

Patterns of Crop Concentration, Crop Diversification and Crop Combination in Thiruchirappalli District, Tamil Nadu

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Abstract

Tiruchirappalli district is centrally located in Tamil Nadu and is 320 kms away in southern direction from Chennai. Agriculture sector provides the major source of income to the population of Tiruchirappalli District and the major crops in this district are paddy, cholam, blackgram, redgram, greengram, horsegram and sunflower. In the present study discusses about the cropping patterns, crop concentration, crop diversification and crop combination in Thiruchirappalli district.

Keywords: Crop Concentration, Crop Diversification and Crop Combination

I. INTRODUCTION

Agricultural region is an uninterrupted area having some kind of homogeneity with specifically defined outer limit. In India we can differentiate the rice region in the eastern parts of Great Plains of India and the wheat region in the Punjab and Haryana similarly, the north-western parts of the block soil of Maharashtra may be termed as a cotton region of the Peninsular India. Looking at the importance of agricultural terms in the agricultural regionalization, it is of paramount importance to explain in some details the concepts of cropping patterns, crop concentration and diversification, crop combination and agricultural productivity (Majid Husain, 1996).

Agriculture continues to be the most predominant sector of Tamil Nadu state economy as 70% of the population is engaged in agriculture and allied activities of their livelihood. The state has as an area of 1.30 lakhs sq. km with a gross cropped area of around 63ha. Tamil Nadu has all along been one of the states with a creditable performance in agricultural production with the farmers relatively more responsive and receptive to changing technologies and market forces. The Agriculture Department has taken up the challenge to achieve higher growth rate in agriculture by implementing several development schemes and also propagation of relevant technologies to step up the production.

The study of cropping pattern constitutes an important aspect of agricultural geography as it provides a good basis for agricultural regionalization. The crops are generally grown in combinations and it is rarely that a particular crop occupies a position of total isolation other crops in a given area at a given time. The physical factors determine the shape of the areas of crops, while the socio-economic relationships determine their extent. The study of crop combination is also helpful for the study of the comprehensive area development planning particularly for the rural areas. The importance of adoption of suitable cropping patterns in a developing country like India cannot be overemphasized. The horizontal expansion of agriculture is not possible without heavy capital investments. Only judicious utilization of land by adopting more remunerative cropping patterns, scientific rotation of crops and multiple cropping may help in overcoming the food and raw material problems of the country.

According to Weaver (1954) was the first to use statistical techniques to establish the crop combination of the Middle West (USA). Scott (1957), Bennett (1961) Coppock (1964), and Doi's (1959) have also been contributed in the same fields. There are many well-known persons in India contributed their valuable works in the study of cropping pattern, crop combination and crop diversification of various parts of India are Rafiullah (1956) Bhatia (1965), Ahmed and Siddique (1967), Majid Husain (1972), Jasbir Singh (1976), Palanivelu (1976), Saravanan (1978), and Samba Siva Rao (1983), Das (2001), Gangai et.al (2012), Kalaiselvi (2012), Nagesh and Biradar (2013). The above stated specialists were applied different methods to show the cropping pattern and crop combination regions in various part of the country. Hence, the present study discusses about the cropping patterns, crop concentration, crop diversification and crop combination in Thiruchirappalli district.

II. THE STUDY AREA

Agriculture sector provides the major source of income to the population of Tiruchirappalli District and the major crops in this district are paddy, cholam, blackgram, redgram, greengram, horsegram and sunflower. Thiruchirappalli District, the area chosen

for the present study is located centrally in Tamil Nadu. Tiruchirappalli district is an important region in the state and had been a Centre of activities for many historical events from the days of the early Cholas. Rock Fort, Thayumana Swamy, Pillaiyar Temple, Teppakulam, the Nawab's palace, the Nadir Shah Mosque, Sri Rangam Temple, Thiruvanaikoi, Subramanyaswami Temple, Upper Anaicut and Grand Anaicut are some of the important monuments and temples reflecting the history, culture and traditions of the district. The district has an area of 4403.83 sq. kms. It is bound by Perambalur district on the north, Thanjavur district on the east, Pudukkottai and Dindigul districts on the south and Karur district on the west. Being a place located centrally in the State, it has excellent transport link to all other districts in the State. The district lies between 10° 00' and 11°30' degrees of the Northern Latitude and between 77° 45' and 78° 50'degrees of the Eastern Longitude. Altitude of the District is 78m above sea level. The topography of Tiruchirappalli District is almost plain except for the short range of Pachaimalai hills in the North. It has a number of detached hills, among which Pachamalai Hill is an important one, which has a peak up to 1015m, located at Sengattupatti Rain Forest. In 2011 Census, Tiruchirappalli had population of 2,722,290 of which male and female were 1,352,284 and 1,370,006 respectively. In 2001 census, Tiruchirappalli had a population of 2,418,366 of which males were 1,208,534 and remaining 1,209,832 were females. Average literacy rate of Tiruchirappalli in 2011 were 83.23 compared to 77.90 of 2001. If things are looked out at gender wise, male and female literacy were 89.72 and 76.87 respectively. At present, there are 3 Revenue Divisions, 9 Taluks with 14 C.D. Blocks, and 471 Revenue Villages in Tiruchirappalli District (Fig.1). The urban frame of the district comprises of 1 Municipal Corporation, 3 Municipalities, 17 Town Panchayats and 10 Census Towns (2011 Census). Tiruchirappalli is the only Municipal Corporation which is also the headquarters of the District.

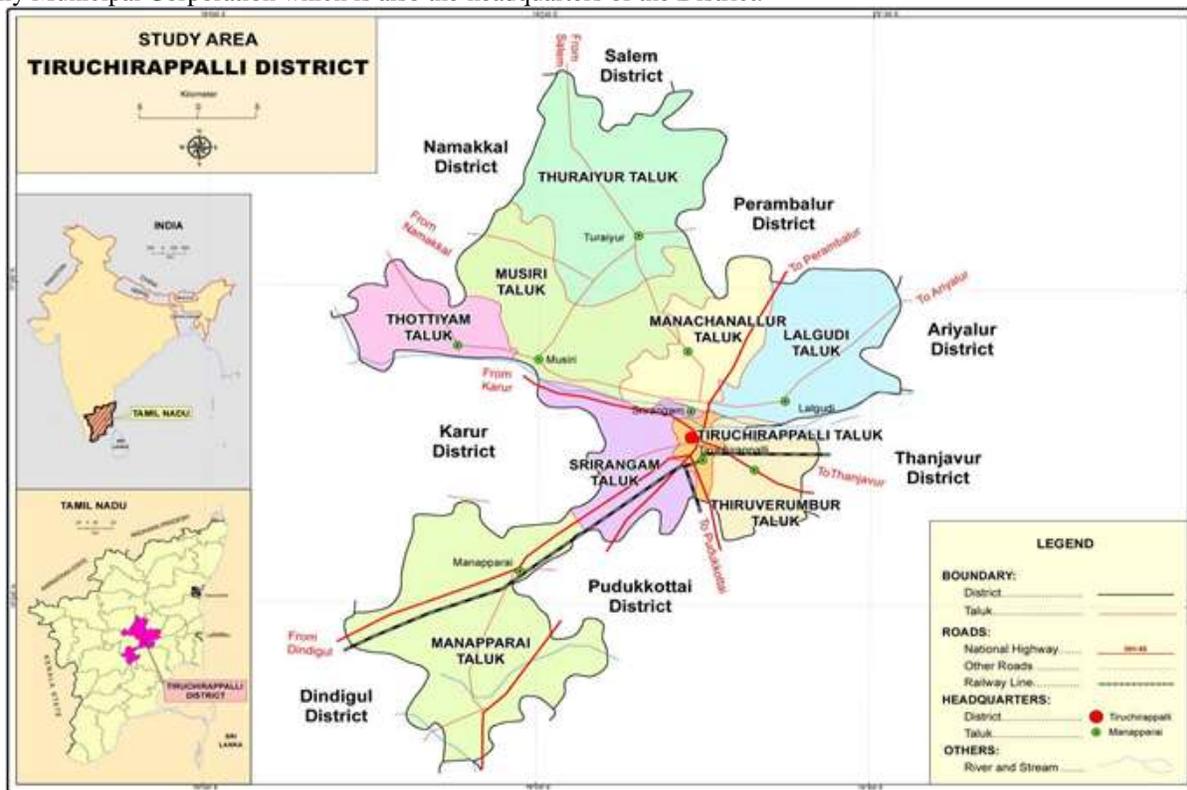


Fig. 1:

III. OBJECTIVES OF THE STUDY

The aims of the present study is to investigate the following objectives are outlined.

- To study about the existing cropping pattern of the study area
- To study the crop ranking, crop concentration, crop diversification and crop combination in the district
- To find out the Weaver's methods used to identify the crop combination regions at block level in Tiruchirappalli district.

IV. METHODOLOGY

The present study is only based on the secondary sources data.

- The secondary data has obtained from government and non-government sources. Crop and Land use data have been collected from Statistical Department and Agricultural Department of Thiruchirappalli District. Population data was collected from Census of India, Tamil Nadu, Chennai for 2001 and 2011 Census.
- The base map of the study area has been prepared based on Survey of India topographical sheet on 1: 2,50,000 scale.

- The cropping data for 7 years (2007–2013) have been collected for 14 blocks which are located in Thiruchirappalli District. Topographical maps were scanned with canner and on-screen digitizing was done using ArcGIS. By using ArcGIS, different types of thematic maps along with line, pie and bar diagrams were prepared and presented.
- The simple statistical techniques were applied to present Crop Combination Regions in the study area.

V. RANKING OF CROPS

For the purpose of analyzing the crop combination ranking of crop on the basis of total cropped area where used to identify the ranking of crops which are dominates in one or more districts of the state. There are 8 crops occupies maximum percentage of total cropped area. The first rank crop may vary from 100% to 40%. The 8 ranking crops are Paddy, Cholam, Blackgram, Sunflower, Redgram and Gingelly. The table 1 shows the first ranking crops in the Thiruchirappalli District. Two crops have been identified as first ranking crops. Paddy ranked first in 11 blocks and Cholam ranked first in 3 blocks of the district. It covers 60,420 hectares area and occupied 35% per cent total cropped area of the region. In Andanallur, Lalgudi, Mannachanallur, Manapparai, Manikandam, Marungapuri, Musiri and Pullambadi blocks paddy has observed as a first ranking crop. Due to heavy rainfall hot and moist climate and black to laterite soil, Paddy is well grown in kharip season in almost all blocks and rabbi season in some blocks of the study region. Cholam is another crop shows first rank in two 3 blocks namely Thuraiyur, Tiruverumbur and Uppiliyapuram.

Table – 1
Crops, Blocks and Area in First Ranking, Thiruchirappalli District, 2007-2013

Sl.No.	Name of Crops	No. of Blocks	Average Area in Hectares	Percentage to Total
1	Paddy	11	55040	91.10
2	Cholam	3	5380	8.90
Total		14	60420	100

Source: Computed by Researcher, 2013

VI. CROPPING PATTERN IN THIRUCHIRAPPALLI DISTRICT

Cropping pattern means the proportions of area under various crops at a point of time. The crop statistics are used to denote cropping pattern. The cropping pattern differs from macro to micro region, both in space and time and is governed largely by the physical, cultural and technological factors. For the purpose of agricultural regionalization and planning, it is necessary to divide the area/ region into homogeneous region on some well-defined basis (Majid Husain, 1979). There can be a number of physical, climatological and agronomic criteria on which cropping pattern can be made. It may vary from region to region depending on the terrain, topography, slope, temperature, amount and reliability of rainfall, soils and availability of water for irrigation. The perception and assessment of environment also guide to grow certain crops in a region.

The cropping patterns of a region or areal unit may be determined on the basis of areal strength of individual crops. The first, second and third ranking crops of an areal unit may be called as the dominant crops of that unit. The importance of adoption of suitable cropping patterns in a developing country like India cannot be over emphasized. The horizontal expansion of agriculture is not possible without heavy capital investments. Only judicious utilization of land by adopting more remunerative cropping patterns, scientific rotation of crops and multiple cropping may help in overcoming the food and raw material problems of the country. Though the district experiences many crops, 8 crops are being cultivated throughout the district. In the district four main crops namely Paddy, Cholam, Redgram and Blackgram are cultivated during the period from 2007-2013. The table 2 and figure 2 are shows cropping pattern of Thiruchirappalli District.

Table – 2
Cropping Pattern of Thiruchirappalli District, 2007-2013

Sl. No	Name of Block	Percentage share of Major Crops 2007-2013				
		Paddy	Cholam	Redgram	Blackgram	Sunflower
1	Andanallur	60.58	0.00	0.00	37.06	0.01
2	Lalgudi	84.33	0.10	0.10	11.34	0.02
3	Mannachanallur	43.31	37.32	6.78	9.49	1.09
4	Manapparai	43.51	50.91	0.23	0.59	1.93
5	Manikandam	80.19	0.33	0.07	19.14	0.02
6	Marungapuri	74.00	12.08	0.22	4.84	0.60
7	Musiri	39.54	51.23	3.21	1.56	3.65
8	Pullambadi	86.74	7.14	3.09	2.02	0.11
9	Thathaiyangarpettai	25.85	65.01	1.09	1.04	6.18
10	Thottiyam	30.39	63.38	1.07	0.68	4.13
11	Thuraiyur	55.95	30.59	0.85	2.45	8.64
12	Tiruverumbur	94.06	0.03	0.02	5.14	0.63
13	Uppiliyapuram	89.37	5.76	0.23	0.64	3.42
14	Vaiyampatti	35.68	54.19	1.04	1.36	5.54
District Total		62.93	24.32	1.21	7.19	2.39

Source: Compiled by Author, 2013

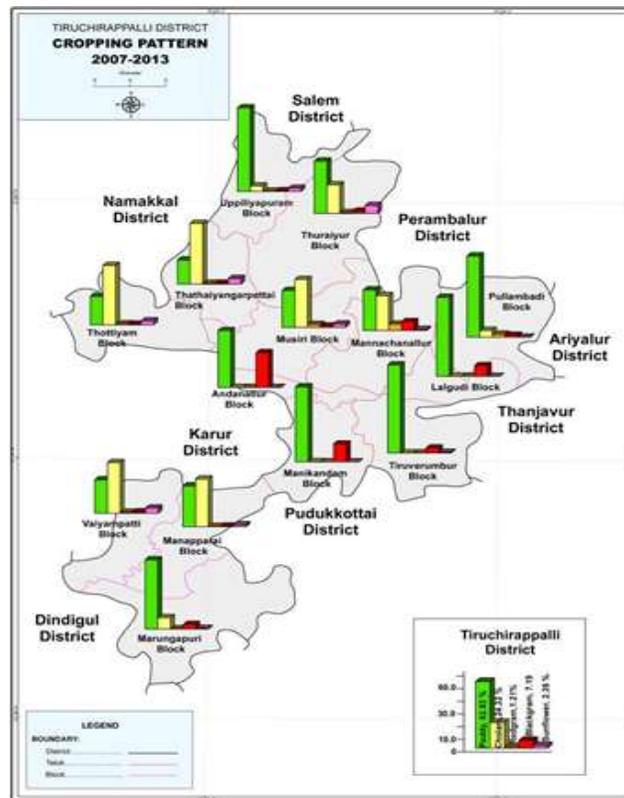


Fig. 2:

Accordingly Paddy, Chulam, Redgram, Blackgrama and Sunflower are the major crops which accounts for 62.93%, 24.32%, 1.21%, and 7.19% and 2.39 % of the total cropped area of the district respectively. The predominance of the crops follows the above order. Therefore paddy is the primary crops which dominate throughout the region. The area under acreage of paddy is varying in its distribution. It varies from 52.8 to 78% of the total cropped area of respective blocks. Tiruverumbur, Uppiliyapuram, Pullambadi, Lalgudi, Manikandam, Marungapuri, Andanallur blocks are accounts for more than 60% Paddy is mainly cultivated area. The rest of the blocks are with below 60% particularly.

The Chulam is the second major crop which is about 6 - 65% in all blocks except Manikandam, Lalgudi, Tiruverumbur and Andanallur blocks. After the harvest of paddy Chulam is grown. All the blocks cultivate Chulam in more than 23% of their total cropped area, in the northeastern part where they occupy 54 -65% each.

Redgram shares 1.21% of the total cropped area of the district which is predominant in Lalgudi, Manikandam, Marungapuri, Andanallur blocks of the central and eastern parts. The rest of the blocks cultivate Blackgram varies from 5-37 % which grows almost in all the blocks but mainly cultivated in Andanallur, Manikandam, Lalgudi, Mannachanallur, Tiruverumbur. The area under Sunflower is cultivated in 10 blocks which accounts 36 % and it is distributed more Thuraiyur, Thathaiyangarpettai, Vaiyampatti, Thottiyam, Musiri and Uppiliyapuram blocks.

VII. CROP CONCENTRATION IN THIRUCHIRAPPALLI DISTRICT

Crop concentration means the variations in the density of any crop in a given area/region at a given point of time. The objective of the study of crops concentration pattern is mainly to differentiate the areas of high and low density of individual crop in the different parts of the region and to determine regional dominance of a crop. The concentration of a crop in an area largely depends on its terrain, temperature, moisture and pedagogical conditions. It has a tendency to have high concentration in the areas of ideal agro climatic conditions and the density declines as the geographical conditions become less conducive (Majid Husain, 1996). A number of statistical techniques have been evolved and applied for the demarcation of crop concentration regions of which the location quotient method has been adopted by Bhatia (1965) to study the crop concentration patterns as given below:

Area of 'x' Crop in a component aerial unit

Area of all crops in a component aerial unit

Concentration Index of 'x' Crop = -----

Area of 'x' Crop in entire region

Area of all crops in entire region

If the index value is greater than unity, the component areal unit accounts for a share greater than it would have had if the distribution were uniform in the entire region, and therefore, the areal unit has a concentration of great agricultural significance. After ascertaining the index values for the crops in the component areal units, the percentage share of each crop is calculated and then the areal units that show concentration are put in an ascending or descending order. The index scale is calculated by dividing the array into equal parts to distinguish the high, medium, and low concentrations in Thiruchirappalli District which has been shown in Figures (3a, 3b, 3c, & 3d).

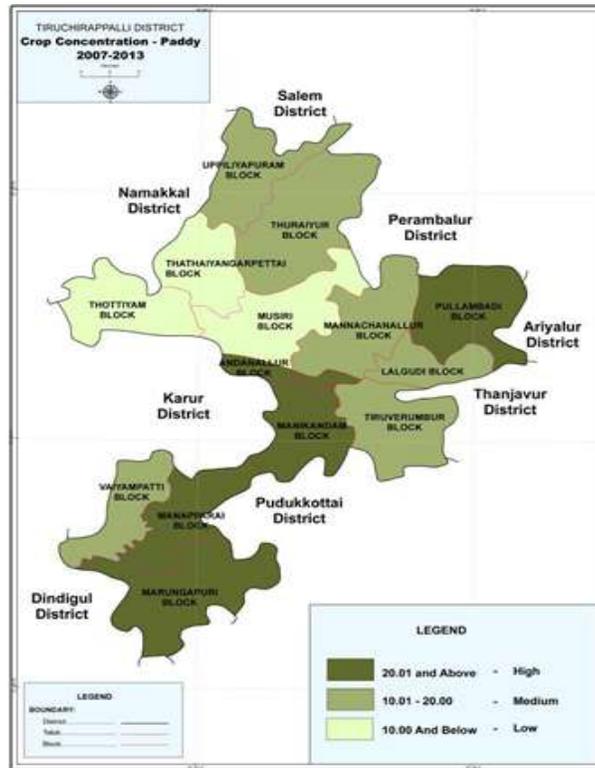


Fig. 3a:

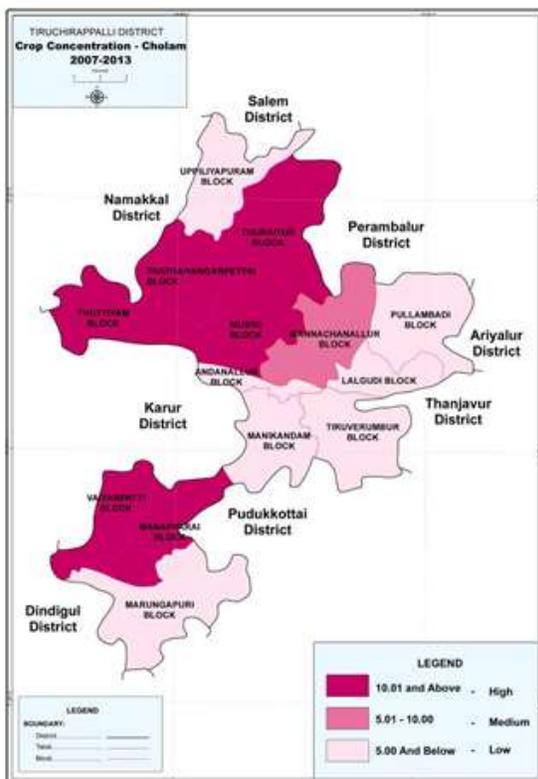


Fig. 3b:

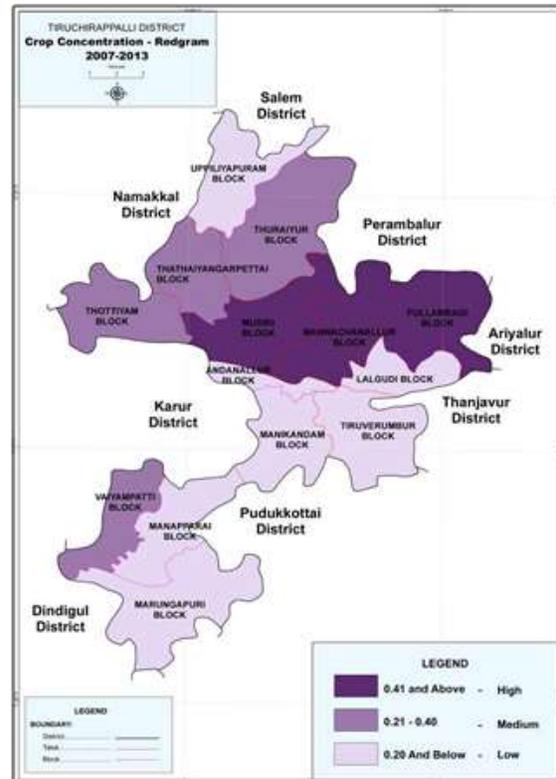


Fig. 3c:

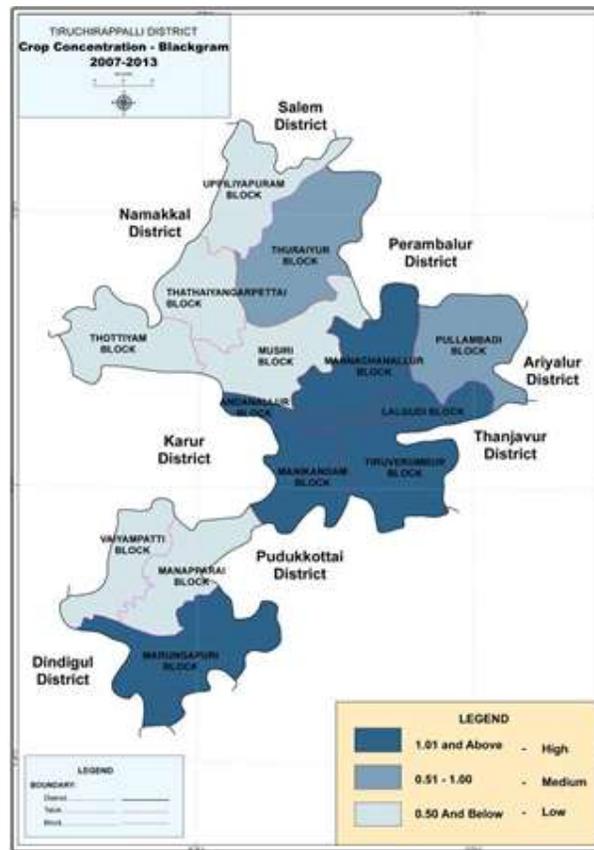


Fig. 3d:

Thiruchirappalli District has 60 % of the total area available for cultivation. Of which net sown area is only 42%. A number of crops are grown in the district on account of the varying climatic conditions, topography, soil and irrigation facilities. The cropping pattern and crop combination varies from one place to another place in the district.

In order to find out the concentration of the district, the crop details for period of 7 years (2007-2013) have been collected and the mean values have been arrived at which more than one percent of the total cropped area for a particular crop has been considered for the study. Accordingly there are six crops such as paddy, cholam, redgram, sugarcane and blackgram, which shares more than 25 percent of the total cropped area of the district. Among the crops paddy is wet crops and others are dry crops. The concentration of each crop is brought under three classes i.e. high, medium and low concentration. This index of crop concentration has the advantages of understanding the area of specialization. Accordingly zones are brought out for each crop that is given in the table 3.

Table – 3
Crop Concentration Index of Thiruchirappalli District, 2007- 2013

Sl. No	Block Name	Paddy	Cholam	Redgram	Blackgram
1	Andanallur	20.19	0.00	0.00	12.35
2	Lalgudi	10.54	0.01	0.01	1.42
3	Mannachanallur	10.83	9.33	1.70	2.37
4	Manapparai	21.76	25.46	0.11	0.29
5	Manikandam	26.73	0.11	0.02	6.38
6	Marungapuri	24.67	4.03	0.07	1.61
7	Musiri	7.91	10.25	0.64	0.31
8	Pullambadi	28.91	2.38	1.03	0.67
9	Thathaiyangarpettai	6.46	16.25	0.27	0.26
10	Thottiyam	7.60	15.85	0.27	0.17
11	Thuraiyur	18.65	10.20	0.28	0.82
12	Tiruverumbur	18.81	0.01	0.00	1.29
13	Uppiliyapuram	17.87	1.15	0.05	0.13
14	Vaiyampatti	11.89	18.06	0.35	0.45

Source: Compiled by author based on District Statistical Office Report

The above table 3 reveals that the paddy highly concentrated in the blocks of Andanallur, Manapparai, Manikandam, Marungapuri and Pullambadi which are located the very nearer to Cauvery River Basin in the district. The concentration is medium

in the blocks are Lalgudi, Mannachanallur, Thuraiyur, Tiruverumbur, Uppiliyapuram and Vaiyampatti blocks in the district. The rest of the four blocks namely Thathaiyargarpettai, Thottiyam and Musiri, are low concentration occurs in the Paddy crop.

The concentration of Cholam is unevenly distributed. There are six blocks namely Thathaiyargarpettai, Thottiyam, Thuraiyur, Musiri Vaiyampatti and Manapparai are high concentration of Cholam in the district. Only one block i.e. Mannachanallur is medium concentration of Cholam. Low concentration is found in seven blocks which are located central, eastern and western part of the study area where the paddy highly dominates.

The high concentration of Redgram occurs in Musir, Pullambadi and Mannachanallur blocks of the district. The adjoining blocks Thathaiyargarpettai, Thottiyam and Thuraiyur fall under medium concentration. Low concentration of the redgram is unevenly distributed. Nearly seven blocks are found the medium range. Nearly about 28 % of the blocks are cultivated in Blackgram of the study area. The concentration of Blackgram is found in six blocks such as Andanallur, Lalgudi, Marungapuri, Mannachanallur, Manikandam and Tiruverumbur. Which are closely located in Cauvery and Kollidam Rivers, the water facilities are available in these blocks. Only two blocks are found in medium concentration namely Thuraiyur and Pullambadi blocks. The rest of the blocks, situated entirely in the west and southwest parts the district is come under low concentration category.

VIII. CROP DIVERSIFICATION METHODS

Diversification means the raising a variety of crops. In Indian conditions the diversification is a common phenomenon because the farmers try to satisfy most of family demands from its own land resulted into crop diversification. The cultivation of crop depends on physical and socio-economic factors.

Crop diversification patterns, like that of crop concentration, have great relevance in the agricultural land use planning. The diversification of cropping patterns means raising a variety of crops for arable land, the keener the competition the higher the magnitude of diversification (Jasbir Singh, 1976). In fact, it is obvious that greater the number of crops in a combination, the greater the degree of diversification (Ayyar, 1969). Since the previous methods shows only the concentration of a particular crop, not considering the other crops and crop combination, Bhatia's (1965) formulated the following formula to find out the diversification of crops in a particular area.

$$\text{Index of crop diversification} = \frac{\text{Percentage of sown area under } x \text{ crops}}{\text{Number of } x \text{ crops}}$$

Where x crops are those that individually occupy 10 per cent or more of the gross cropped area in the area under study. In this method, higher the value of the diversification index lower is the degree of crop diversification and vice versa. The value that comes in between these two diversification would be considered as medium. By this method crop diversification index have been found out for each block in the District. This gives an idea of how many blocks are having high and low diversification of crops and thus laying path for the study of crop combination. If there is high diversification, naturally there is a possibility of different crops grown in that particular area. Same way if there is a low diversity which clearly indicates monoculture. Thus, it gives basic knowledge for the crop combination. But the limitation in this method or the demerit is that one cannot find out what are the crops are grown in that area or crop combination.

As the major wet and dry crops such as Paddy, Cholam, Redgram, Balckgram and Sunflower showed only their distribution of concentration in the District. The high diversity of crops is show in 8 blocks of Manapparai, Marungapuri, Mannachanallur, Pullambadi, Thathaiyargarpettai, Thottiyam, Thuraiyur and Vaiyampatti. The medium diversity of crops are seen in the blocks of Andanallur, Musiri, Uppiliyapuram and Manikandam. The low diversity of crops is distributed in Lalgudi and Tiruverumbur. The high diversifications of crops are dominating mostly in the Thiruchirappalli District. The table 4 and Figure 4 are shows the Crop diversification index in the district.

Table – 4
Index of Diversification in various blocks of Thiruchirappalli District, 2007-2013

Sl. No	Name of Block	Total harvested area of 'n' crops (in hac)	Area in (%)	No of crops	Crop
					Diversification
					Index
1	Andanallur	5945	6.19	4	1.55
2	Lalgudi	14548	15.15	7	2.16
3	Mannachanallur	6423	6.69	8	0.84
4	Manapparai	4326	4.51	8	0.56
5	Manikandam	5975	6.22	6	1.04
6	Marungapuri	5342	5.56	8	0.70
7	Musiri	8487	8.84	8	1.10
8	Pullambadi	4898	5.10	6	0.85
9	Thathaiyargarpettai	7135	7.43	8	0.93
10	Thottiyam	6382	6.65	7	0.95
11	Thuraiyur	5827	6.07	7	0.87
12	Tiruverumbur	7932	8.26	3	2.75
13	Uppiliyapuram	8321	8.67	7	1.24
14	Vaiyampatti	4475	4.66	6	0.78

District Total	96,016	100.00	
Source: Compiled by Author, 2013.			

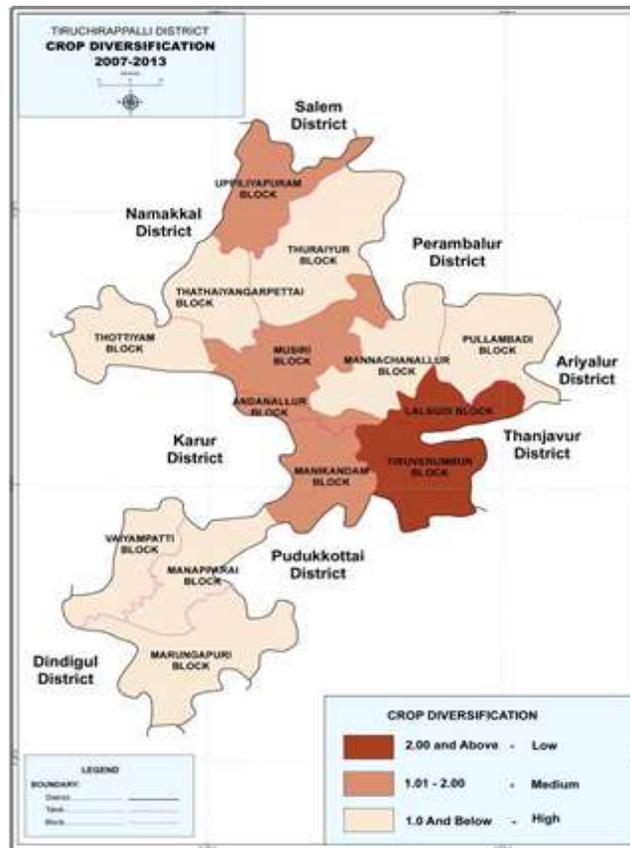


Fig. 4:

IX. CROP COMBINATION BY WEAVER’S METHOD

The study of crop combination region constitutes an important aspect of agricultural geography as it provides a good basic for agricultural regionalization for the rural planning. Owing to high density of population and ever growing population, it is necessary to produce more crops in the same field. So diversification and suitable combination of crops with short duration is necessary for an increase in the production. The study of crop combination is also helpful for the study of the comprehensive area development planning particularly for the rural areas.

Prof. John C. Weaver presented a valuable statistical method of combination analysis in 1954 in his study of crop combination regions in the Middle West, U.S.A. He takes into consideration the percentage of crop area to the total cropped area and has calculated deviation of real percentage for all the possible combination in the areal units against a theoretical standard. The theoretical standard is 100% for the gross cropped area for monoculture, 50% for two crop combination, 33.3 % for three crop combination, 25.0 5 for four crop combination, 20 % for five crop combination and so on. For the determination of the minimum deviation for each block in the District the standard deviation method.

$$\sigma^2 = \frac{\sum (d)^2}{n}$$

Where ‘d’ is the difference between the actual crop percentage in a block and the appropriate percentage in the theoretical standard. ‘n’ is the number of crops in a given combination. Weaver’s Minimum deviation method has been applied for each block in the District considering first 9 ranking crops and accurate crop combination have been found out (Table 5). In the Thiruchirappalli District used this technique at the block level for the period of 2007-2013 and identified eight crop combinations out of 8 crops in the District which has been plotted in Figure 5.

Table – 5
Block Wise Crop Variance Value - by Weaver’s Method

Sl. No.	Block Name	Weaver’s Method	Name of Crops
1	Andanallur	3 crops	Paddy, Blackgram, Gingelly
2	Lalgudi	7crops	Paddy, Blackgram, Gingelly, Greengram, Redgram, Cholam, Sunflower
3	Mannachanallur	8 crops	Paddy, Cholam, Blackgram, Redgram, Gingelly, Sunflower, Horsegram, Greengram
4	Manapparai	8crops	Paddy, Cholam, Blackgram, Redgram, Gingelly, Sunflower, Horsegram, Greengram

5	Manikandam	4 crops	Paddy,Blackgram,Cholam,Gingelly
6	Marungapuri	5crops	Paddy,Cholam,Blackgram,Redgram,Gingelly
7	Musiri	5crops	Paddy,Cholam,Blackgram,Redgram,Gingelly
8	Pullambadi	5 Crops	Paddy,Cholam,Blackgram,Redgram,Gingelly
9	Thathaiyangarpettai	4 crops	Cholam, Paddy, Sunflower, Redgram
10	Thottiyam	6 crops	Cholam, Paddy, Sunflower, Redgram,Blackgram,Greengram
11	Thuraiyur	6 crops	Paddy,Cholam,Sunflower,Blackgram,Gingelly,Redgram
12	Tiruverumbur	2 crops	Paddy, Blackgram
13	Uppiliyapuram	2 crops	Paddy, Cholam
14	Vaiyampatti	7 crops	Cholam,Paddy,Sunflower,Blackgram,Horsegram,Greengram, Redgram

Source: Compiled by Author, 2013.

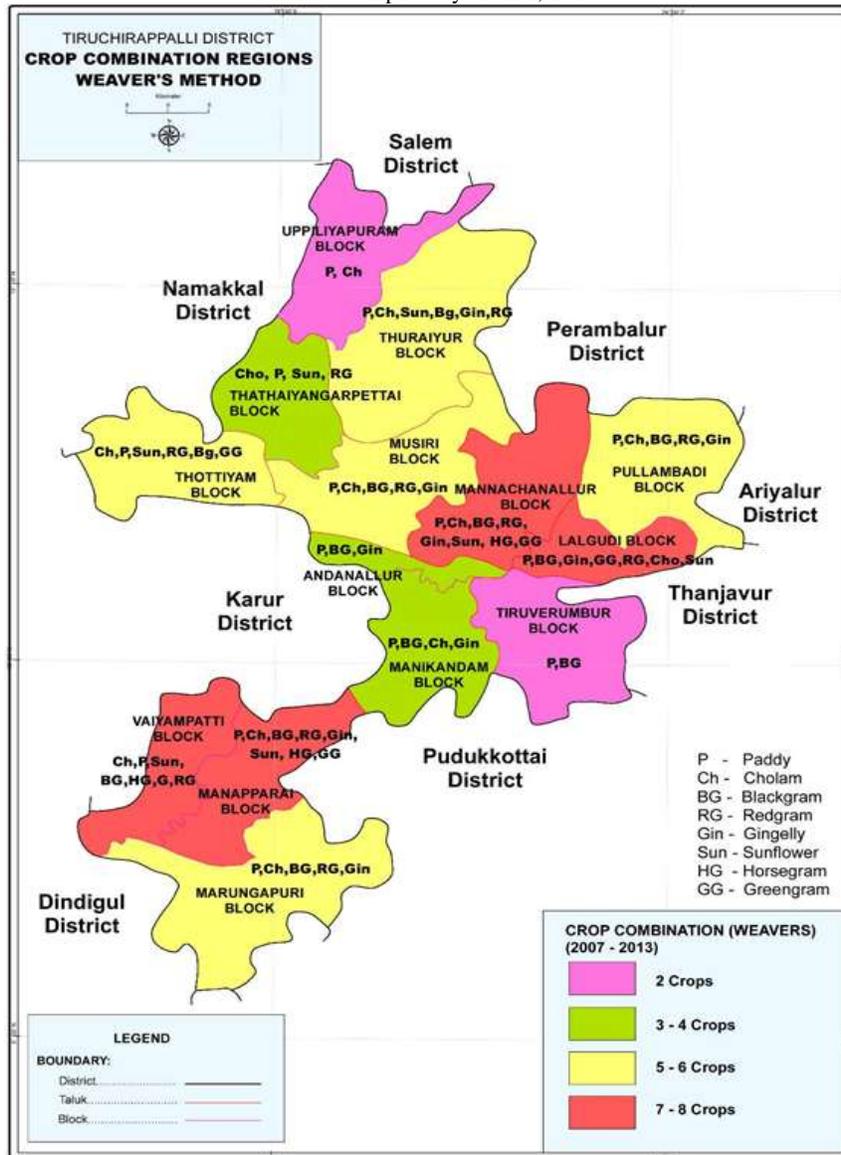


Fig. 5:

Monoculture or one crop combination is not found in Thiruchirappalli District. In the district, 2 crop, 3 crop 4 crop, 5 crop, 6 crop 7crop and 8 crop combination have identified during the year 2007-2013. Paddy cultivated throughout the year as 3 crops per year due to the availability of fertile soil and irrigation facilities by the rivers and tanks.

The two crop combinations are found in two blocks namely Uppiliyapuram and Tiruverumbur blocks. The three crop combination is found in Andanallur block. The four crop combinations are identified in two blocks such as Manikandam and Thathaiyangarpettai. The five crop combinations are found in Marungapuri, Musiri and Pullambadi. The six crop combinations are found in tow blocks namely Thottiyam and Thuraiyur. The seven crop combinations are found in the district. They are Lalgudi and Vaiyampatti blocks. The eight crop combinations are identified in two blocks such as Mannachanallur and Manapparai.

It is clearly found that the cropping pattern of the district is influenced by the physical as well as socio-economic factors of the study region. There are numerous ways in which the present cropping pattern could be improved. The marginal lands could be used by bringing them under cultivation. In the same way fertilizer should be used for the poor soil to improve the fertility. The perennial and non-perennial rivers could be used to the maximum extent without vesting much water. The canals carrying water should be cemented so that there will not be much of water wastages due to seepage and evaporation. Apart from this, the most important factor is hybrid variety should be used by the farmers to improve the production.

X. RECOMMENDATION

The following suggestions are recommended for better agricultural planning and development in Tiruchirappalli District.

- 1) Strengthening the support system of the agricultural extension machinery, and
- 2) Intensive development education to improve the knowledge and capability of the farmers.
- 3) New High Yield Varieties (HYV) and salt tolerated seed has to be use to increase productivity of the crops in the region.
- 4) Soil is the life for plants thus Government should not be permitted to use the fertile soil from the agricultural farms for the brick industry.
- 5) Efforts to be taken for massive plantation of trees through Social Forestry Programmes on the fallow land available in the district.
- 6) To overall development, besides the agricultural activity agro based activities like dairy, poultry and house hold industries should be started in the eastern side of the study region.

XI. CONCLUSION

The change in the cropping pattern and introduction of crop in relation to agro climatic condition can provide high standard of productivity. To determine the region character of crop distribution various method of analyzing cropping pattern is made to bring out the regional dominates of crop. The study area, Tiruchirappalli District is agriculturally rich due to the availability of fertile lands and presence of perennial rivers. Cauvery with numerous tributaries forms the basis of sustained paddy cultivation on an extensive scale throughout the year. Paddy, Cholam, Redgram, Blackgram, Sunflower, Greengram, Horsegram and Gingelly are the Major crops cultivated in the district and majority of the area is used for the production of Cereals and Pulse.

In the present study concludes that the cropping patterns and crop combinational analysis reveals that the irrigational facilities impact on the farmers to grow few number and major crops depending upon the prices in the market and their demand. All the methods almost coincide with each other but the best being Weaver's Minimum deviation method which gives a clear and vivid picture of crop combination. Therefore, it is clearly found that the cropping pattern of the district is influenced by the physical as well as socio-economic factors of the study region. According to Weavers method mostly 2-8 crop combinations are identified in Tiruchirappalli district.

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