981) : "Changing Landuse and Cropping Pattern in Bihar," Perspective in Agricultural Geography, Concept Publication, New Delhi.
4. Coppock ,1964 .Agricultural Atlas of England and Wales, London: Feber.
5. Gautam ,2015.Cropping Pattern in India.
6. Husain ,1976 .A New Approach to the Agricultural Productivity Regions of the Sutlej-Ganga Plains of India Geographical Review of India, 38: 230-236.
7. Noor Mohammad (1970) : "Crop-Combination in Trans-Ghagsa Plain". Geographical Review of India, Kalkutta, 32/1.
8. Scott ,1957 .The Agriculture Regions or Tasmania", Economic Geography, 33: 109-31.
9. Shafi .2006.Agricultural Geography, Delhi, Dorling Kindersley (India) Pvt. Ltd. 111-112.
10. Siddiqui ,1972 . Deficiency Disease Combinations in Utter Pradesh.
11. Singh, S. (1994) : Agricultural Development in India, (A Regional Analysis), Kushal Publications, Shillong.
12. Statistical Handbook (2011) (West Bengal): Bureau of Applied Economics and Statistics, Government of West Bengal.
13. Statistical Handbook (2012) (West Bengal): Bureau of Applied Economics and Statistics, Government of West Bengal.
14. Weaver, J.C. (1954) : "Crop Combination Regions in the Middle West". The Geographical Review". Vol. 44 No. 2. Pp. 176181.
15. [https://www. Wikipedia. Org](https://www.Wikipedia.Org)
16. www. Google.org.in