International Journal of Scientific Research and Reviews

A Study on the Cropping Intensity and Crop Combination Regions of Kongu Uplands, Tamil Nadu.

Jincy P.P.[*1], Priyanka P. L[1]., Madhumitha R.[1], Jasim H. R.[1], Kumaraswamy K.[2], and Jegankumar R.[3]

[1]UGC – BSR Research Scholar, [2]UGC – BSR Faculty Fellow and [3]Assistant Professor and Head Department of Geography, Bharathidasan University, Tiruchirappalli, Tamil Nadu, India, 620 024, Mob. No. 8921861076, 8547941324 E-mail: Jincyevr@gmail.com

ABSTRACT

A study on the cropping pattern of a region through quantitative measurement techniques isessential to understand the crop distribution of a given area. Multiple numbers of crops has been grown in the single strip of land inorder to overcome the shortage of land for agriculture andalso to obtain maximum profit from the minimum land area. Kongu Uplands occupies a large portion of its land under agriculture and hence a study on the cropping pattern is relevant. This study is a part of agricultural regionalisation, a technique for dividing land into different fragments as well as facilitates our understanding of the existing agricultural patterns of the region. Thus in this study the quantitative methods of crop combination and cropping intensity has been carried out. In general, nineteen crops are found to be the cultivated in Kongu Uplands butseven crops viz., Jowar, Coconut, Ground Nut, Paddy, Maize, Fodder Crop and Sugar canehas the maximum share. Cropping intensity is low among forty-nine blocks, moderate among twenty-two blocks and high among ten blocks. The crop combination analysis conveys that except in Anamalai, Pollachi North and Pollachi South, all other blocks can possess multi-crops and thusthe area is said to be much fertile. A study on the cropping pattern of any region can be utilized by agriculturalist, agro- climatologist and even the decision makers at any level to scientifically suggest better developmental and land use planning in that area.

KEY WORDS: Quantitative Measurement, Cropping Pattern, Agricultural Regionalisation, Cropping Intensity and Crop Combination.

*Corresponding Author

Jincy P.P.

UGC – BSR Research Scholar, Department of Geography,

 Bharathidasan University, Tiruchirappalli, Tamil Nadu, India, 620 024,

Mob. No. 8921861076, 8547941324

 E-mail: Jincyevr@gmail.com

INTRODUCTION

The primary purpose of this study on cropping pattern of a region is to undertake a geographical enquiry into the regional differences, spatial variations and suitable combinations of the crops and its geographical and human associations. Cropping pattern is the yearly sequence and spatial arrangement of crops on a given area. It is not only the physical aspects that supports/not support the cultivation of crop in a region but also its economic and social interactions. Crop distribution changes with varied physical and cultural set up such as in climate, terrain, economic policies, market and so on. Multiple numbers of crops has been grown in the single strip of land inorder to overcome the shortage of land for agriculture and also to get maximum profit from the minimum land area. Agricultural regionalization is both a technique of dividing a land into different fragments as well as understanding the existing agricultural patterns of a region. The existing cropping pattern is the clear reflection of the combinations of physical and socio-economic balance of a region. The two phases of mapping agricultural patterns are definition and delimitations. The definition includes identification of crop concentration, diversification, intensity and combination.

The delimitation is carried out by drawing boundaries for regions with statistical analysis such as clustering and deviations. The Cropping patterns of crop concentration and diversification was brought to India through the studies of [1]Bhatia in 1965. [2]Vahitha in 2014 studied on the cropping pattern in Noyyal River Basin in Tamil Nadu was a case study using GIS Technology, [3]Priyadharshini and Aruchamy in 2014 studied on the agricultural regionalization based on cropping pattern in Sweta Nadhi basin in Tamil Nadu, [4]Jegankumar in 2015 studied the cropping pattern in Salem District in Tamil Nadu, [5]Masilamani in 2015 studied on the cropping pattern of Koraiyar watershed in Coimbatore District in Tamil Nadu and [6]Premkumar in 2015 made a study on crop combination regions in Palakkad district in Kerala, [7]Gomathi M. and Kumaraswamy in 2016 studied on the patterns of crop concentration and diversification in Aiyar Basin in Central Tamil Nadu, [8]Shyju and Kumaraswamy in 2017 made a recent study on agricultural landuse and cropping pattern in Talappilli Taluk, Thrissur District in Kerala.

STUDY AREA

Kongu uplands geographically lie in $10^{\circ}10'$ N to $12^{\circ}10'$ N latitudes and $76^{\circ}40'$ E to $78^{\circ}25'$E longitudes. It covers an area of 26,000 sq. km approximately, which is nearly one fifth of the total geographical area of the Tamil Nadu. It falls in West to the Kolli Hills, East to the Nilgiri hills, below the Stanley reservoir and above the Kodaikanal hills. The study area is a plateau region of geographical isolation and hence its physical setup differs from other parts of the state.

It has an average elevation of 450m in the West and decreasing towards East to 200m approximately.The study area comes under the semi-arid classification of Tamil Nadu and structurally, in the southern part of Deccan Plateau which is the oldest formation in the Archaen period. The geology of the study area is highly characterized by old crystalline and metamorphic rocks of Archaen period. The total population of Kongu Uplands is 98, 335, 71 persons, out of which the rural population consist of 69, 870, 82 persons as per the Census of India, 2011. The total male population of 34, 420, 72 persons is higher than the total female population of 33, 644, 54 persons. The area is connected with other parts of the state through well-established transportation system which includes road ways, railways and airways. Kongu Uplands consist of eighty-oneblocks distributed in eight districts of Coimbatore, Tiruppur, Erode, Karur, Tiruchirappalli, Salem, Dindigul and Namakkalin Tamil Nadu. The study area is shown in the Fig.1.
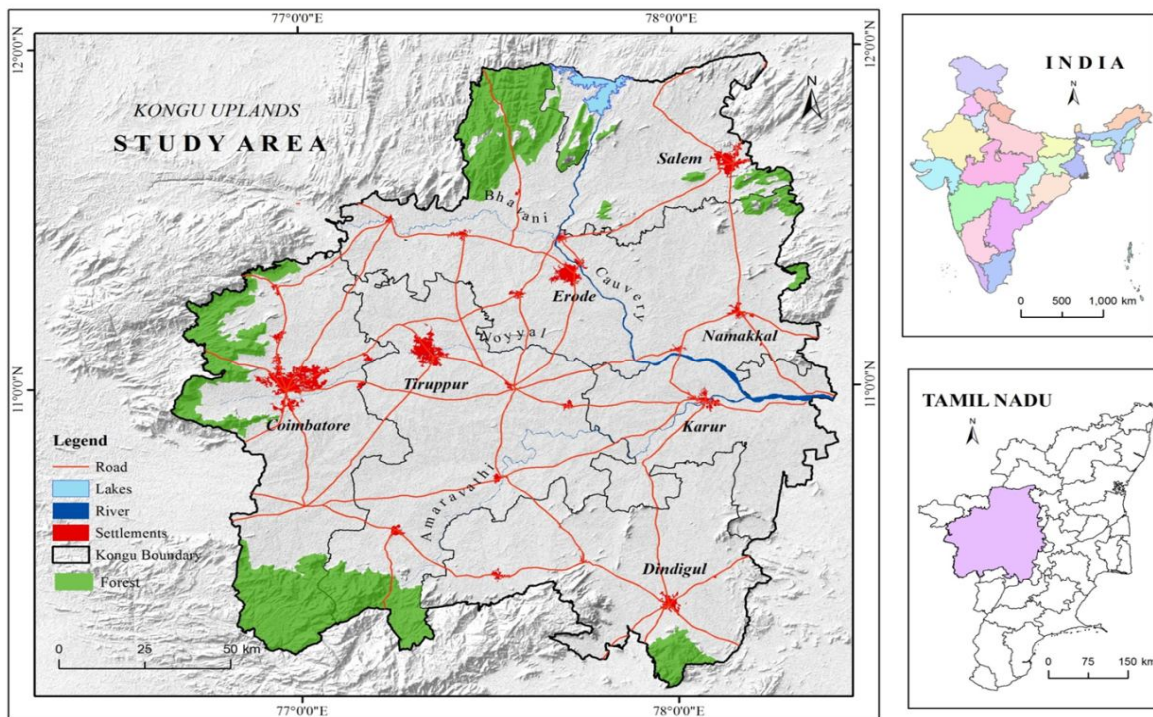

Fig- 1:Study Area

DATA AND METHODOLOGY

The cropping data for the year of 2015-2016 has been collected from The District Economics and Statistical Departments of each District. Kongu Upland's natural boundary has been demarcated with the help of 1: 2,50,000 Toposheets and Aster 30m DEM and Block maps were digitized from the Census Hand Book, 2011. Cropping intensity is calculated as a ratio of total cropped area and net sown area of each block and the crop combination has been found out using [9]Weaver's statistical

method of crop combination. All the resultant outcomes have been represented in maps to facilitate the understanding of its spatial distribution in the study area.

Cropping intensity depicts the feasibility of land for cultivation more than once in a year and is calculated by using the following formula:

$$\text{Cropping intensity} = \frac{\text{Gross Sown Area}}{\text{Net Sown Area}} \times 100$$

It acts a significant role in agricultural development. The cropping intensity is usually referred to as the ratio between the gross sown area and net sown area of a particular area. The high cropping intensity reveals that all the factors affecting crop cultivation are favourable for double or triple cropping, while as low cropping intensity reflects unfavorable condition for multiple usage of the land area.

The study of crop combination regions is a significant aspect of agricultural geography as it provides good basis for agricultural regionalization[10]Singh. In simple terms, crop combination is the practice of growing more than one crop in same area. Crops are usually grown in combinations. The study of crop combination of any region has gained prominence in geographical study. The patterns of crop combination give rise to spatial predominance of certain crops or combinations results in the emergence of crop regions[11]Singh. Such analysis would ultimately minimize the change of oversimplified generalization [12]Bhat. Crop combination study is geographically fruitful in many ways, firstly it provides an adequate understanding of an individual crop; secondly, combination in itself an integrative reality that demands definition and distribution analysis and finally crop combination regions are essential for the construction of more complex structure of vivid agricultural region[13] Das. The study of crop combination thus forms an integral part of agricultural geography, and such study is greatly helpful for regional agricultural planning[14]Shyamal Dutta. Weaver's method of multifactor approach which he applied in Middle U.S.A during 1954 has been adopted in this study. In monoculture 100% of the region is cultivated by a single crop, in two crop combination 50% of the region is cultivated by one crop and the rest 50% by the second crop and so on will divide the region according to the number of combinations. The following statistical formula can be used for this analysis:

$$\text{Standard Deviation} = \frac{\sum \mathbf{d}^2}{\mathbf{n}}$$

Where **d** = Difference between the actual crop percentage

of a block and equivalent theoretical value.

RESULTS AND DISCUSSION

Cropping Intensity in Kongu Uplands

The cropping intensity of the study area has been classified in to three categories such as high (> 130%), moderate (110 - 130) and low (<110%). The quantitative analysis reveals that Perundurai block with 147.1% is the block with maximum cropping intensity in Kongu Uplands. The highest cropping intensity is identified in ten blocks,moderate cropping intensity in twenty- two blocks and the low intensity in forty- nine blocks of Kongu Uplands.So it can be concluded that the cropping intensity of Kongu Uplands is not a favourable and hence it should be improved in the coming years, inorder to raise the agricultural potential of the given area.The results has been numerically represented in Table1 and spatially represented in Fig-2.in detail.
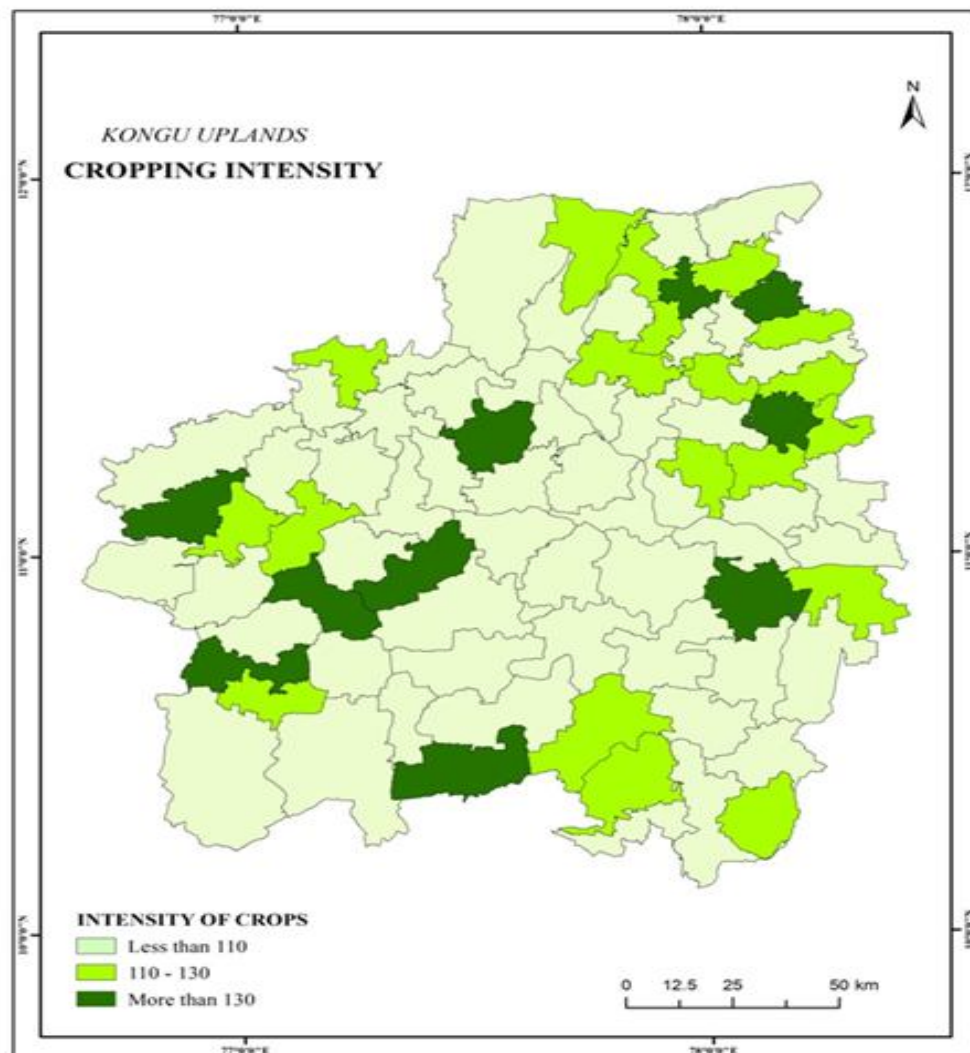

Fig- 2: Cropping Intensity

Table- 1: Cropping Intensity

Block Name	Index	Block Name	Index	Block Name	Index
Ammapettai	106.1	Kodumudi	107.5	Pongalur	142.1
Anaimalai	100.0	Kolathur	113.5	Puduchatram	138.4
Annur	101.3	Konganapuram	118.5	Rasipuram	125.9
Anthiyur	100.0	Krishnarayapuram	114.0	Reddiarchatram	123.3
Aravakurichi	102.5	Kundadam	103.5	Salem	138.1
Athoor	101.4	Madathukulam	108.7	Sanarpatti	126.5
Avinashi	101.1	Madukkarai	104.3	Sankari	117.5
Bhavani	102.7	Magudanchavadi	102.0	Sarkar Samakulam	124.5
Bhavanisagar	100.0	Mallasamudram	122.2	Sathyamangalam	125.4
Chennimalai	100.0	Mecheri	100.5	Senthamagalam	127.4
Dharapuram	100.0	Modakurichi	100.0	Sultanpet	131.8
Dindigul	106.2	Mohanur	100.0	Sulur	119.7
Edappadi	100.0	Mulanur	100.1	Thanthoni	136.7
Elachipalayam	101.9	Namakkal	113.9	Tharamangalam	142.1
Erode	100.9	Nambiyur	101.3	Thiruppur	100.1
Erumaipatti	100.2	Nangavalli	124.1	Thondamuthur	101.3
Gobichettipalayam	101.4	Oddanchathram	119.0	Thoppampatti	100.1
Gudimangalam	107.6	Omalur	120.5	Thottiyam	100.0
Guziliamparai	102.7	Palani	130.2	Thukkanaickenpalayam	101.6
K.Paramathy	106.0	Palladam	110.8	Tiruchengode	100.0
Kabilarmalai	100.5	Pallipalayam	105.2	Udumalpettai	106.7
Kadavur	103.4	Panamarathuppatti	114.7	Uthukuli	100.0
Kadayampatti	100.8	Paramathi-Velur	112.7	Vadamadurai	100.0
Kangeyam	111.0	Periyanaickenpalayam	136.2	Vedasandur	100.1
Karamadai	110.6	Perundurai	147.1	Veerapandi	106.1
Karur	105.4	Pollachi North	136.5	Vellakoil	100.0
Kinathukadavu	108.9	Pollachi South	121.5	Vennandur	101.8

(Source: Computed by Author from G-Return Data, 2016)

Crop Combination Regions in Kongu Uplands

Weaver's minimum deviation method is worked out to bring out the various crop combination regions in Kongu Uplands. The result reveals that the study area has one to seven cropping regions in the study area. One crop combination is only found in three blocks of Anaimalai, Pollachi North and Pollachi South; two crop combination is found in twelve blocks, three crop combination is found in twenty-one blocks, four crop combination is found in twenty-two blocks,

five crop combination is found in seven blocks, six crop combination in ten blocks and the seven crop combination in six blocks.

Banana is the first ranking crop in only one block of Karamadai; Jowar is the first ranking crop in forty-seven blocks, coconut is the first ranking crop in sixteen blocks, cow pea is the first ranking crop in Mecheri and Nangavalli; fodder crop is the first ranking crop in four blocks, green gram is the first ranking crop in two blocks, ground nut is the first ranking crop in five blocks, maize is the first ranking crop in six blocks, mango is the first ranking crop in Sanarpatti, paddy is the first ranking crop in ten blocks andsugar cane is the first ranking crop in two blocks. Table- 2 and Fig- 3 representcropping regions and crop combination of Kongu Uplands.
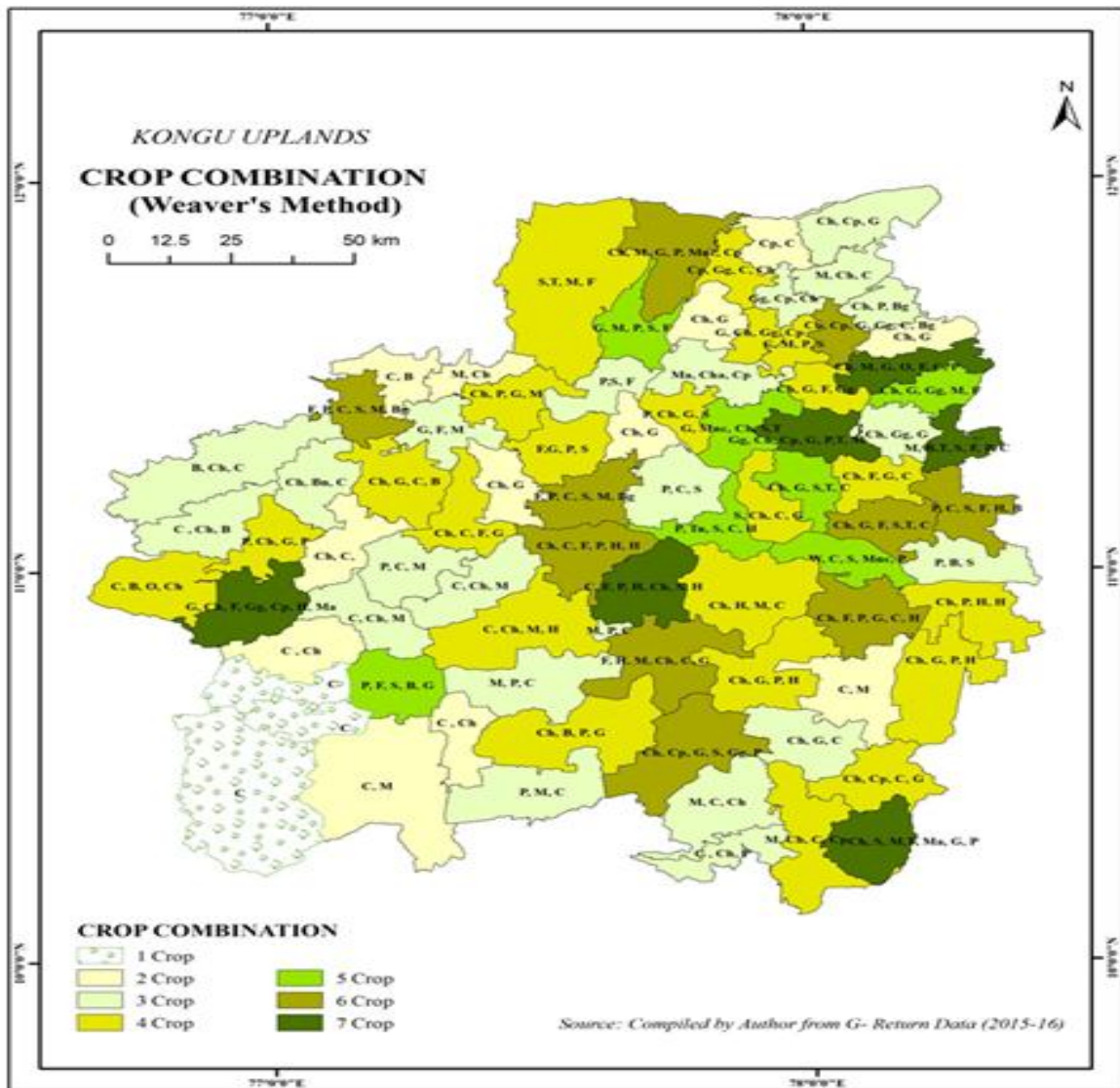

Fig- 3: Crop Combination Regions

Table- 2: Crop Combination Regions of Kongu Uplands

Crops	No. of Blocks	Block Name
Seven	6	Edappadi, Magudanchavadi, Sathyamangalam, Senthamagalam, Vellakoil, Vennandur.
Six	10	Bhavanisagar, Chennimalai, Erode, Kangeyam, Kolathur, Mohanur, Mulanur, Omalur, Thanthoni and Veerapandi.
Five	7	Ammapettai, Gobichettipalayam, Karur, Kodumudi, Paramathi-Velur, Rasipuram and Tiruchengode.
Four	22	Anthiyur, Aravakurichi , Avinashi, Dindigul, Erumaipatti, K.Paramathy, Kabilarmalai, Kadavur, Konganapuram , Krishnarayapuram, Kundadam, Madathukulam, Mallasamudram, Namakkal, Nangavalli, Pallipalayam, Perundurai, Sankari, Thiruppur, Thondamuthur, Thottiyam and Vadamadurai.
Three	20	Annur, Athoor, Bhavani, Dharapuram, Kadayampatti , Karamadai, Modakurichi, Nambiyur, Oddanchathram, Palani, Palladam, Periyanaickenpalayam, Pongalur, Puduchatram, Reddiarchatram, Salem, Sanarpatti, Sultanpet, Tharamangalam, Thukkanaickenpalayam and Vedasandur.
Two	12	Elachipalayam, Gudimangalam, Guziliamparai, Kinathukadavu, Madukkarai, Mecheri, Panamarathuppatti, Sarkar Samakulam, Sulur, Thoppampatti, Udumalpettai and Uthukuli
One	3	Anaimalai, Pollachi North and Pollachi South

(Source: Computed by Author from G-Return Data, 2016)

CONCLUSION

The cropping pattern of Kongu Uplands has been analysed through the methods ofcrop intensity and crop combination in this work. The study reveals that as a whole there are nineteen crops cultivating in which banana, jowar, coconut, cow pea, fodder crop, green gram, ground nut, maize, paddy and sugar cane are the first ranking crops. The cropping intensity results in Kongu Uplands shows unfavorable, which implies that the land area there is not feasible for the cultivation of crops more than once in a year.Improved irrigation facilities which helps in the better yield of crops during dry seasons; crop rotation, mixed cropping and relay cropping which helps in maintaining the soil nutrients and potentials of the land without fail; and selective mechanisation, use of fast maturing crop varieties etc. helps in growing of more than one crop within one growing season of a year all of which helps in raising the cropping intensity of the study area.

The crop combination analysis estimated through Weaver's minimum deviation method states that there are seven combination regions in the study area with various crop combinations each. Four crop combinations (twenty- two blocks) and three crop (twenty- one blocks) combinations occupies majority of the blocks followed by two crop combinations (twelve blocks), six crop combinations (ten blocks), five crop combination (seven blocks) and one crop combination (three

blocks). Sustainable irrigation practices, the use of fertilisers, the practices of crop rotation, mixed cropping methods, relay cropping, selective mechanisations, use of fast maturing varieties and appropriate and scientific planting of crops are some of the suggestions to improve the cropping intensity and increase the agricultural potentials of Kongu Uplands.

ACKNOWLEDGEMENT

REFERENCE

1. Shyam Bhatia S. Patterns of Crop Concentration and Diversification in India, Economic Geography. 1965; 41(1): 39-56.

2. Vahitha T, Murugannadam R., Ruthravel Murthy K, and Kumaraswamy K. Cropping Pattern in Noyyal River Basin, Tamil Nadu, A case study using GIS Technology. Journal of the Swamy Botanical Club.2014; 31: 5-14.

3. Priyadharshini S, and Aruchamy S. Agricultural Regionalization Based On Cropping Pattern in Sweta Nadhi Basin, Tamil Nadu. International Journal of Innovative research and Development. 2014; 3(13): 216-223.

4. Jegankumar R., Nagarathinam S R, Kannadasan K and Abdul Rahaman S. Cropping Pattern in Salem District, Tamil Nadu, India. International Journal of Current Research.2015; 7(8): 19808 – 19817.

5. Masilamani, P. Cropping Pattern of Koraiyar Watershed, Coimbatore District, Tamil Nadu. International Journal of Geomatics and Geosciences.2015; 6(1): 1420- 1429.

6. Premkumar K, Anandan R, and Nagarathinam S R. A Study on Crop Combination Regions in Palakkad District, Kerala. International Journal of Geomatics and Geosciences. 2015; 6(2):1430-1440.

7. Gomathi M, and Kumaraswamy K. Patterns of Crop Concentration and Diversification in Aiyar Basin, Central Tamil Nadu. Punjab Geographers Journal.2016; 12:98-112.

8. Shyju K and Kumaraswamy K.A Study on Agricultural Landuse and Cropping Pattern in Talappilli Taluk, Thrissur District, Kerala.Research Expo International Multidisciplinary Research Journal.2017; 7(6): 40-53.

9. Weaver J C. Crop Combination Regions in the Middle West. Geographical Review. 1954; 44(2): 175-200.

10. Singh J, and Dhillon.(1984), Methods of agriculture regionalization in agricultural geography New Delhi, India Tata McGrawHill.1984; 3: 213 -297.

11. Singh R P. Concept of Land Use. Patna University Journal. 1967; 22(1): 52-62.

12. Bhat M M. Agricultural Land Use Pattern in Pulwama District of Kashmir Valley.International Journal of Economics, Business and Finace.2013; 1(5): 80 -93.

13. Das G. The Study of Crop Combination Regions in Jalpaiguri District, West Bengal. Acne international journal of multidisciplinary research.2013; 1(9): 27-33.

14. Shyamal Dutta.A Spatio-Temporal Analysis of Crop Diversification in Hugli District, West Bengal.Geo-Analyst. 2012; 2(1): 77 -81.