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Patterns Of Crop Concentration And Diversification In Vizianagaram District Of Andhra Pradesh

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Abstract

Crop concentration and diversification are important components of crop geography of a region. The higher index values represent high concentration and lower values represent low concentration. The term 'crop specialization' indicates cultivation of less number of crops and crop diversification implies raising a variety of crops from the soil. In this paper an attempt is made to analyse the crop concentration and diversification regions (at mandal level) in Vizianagaram district. The secondary data have been collected from Agriculture department, Vizianagaram district. Based on S.S.Bhatia, Gibbs and Martin index of concentration and diversification. Using Bhatia's method, the crop concentration indices for all mandals of Vizianagaram district are calculated for major crops like Paddy, Groundnut, Sugarcane, Mesta, Blackgram, Greengram, Horsegram, Sesamum and Maize. Crop diversification indices have been computed for all the mandals in Vizianagaram district with the help of Gibbs and Martin index of diversification.

Keywords: cropping pattern, crop specialization, concentration, diversification, geo-climatic / socio-economic conditions, Vizianagaram District, Andhra Pradesh

Introduction

The present study is an attempt at analyzing the crop concentration and diversification of agriculture in Viziznagaram district of Andhra Pradesh State. The district is a part of the Northern Coastal plains of Andhra Pradesh and lies between 17^{o}-15^{1} and 19^{0}-15^{1} of the Northern Latitudes and 83^{0} to 83^{0}- 45^{1} of the Eastern Longitudes. (Fig.1). Agriculture is the single most important sector of the economy in Viziznagaram district and it is the major source of livelihood in the rural areas. Approximately two-thirds of the labour force is employed in agriculture. It was observed that the land holdings are very small in the district and about 90 percent of the total holdings are below 2 hectares. The total cropped area of the district is 4, 42,588 hectares accounting for 68 percent of the total geographical area. The gross area irrigated under principal crops is 1, 86,690 hectares accounting for 42 percent of total cropped area. Approximately around 60 percent of the cropped area is rainfed and dependent on monsoons. Agriculturally, the district is less developed when compared to other coastal districts of Andhra Pradesh due to lack of assured irrigation facilities. Both annual and seasonal rainfall is highly variable over time and space. Crop diversification in Vizianagaram is generally viewed as a shift from traditionally grown less remunerative crops. Higher profitability and also the resilience / stability in production also induce crop diversification, for example sugarcane replacing rice. Crop diversification and also growing of number of crops are practiced in rainfed lands to reduce the risk factor of crop failure due to droughts or less rain. Crop substitution and shift are also taking place in the areas with distinct soil problems. For examples, the growing of rice in high water table areas replacing maize, pulses and oilseeds.

Number of research papers were published relating to patterns of crop concentration and diversification. Sustainable agricultural resources management under rainfed agro-ecosystem was analysed by Singh and Sureja (2008). Madhuri and Ramanaiah (2007) have studied the level of crop intensification and diversification in Rayalaseema region of Andhra Pradesh. Hangaragi (2010) has studied patterns of crop diversification in Bagalkot district of Karnataka, Crop diversity which refers to crop variety is an important component of crop geography of region. Bidyut Kumar Ghosh (2011) has systematically analysed crop diversification

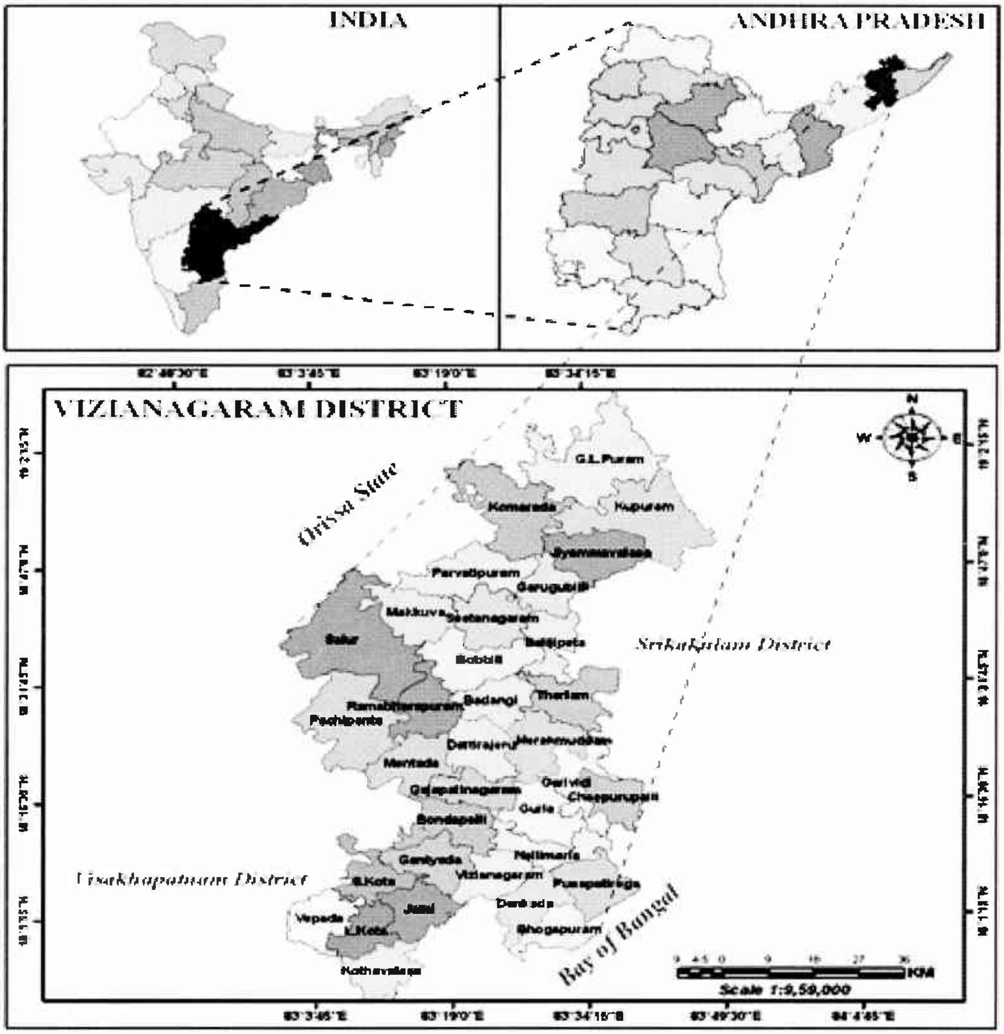

Fig1: Location map of the study area

in West Bengal. Crop diversification is necessity for agricultural based economy like Haryana since growing of staple food such as cereals alone cannot support the process of economic development and growth Malik and Singh (2002). Joko Mariyono (2007) has analysed optimizing food crop diversification to enhance the rural income generated from the agricultural sector. Agricultural product diversification is one way to increase rural income.

Database and Methodology: No primary data have been generated in this study. The whole study is based on secondary data collected from Statistical hand books and Economic review of Andhra Pradesh, published by the directorate of Economics and Statistics, Government of Andhra Pradesh (2009-2010). The nature of crop diversification is first examined through changes in allocation of land towards the cultivation of different crops grown in different seasons over the year. Inter crop variations are also considered in contrast to the explaining acreage allocation. The most commonly used methods are S.S.Bhatia, Gibbs and Martin formulae of crop concentration and diversification.

Crop Concentration

Crop concentration means the variation in the density of any crop in an area at a given point of time. The concentration of a crop in an area largely depends on its terrain, rainfall and pedagogical conditions. Each crop has a tendency to have high concentration in the areas of ideal agro-climatic conditions. Delineation of crop concentration region helps in ascertaining the areas where a particular crop grows well even with the help of minimum inputs, and thus great significance for agricultural development and planning.

The present analysis is based on Bhatia's formula.

$$c_x = \frac{a/b}{a'/b'}$$

Where a area of particular crop in the unit area (mandal) ÷

b total cropped area in the unit area (mandal)

a' area of particular crop in the region (district)

b' total cropped area in the region (district)

The higher index values represent high concentration and lower values represent low concentration or in other words the index values are directly proportional to the concentration levels.

Using Bhatia's method, the crop concentration indices for all mandals of Vizianagaram district are calculated for major crops like Paddy, Groundnut, Sugarcane, Mesta, Blackgram, Greengram Horsegram and Sesamum. Crop concentrations of major crops are shown in Fig.2, 3, 4 and 5. Paddy is the most dominant crop of the district and accounts for 28.7 percent of the total cropped area. Paddy shows very high concentration in only one mandal, Jiyyammavalasa. Though Paddy is the leading food crop of the district high concentration of the crop is limited to only few mandals such as Parvathipuram, Komarada, Kurupam Garugubilli and Jami mandals (Fig.2) & Table.1). Moderate concentration of the crop is observed in about 12 mandals and low concentration of the crop is identified in six mandals (Fig.2). Very low concentration of Paddy is noticed in another six mandals. Mesta is the second rank crop of the district.

Very high concentration of Mesta is observed in five mandals and high concentration in another five mandals (Fig.2). Moderate concentration is observed in 4 mandals. Moderate and very high concentration is found in the central part of the district. The rest of the district towards northeast, west and south shows low and very low concentration of the crop (Fig.2 & Table.1).

Groundnut is another important commercial crop of the district and its concentration is very high in six mandals such as Therlam, Garividi, Gurla, Cheepurupalli, Nellimarla and Pusapatirega (Fig.3). High concentration of crop is observed in five mandals. Low concentration of Groundnut is found only in two mandals in Pachipenta and Badangi. Most part of the district shows very low concentration of the crop (Fig.3).

Among cash crops, Sugarcane is the leading crop of the district. High concentration of the crop is found in the central part of the district which includes Seethanagaram, Badangi and Ramabhadrapuram mandals and also south western part of the district consists of S.Kota, Jami and Vepada mandals (Fig.3). High concentration of the crop is observed in 2 mandals and moderate concentrate is noticed in only one mandal. Low concentration of crop is found in five mandals and very low concentration is observed in 18 mandals of the district. Though it is a commercial crop, its main concentration is limited to certain areas where good irrigation facilities are available.

Pulses, which include Greengram, Blackgram, Redgram and Horsegram, occupied an area of 62,237 hectares during 2009-2010. In Vizianagaram district, pulses especially Greengram and Blackgram are important crops and high concentration of these crops is observed in central part of the district and also southern mandals (Fig.4). Very high concentration of Greengram is identified in two mandals, Baljipeta and Denkada and high concentration is found in four mandals.

Moderate concentration of crops is observed in five mandals. But 50 percent of total geographical area of the district shows low concentration of crop (Fig.4). About 14 mandals show low concentration of crop and very low concentration is observed in 9 mandals. Blackgram shows very high concentration in 3 mandals and high concentration in 2 mandals. Moderate concentration is found in about 8 mandals and low to very low concentration of Blackgram is observed in 21 mandals.

Sesamum is another important crop of the district which is being cultivated in 31,157 hectares and accounts for 4 percent of the total cropped area. Though it is cultivated in all the mandals of the district, its main concentration is confined to southern part of the district, Moderate concentration is observed in 8 mandals and low to very low concentration is found in 19 mandals. Maize is also one of the important crops of the district.

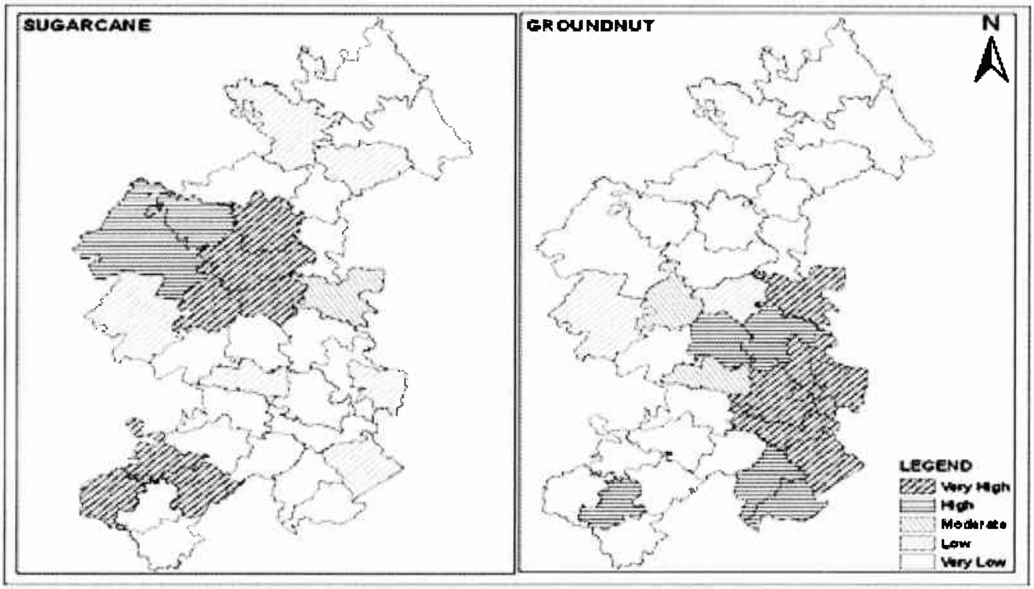

Fig.2. Vizianagaram District - Crop concentration

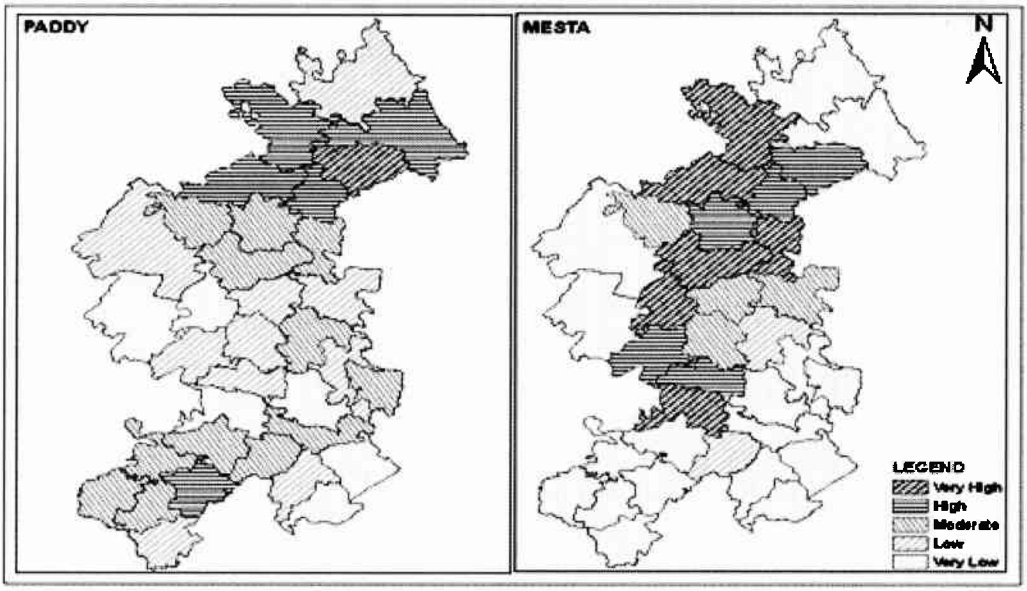

Fig.3. Vizianagaram District - Crop concentration

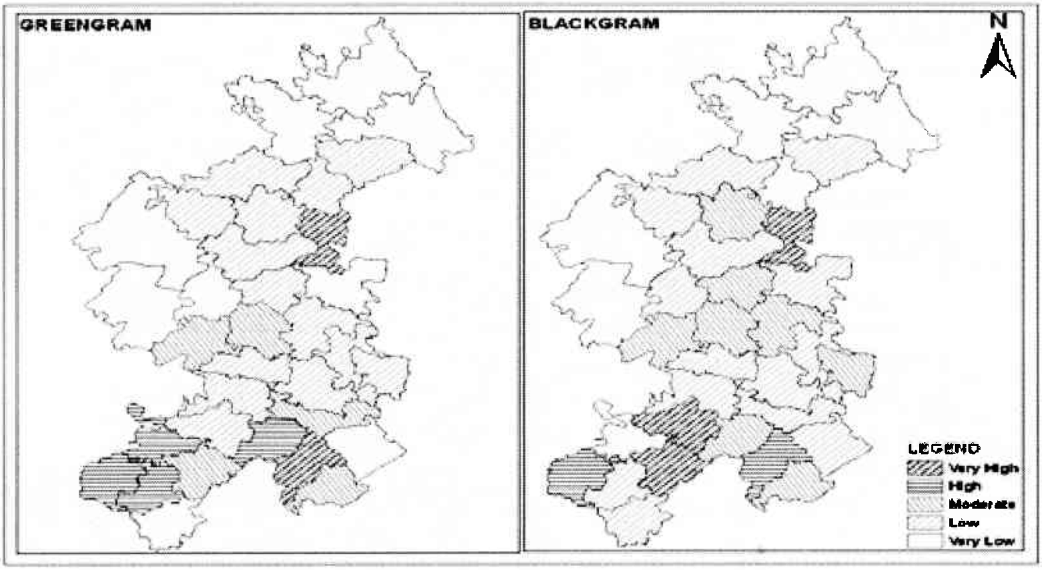

Fig.4 Vizianagaram District - Crop concentration

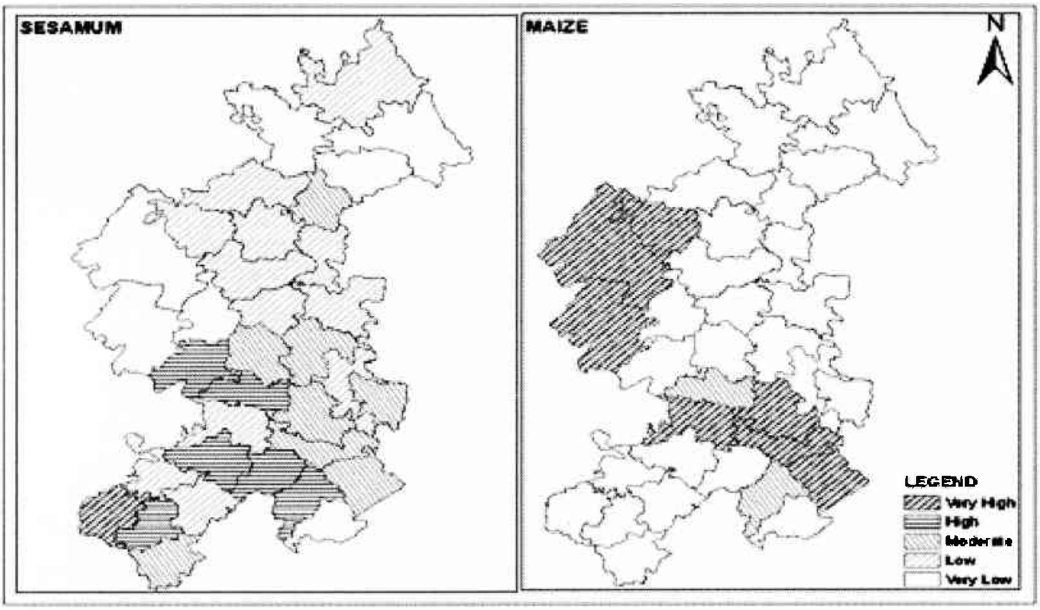

Fig.5. Vizianagaram District - Crop concentration

Table 1: Vizianagaram district- Crop Concentration

S.No	Name of the mandal	Paddy	Mesta	Sugar cane	Ground-nut	Green gram	Black gram	Sesamum	Maize
1	Komarada	1.64	2.50	0.50	0.12	0.40	0.25	0.42	0
2	G.L.puram	0.78	0	0	0	0	0	1.16	0
3	Kurupam	1.53	0.11	0	0	0.20	0	0.14	0
4	Jiyyammavalasa	2.14	1.66	0.50	0	0.60	0.50	0.14	0
5	Garugubilli	1.85	1.66	0.25	0	0.80	0.25	1.00	0
6	Parvathipuram	1.50	3.44	0.25	0	0.60	0.50	0.57	0
7	Makkuva	1.35	1.44	1.75	0	0.60	0.75	0.57	2.00
8	Seethanagaram	1.17	1.55	4.25	0	0.60	1.00	0.71	0
9	Baljipeta	1.25	2.77	0	0.12	2.60	2.25	0.85	0
10	Bobbili	1.25	2.11	3.25	0	0.80	1.00	0.71	0
11	Saluru	0.53	0.44	1.75	0.37	0.20	0.25	0.14	6.00
12	Pachipenta	0.35	0	0.75	0.75	0.20	0.25	0	7.50
13	R.B.Puram	0.50	2.44	2.76	1.25	0.40	0.50	0.28	0.50
14	Badangi	0.57	1.33	6.50	0.50	0.80	1.00	0.71	0
15	Therlam	0.92	1.44	1.0	2.87	0.40	0.75	0.57	0
16	Merakamudidam	1.17	0.77	0.25	1.5	0.80	1.00	1.42	0
17	Dattirajeru	0.89	1.22	0.25	1.87	1.00	1.00	1.42	0
18	Mentada	0.82	1.88	0.25	0	1.20	1.50	1.57	0.50
19	Gajapathinagaram	0.53	1.88	0.50	1.0	0.80	0.50	1.71	1.00
20	Bondapalli	0.39	2.22	0	0.12	0.60	0.50	0.57	2.50
21	Gurla	0.50	0.11	0	3.75	0.60	0.50	1.00	5.50
22	Garividi	0.75	0.22	0.25	3.87	0.40	0.50	0.57	0
23	Chipurupalli	1.14	0.22	0.75	3.37	0.80	1.00	1.14	0.50
24	Nellimarla	1.00	0.33	0	2.12	1.20	0.75	1.00	2.50
25	Pusapatirega	0.39	0	0.50	2.25	0.40	0.50	1.28	11.0
26	Bhogapuram	0.50	0	0	1.75	1.20	1.00	0.28	0
27	Denkada	0.75	0	0	1.62	6.00	1.75	1.57	1.00

28	Viziangaram	1.14	0.66	0	0.25	1.60	1.00	1.57	0
29	Gantyada	1.28	0	0.50	0	0.80	2.75	1.71	0
30	S.Kota	1.10	0	4.00	0.12	1.80	0.25	0.71	0
31	Vepada	1.39	0	2.00	0.25	1.60	1.75	2.42	0
32	L.Kota	1.50	0	0.25	1.50	1.60	0.75	1.57	0
33	Jami	1.60	0	2.00	0.12	1.20	2.00	0.85	0
34	Kothavalasa	0.67	0	0	0	0.40	0.75	1.28	0

The total area of Maize cultivation in the district is 12,553 hectares. Very high concentration of Maize is found in 5 mandals, Saluru, Makkuva, Bondapalli, Gurla, and Nellimarla and high concentration is in Pusapatirega. Moderate concentration is noticed in 2 mandals, Ramabhadrapuram and Mentada and very low concentration (Fig .5) is observed in 25 mandals. Very high concentration is mainly observed towards west and southeast.

Tobacco and cotton are newly introduced commercial crops in the district. But their concentration is limited to curtain regions, Pachipenta and Saluru mandal.

CROP DIVERSIFICATION

Crop diversification is a concept which is opposite to crop specialization and farmers grow several crops in an agricultural year. The level of crop diversification largely depends on the geoclimatic/ socio economic conditions and technological development in a region. In general, higher the level of agricultural technology, lesser the degree of diversification. Moreover, the rich farmers prefer to specialize in selective crops while the poor and subsistent farmers are generally interested in the diversification of crops. Crop diversity which refers to crop variety is an important component of crop geography of a region (Hangaragi, 2010).

The main causes for the crop diversification are uncertain weather, especially the erratic rainfall and also traditional farming (subsistent farming systems) which allow farmers to grow several crops to meet the family requirements. Diversification of crops also includes growing pulses. The roots of the pulses plants have the nitrogen fixing bacteria that obtain nitrogen from the atmosphere and convert it into nitrates to be utilized by the plants. For the measurement of crop diversification, Gibbs and Martin (1962) developed the following formula

Index of diversification=

$$1-\frac{\sum x^2}{(\sum x^2)}$$

where x is the percentage of total cropped area occupied by each crop. Taking the percentage of each crop, the formula would work out. If the value is relatively close to 1, the diversification is relatively high. If the value is not close to one, the diversification would be low.

Table 2: Vizianagaram district - Crop diversification

S.No	Mandals	Crop diversification indices
1	Komarada	0.54
2	G.L.puram	0.60
3	Kurupam	0.40
4	Jiyyammavalasa	0.44
5	Garugubilli	0.53
6	Parvathipuram	0.60
7	Makkuva	0.66
8	Seethanagaram	0.71
9	Baljipeta	0.73
10	Bobbili	0.71
11	Saluru	0.78
12	Pachipenta	0.72
13	R.B.Puram	0.77
14	Badangi	0.77
15	Therlam	0.74
16	Merakamudidam	0.80
17	Dattirajeru	0.78
18	Mentada	0.74
19	Gajapathinagaram	0.74
20	Bondapalli	0.70
21	Gurla	0.73
22	Garividi	0.74
23	Cheepurupalli	0.77
24	Nellimarla	0.73
25	Pusapatirega	0.76
26	Bhogapuram	0.68
27	Denkada	0.62
28	Vizianagaram	0.66
29	Gantyada	0.69
30	S.Kota	0.64
31	Vepada	0.59
32	L.Kota	0.58
33	Jami	0.54
34	Kothavalasa	0.60

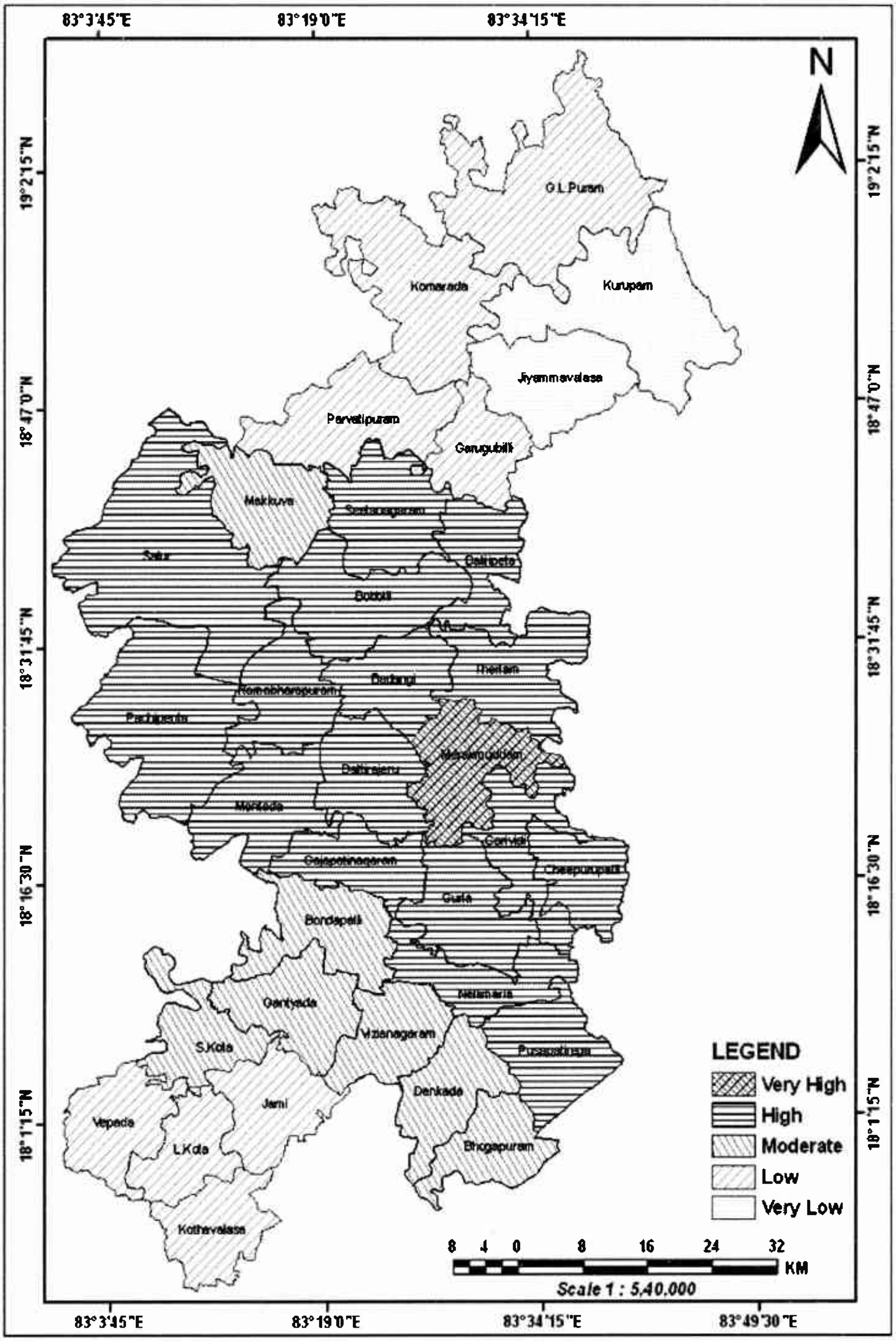

Fig.6 Vizianagaram district - Crop diversification

If the total area in a region is devoted to one crop [i.e. specification] the index value will be zero and it is distributed evenly among all crops (i.e. diversification) the index value will be 1. In other words the indices are directly proportional to the magnitude of diversification. The larger the number and the closer the percentage of land occupancy of crop in a regional Unit., the higher the degree of diversification and vice versa. Crop diversification indices have been computed for all the mandals in Vizianagaram district with the help of Gibbs and Martin index of diversification and presented in Table.2

Based on the index values, the mandals are grouped into very high, high, medium, low and very low diversification levels. Very high level of crop diversification is observed in only one mandal, Merakamudidam followed by high diversification levels in 16 mandals (Fig.6). Most of the mandals show high level of diversification in the study area. Medium range of index values is observed in seven mandals and eight mandals show lower values. Very low diversification index is observed in only 2 mandals in Kurupam and Jiyyammavalasa. These two mandals are specialized in Paddy cultivation mainly due to irrigation facilities and hence agriculture is less diversified. Over all observation indicates that the district has a tradition of cultivating many crops such as Paddy, Groundnut, Sugarcane, Mesta, Greengram, Blackgram, Sesamum and Maize etc and stands as good example for crop diversification.

CONCLUSIONS

The cropping pattern of Vizianagaram district is fairly diversified mainly central part of the district. Jiyyammavalasa and Kurupam mandals are specialized in paddy cultivation mainly due to irrigation facilities and hence agriculture is less diversified. It was observed indicate that the district has a tradition of cultivation many crops such as Paddy, Groundnut, Sugarcane and Maize etc and stands as good example for crop diversification. Paddy is most dominant crop of the district accounts for 28.7 percent of the total cropped area. Mesta is the second rank crop of the district. The most feasible way of improving rural income from the diversification is to reduce rice cultivation in the dry season and improve maize cultivation.

It is observed that Central part of the district is highly diversified and southern part of the district is moderately diversified. Northern and Southeastern parts of the district are less diversified. Vizianagaram is a district of small farmers and agriculture is a challenge of the future for the farmers. It is suggested that output of all existing crops should be increased to meet the diversified consumption needs of the people. And there should be a shift towards high valued crops, which leads to a more efficient utilization of land. The transport, communication, market infrastructure and processing facility for high value crops should be strengthened in the district. It is possible to bring sustainability in agriculture economy of the region by bringing out changes in the expansion of irrigation, improving livestock production and modernization of agriculture.

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