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Spatial Analysis of Agricultural Landuse in Western Coastal Zone Of Palghar

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Introduction

Agricultural practices and typology are best represented by crops in any region. The principal crops tend to concentrate according to their requirement of physical environment. Cropping pattern or crop combinations become essential crops combination can be identified by taking recourse to ranking. Ranking leads to determine few dominant crops, but at the same time ignoring other in any given region. These crops which have low ranks. Though there are various methods to determine cropping patterns, in the present study K.Doi's method has been used. An attempt has been made to spot light the spatial distribution of various crops, their growth and response to physio-socio-economic conditions prevalent in the region. The cultivation of crops and their growth are closely related to the decision making process on one hand and adaptation of innovation in agriculture. The selection of crops for sowing in the field present composite picture of cultivation of crops in the region. The hectarage under individual crop gives relative strength and realistic picture of cropland use in the analysis of crop ranking of the region. The ranks of crops and their combination provide spatial variation in the distribution patterns. In this respect the study of crop combinations and diversification's manifest the present agricultural scenario.

K.Doi's Method

The method is a derivative of Weavers method of crop combination region. Weaver in 1954 has applied least standard deviation technique for computing crop combination regions. This method is based on the comparison of the actual percentage of cropped areas occupied by the different field crops with theoretical distribution. Thus the standard deviation is calculated for all possible crops and regional unit is designated with crop combination. Raffiullah (1956), Doi(1959), Thomas(1963), Singh (1974) and many others have modified crop combination analysis. By taking recourse to all table which gives critical values for different combinations, it is possible to identify crop combinations percentage of different crops to net sown area are calculated and the combinations decided as per the table after due correction. The results according to Doi's method are more realistic is in comparison to other methods. They are equally suitable in regions of high specialization, as well as in the region of no marked variations. In the present study Doi's method is applied to fifteen crops in 122 villages which constitute the study region.

Study Area

The Thane District Consists of 14 tahsils, Palghar is one of the significant tahsil. The Palghar tahsil is divided in to five revenue circles namely Tarapur, Boisar, Palghar, Saphale and Manor for land revenue purpose (2011). The western coastal plain in Palghar tahsil is a part of Thane District in North Konkan. The extent of the coastal plain is $19^0$30' to $19^0$50' North latitude & $72^0$40' to $72^0$50' East longitude. It has a length of about 40 kms from north to south and 15 kms from west to east and covers an area of 654 sq.km. (65492 hectares). The soil along the coast is brackish and contains sand which is suitable for garden crops. Further inland is a flat alluvial low- land with fairly productive black-soils; its eastern limits are marked more or less by the railway line. Toward the east the soil is red and brown.

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Objective

- To present areal strength of the crops grown in the region by ranking and interpret the factors responsible for this rank distribution.
- To delineate the patterns of crops combination of the coastal plain of Palghar tahsil by applying Doi's method and plot it in a regions of crop combination;
- To identify the crop diversification patterns of the coastal plain of Palghar tahsil by applying Bhatia's method of crops diversification and find out the variables responsible for such patterns in the area under study.

Database and Methodology

The secondary data includes all published materials; It also includes unpublished records preserved in land revenue department. The tahsil office and revenue records (Talathi) were the prime source of data for area under individual crops for 2018-19 at the village level. Besides this, published records and abstracts such as, socio-economic review of Thane district, crop and season report, Thane District, crop and season report, Thane District Gazetteer were also used.

Crops Ranking Frequency

The ranking obtained for six main crops in the region to identify the relative significance of individual crop in cropping pattern. The first six crops have been identified and mapped.

Sr. No	Crops	I	II	III	IV	V
1.	Rice	99	23	-	-	-
2.	Grass	23	97	-	-	-
3.	Fruits	-	-	38	26	-
4.	Vegetable	-		28	30	-
5.	Coconut	-	02	03	05	06
6.	Pulses	-	-	08	05	17
7.	Betel Leaf	-	-	-	-	03

Source: Tahsil Office Records, Revenue (Talathi) Office Records, Palghar Table-1

Two crops are identified occupying first rank, namely rice and grass. Shows the dominance of areal strength of these two crops. Table displays first ranking crops, village and area in the study region. Rice is main crop and it stands as first rank and is found to have largest coverage in the region. The favorable climatic conditions in the region are responsible for growing rice on coastal alluvial soil. The sufficient annual average rainfall (1700 mm) during kharif season and average temperature 30 Celsius in growing period supports for the growth of this crop. The rice is grown on 49522 hectares (79.03 per cent total area) in 99 villages. Grass is identified as the second major crop standing in the area under study. Grass is grown in 23 villages and is confined to the north and south part of the region covering 13143 hectares (20.977 per cent to total area). The coarse shallow soil does not allow other crops to grow like rice and other cash crops in this part. The village having more than 50 percent area to net sown area as a grass crop is Kelwe road. Due to coarse shallow soil this part has low per hectare yields. Fruits and Vegetables prefers in third and fourth ranks. Fig. 2 indicates the ranks frequency of rice, grass, fruits, vegetables, coconut, pulses and betel leaf in the study area.

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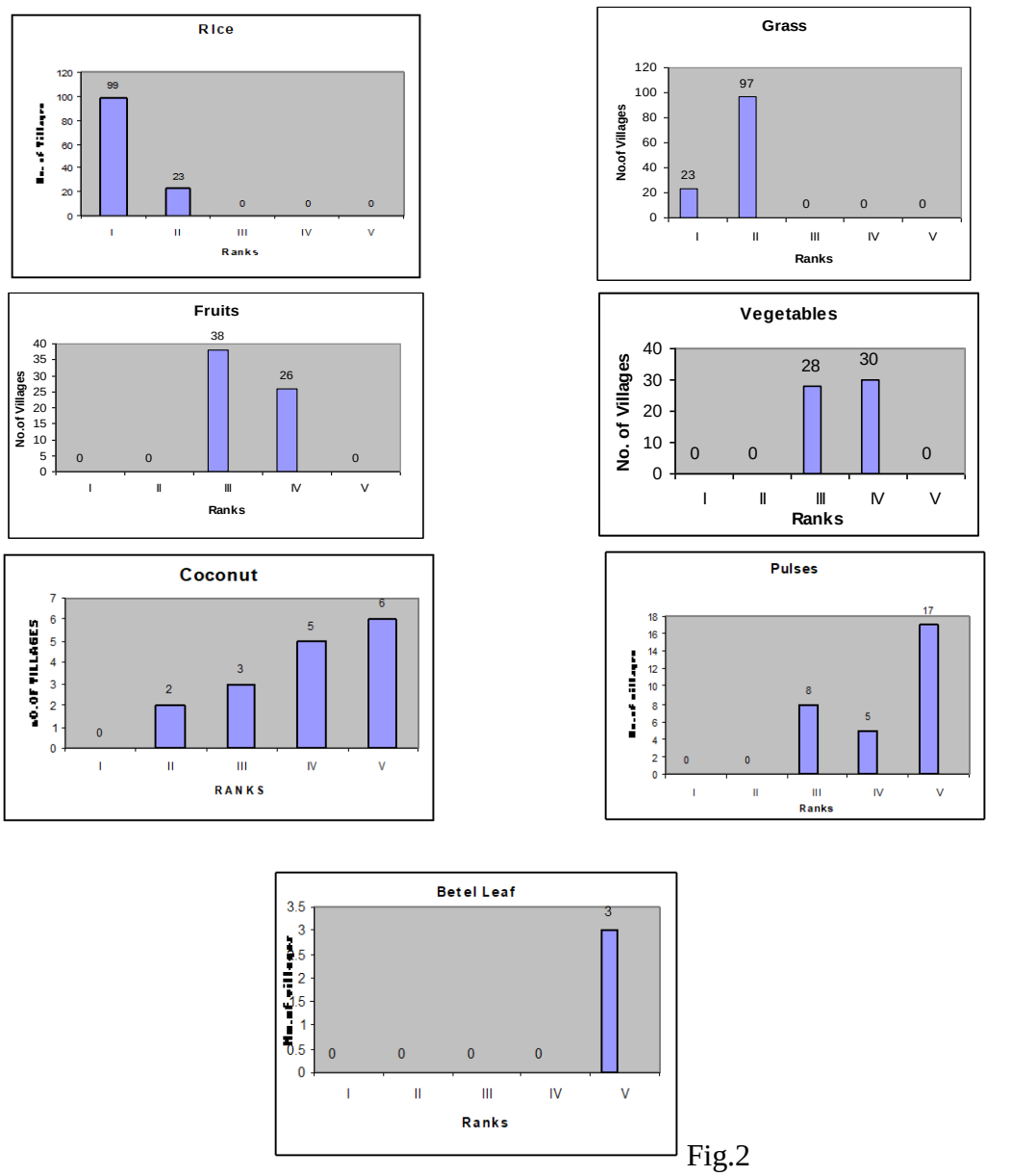

Fig.2

CROP COMBINATION:

Agricultural practices and typology are best represented by crops in any region. The principal crops tend to concentrate according to their requirement of physical environment. A single crop like rice can dominate a region and also occurs as a monoculture in three villages. Cropping pattern or crop combinations become essential crops combination can be identified by taking recourse to ranking. Ranking leads to determine few dominant crops, but at the same time ignoring other in any given region. These crops which have low ranks. Though there are various methods to determine cropping patterns, in the present study K.Doi's method has been used.

Crop Combination in western Coastal Plain of Palghar

Combination Types	Crops in Combination	No. of Villages
Monoculture	Rice	3
Two Crop-combination	Grass/Rice/ coconut	39
Three Crop-combination	Rice/Grass Fruits/ Pulses	12

Four Crop-combination	Rice/Grass/Vegetable /Pulses/coconut	42
Five Crop-combination	Rice/Grass/Vegetable / Fruits/coconut/Pulses/Betel leaf	26

Source : Compiled by Author Table-2

Rice is identified as monoculture occupying only 0.83 percent area in the region, it is cultivated in three covering 522 hectares area. Three crops namely, rice, grass and coconut enter into two crop combination in different villages. The area under two crop combinations is 13783 hectares (21.99 per cent to total area) "served in 34 villages". Three crop combination in the region. Six crops enter in this combination are namely. Rice, grass, fruits, pluses, coconut and vegetables. Three crop combination is dominant in five villages on area of 2426 hectares (3.87 per cent to total area). Four crop combinations denote the increase in the number of crops with comparative diversification in crop combination. Six crops entered in this combination, namely, rice, grass, vegetable fruits, pluses and coconut. The region of four combinations is wide spread in the eastern part of study area. There are two pockets and other small patches of this category in the western coastal plain, where five crop combination of various crop have been observed. Seven crops are entered in this combination are namely, rice, grass, fruits, vegetables, pulses, coconut and betel leaf (Nagveli / Panveli). Five crop combination is dominant on 77308 hectares (27.62 per cent to total area).

Crop Diversification Technique:

In order to identify spatial pattern of crop diversification in present study. Bhatias method has been adopted in modified form. The crop having five or less than five percentages have been excluded from computation. This modification formula expresses as.

$$\text{Index of Crop Diversification} = \frac{\text{Percent of Net Sown Area}}{\text{Number of `n` Crops}}$$

Where 'n' crops are those which individually occupy five or more than five percent of crop to net sown area in the village.

Crop Diversification

Sr. no	Class of Crop Diversification	Magnitude of Crop Diversification	No of Village	Percentage of Total Villages	Area Involved	Percent of Area
1	0-10	High	40	32.79	31405	50.11
2	10-20	Moderate	52	42.62	24422	38.97
3	20-30	Low	19	7.37	2853	4.55
4	30 above	Very Low	11	9.01	3985	6.35

Source: Compiled by Author Table-3

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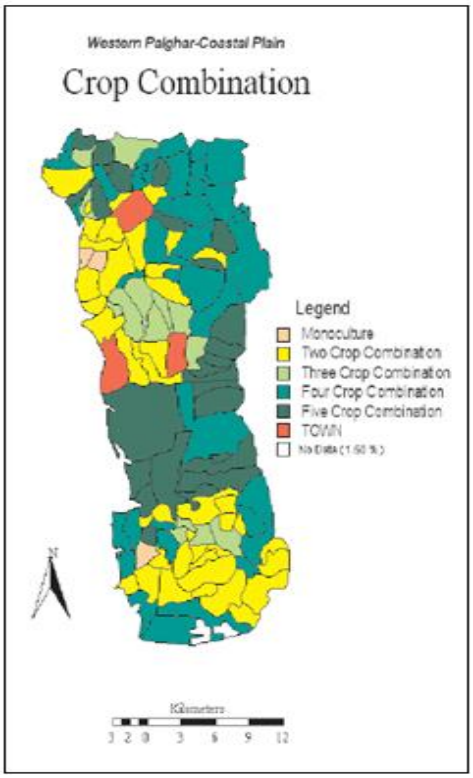

Fig.3

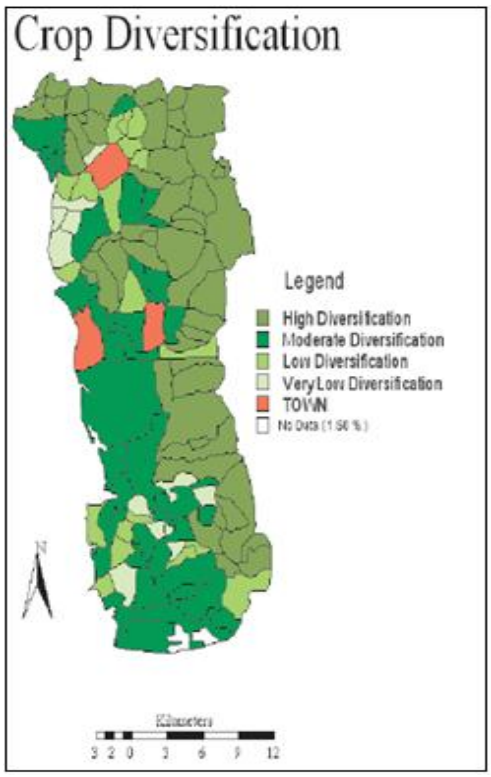

Fig.4

CROP DIVERSIFICATION APPLICATION AND RESULTS:

The obtained results have been displayed in table and Fig.4. That shows crops in number villages and area in crop diversification in the western coastal plain of Plaghar tahsil.

Fig.4 shows the area distribution pattern of crop diversification in the region Maximum crop diversification appears in eastern part and lowest at southern and northwest parts in the region.

It is seen from the above Exhibit that four crop – diversification region have been identified as:

i. Area of high crop diversification
ii. Area of Moderate diversification
iii. Area of low diversification and
iv. Area of very low diversification

The four categories of crop diversification its class magnitude village and area as shown in table. It is observed from this table that the largest area appears in the moderate crop diversification class covering 52 percent area in the region.

High diversification appears in eastern part and some pockets in central part stretching south to north and northwest villages. The largest numbers of crops are found in high degree of diversification. There are six major crops, namely rice, grass, fruits, vegetable, pulses and coconut enter in this diversification. High crop diversification observed in 40 villages covering 31405 hectares (50.11 per cent to total area). in the region. The eastern margin of the region is end to the hill range and foot hill villages have Uncertain and lack of irrigation facilities, shallow soil of upland does not give high yield per hectare. Hence high diversification, of crops is obvious in this part of the region. In the central pockets also found high diversification rice grown is kharif season and some plantation crops throughout the year. After kharif season the land may utilize for raising vegetables with the availability of irrigation by well. About fifty per cent area is observed in the high diversification shows diversification crops grown in the region Fig.4.

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Conclusion

To attempt an exposition of agriculture landuse pattern in the region the village has been taken unit for study to throw light on crop combination and diversification. The area strength of individual crop has been discussed by ranking. This falls into five descending order. Rice stands as first in ranking while grass in second ranking crops. Rice ranking in the first in ninety nine villages (81.14 per cent to total village),consequently occupying the predominant position within the region (49522 hectares) Grass has been observed first in second ranking in ninety seven villages (76.85 per cent to total area). Other crops such as vegetables, fruits, coconut, pulses have been ranking below rice and grass in the descending order.

The application of Doi's method shows the realistic picture of crop combination in the region. It has been observed that four and five crop combination cover the largest areal extent in combination. Out of seven crops in total six crops namely, rice, grass, fruits, vegetable, pulses and coconut enter in the four crop combination in 38 villages on 26945 hectares (42.99 per cent to total area in the region). Out of the seven crops namely rice, grass, pulses, coconut, vegetable, fruits and betel leaf combination in twenty five villages on 16908 hectares (26.98 per cent), follows by this two crop combination enter in thirty five villages on 13481 hectares (21.51 per cent) Other crop combination are of little significance in the region. The crops are namely rice, grass, fruits and pulses are in combination in eleven villages on 4809 hectares (7.67 per cent)

In order to understand the competition among crops in the region the crop diversification has been computed by applying Bhatia's formula. According to Bhatia's method two crop diversification categories have been revealed in the region. The result of crop diversification establishes relationship with physio–socio-economic conditions. The largest area covers with high crop diversification in forty villages on 31405 hectares (50.11 per cent) followed by moderate crop diversification in fifty two villages on 24422 hectares (38.97 per cent) The high diversification is observed on eastern side and some patches spread west wards. The moderate crop diversification is found on extensive pockets in the coastal alluvial plain of Palghar tahsil, where crops namely rice, grass, vegetables, fruits, pulses and betel leaf are grown in this diversification whereas the low diversification crops is not significant it observed in nineteen villages on 2853 hectares (4.55 percent) very low crop diversification covers 3985 hectares (6.35 per cent) observed in eleven villages.

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