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## SPATIO-TEMPORAL ANALYSIS OF CROP DIVERSIFICATION IN SATARA DISTRICT: A GEOGRAPHICAL STUDY

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### Abstract

The present paper an attempt has been made to analyze the agricultural land use pattern and crop diversification in Satara district. Crop diversification patterns, like that of crop concentration, have great relevance in the agricultural land use studies. Crop diversity is an important component of the crop geography of a region. In this paper an attempt is made to analyze the crop diversification regions at tahsil level in Satara District and to delineate the highly diversified areas and low diversified areas. The secondary data have been collected from varies published reports to analyses the Crop diversification based on Gibbs and Martin Index of Diversification. This method is applied to find out the levels of crop diversification reveals that the spatial variations amongst tahsil of Satara. In this paper an attempt is made to analyze the Crop diversification region at tahsil level and delineate the highly diversified areas and low diversified areas.

**Keywords:** Agricultural Land Use Pattern, Crop Diversification, Crop Diversification Index.

### Introduction

Crop diversification patterns, like that of crop concentration, have great relevance in the agricultural land use studies. Crop diversity is an important component of the crop geography of a region. It refers to crop variety. Larger the number of crops grown in an area during a year with each occupying equal proportion of cropland, the higher is crop diversification. Specialization is reverse of diversification. The term Crop specialization indicates cultivation of fewer/ less number of crops and crop diversification implies raising a variety of crops from the soil. The keener the competition, the higher the magnitude of the diversification and lesser the competition, the greater will be the trend towards specialization or monoculture farming where emphasis is on one or two crops. In fact, it is obvious that greater the number of crops in a combination, greater will be the degree of diversification. The main advantage of the study of crop diversification regions lies in the fact that it enables to understand that impact of physical, and socio-economic conditions on the agricultural mosaic and scope for rotation and effect on double cropping, total production and per hectare productivity.

### Study Area

The Satara district is situated in western part in Maharashtra state. This district consists of eleven tahsils covering 1547 villages. The total area extent is of 10,492 Sq. km. extending from 17<sup>05</sup>' to 18<sup>11</sup>' north latitude and 73<sup>33</sup>' to 74<sup>54</sup>' east longitudes. This district is confined by Pune district to north, Solapur district to east, Sangli district to south and Ratnagiri and Raigad district to west. Satara district has typical landscapes due to variations in relief, climate and vegetation. The variation of relief ranges from the pinnacles and high plateau of the main Sahyadrians range having heights over 1500 meters above means sea level to the subdued basin of Nira river with an average height of about 600 meters above means sea level. The climate ranges from the rainiest in the Mahabaleshwar region which has an average annual of over 6000 mm to the driest in Man tahsil where the average annual rainfall is about 500 mm. The vegetal cover to varies from the typical monsoon forest in the west part to scrub and poor grass in the east parts. Jowar, rice, bajra, sugarcane, oil seeds and pulses are mainly cultivated in the district.



### Location Map: Satara District

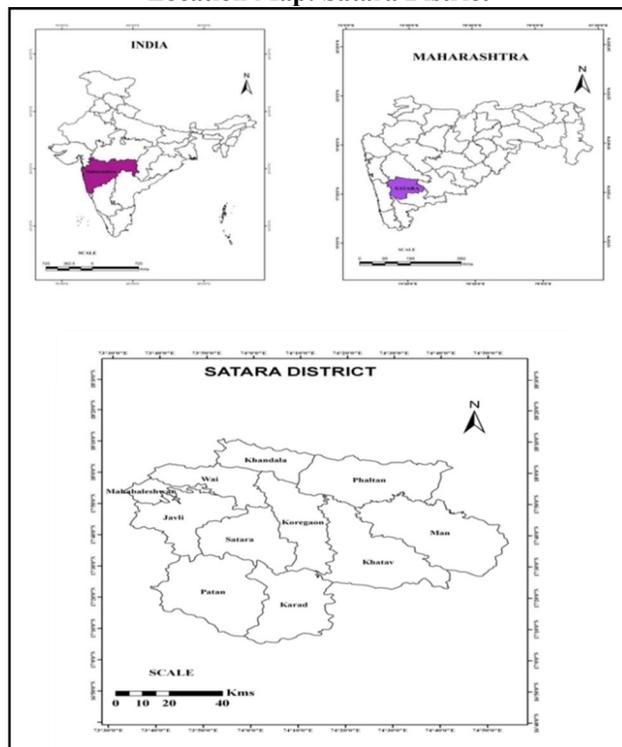


Figure No. 1.1: Satara District

### Objective

The main objective of the present paper is to assess the Spatio-temporal analysis of crop Diversification in Satara district and to demarcate the spatial variations in crop Diversification at tahsil level.

### Database and methodology

The present paper has been interpreted quantitatively and qualitatively with suitable research methods. Most of the data used in the paper is analyzed with the help of graphic representations, percentage representation and cartographic representation. The present study is based on secondary data collected from different published sources for the year 2019-2020. Tahsil wise land use data collected from socio-economic abstract, Satara district and district census handbook in Satara referred to collect related information. The Gibbs and Martin Index of Diversification (1962) provides a useful alternative index for measuring the degree of diversification in the cropping pattern in an area and the formula developed for calculating the index is as under:

$$\text{Index of Diversification} = 1 - \frac{\sum x^2}{(\sum x)^2} \quad 1 - \sum x^2 / (\sum x)^2$$

Therefore, The Gibbs and Martin Index of Diversification is proved to be most suitable in measuring the diversification of crops in Satara district and hence is adopted here, at points of time.

### Analysis of Crop diversification pattern

Crop diversification index in Satara district has increased from 0.62 in 2009-10 to 0.66 in 2019-20. Because the number of crops treated at all points of time have been changed. Therefore, the increase in the index value is directly related with decrease in area under few crops at the cost of others. The crops which have become more profitable in due course of time with the introduction of high yielding variety seeds and assured market the through state trading and support prices have recorded considerable decrease in their area. Such an economic nationalization of cropping pattern has been largely facilitated by the expansion and intensification of irrigation, use of chemical fertilizers as an essential input for raising high yielding strains. Bajara is a traditional crop of a eastern part



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of district recorded a considerable reduction in cropped area. The decrease in its area from 39.23 percent to 32.17 percent in the total crop complex has been mostly at the cost of increase in area of oilseeds, total pulses, sugarcane, and fodder crops. A larger proportion of the newly reclaimed land too was devoted to these crops.

The tahsil level analyses of crop diversification in Satara district reveals a unique scene as compared to the district on the whole. Though the variation of the index values from 2009-10 to 2019-20 is not quite high, as has been noted earlier, the inter tahsil variations are quite significant.

As per the 2019-20 results, Mahabaleshwar, Khandala, Jawali, Man and Khatav tahsil has the lowest diversification index, (0.48,0.48, 0.47, 0.42 and 0.46) but it was 0.72, 0.51, 0.53, 0.55 and 0.51 in 2009-10. It is mainly because of more than 60 percent occupancy of cereals, Bajara crops, were in Bajara and Jowar together account for 68.09 percent of the total cropped area, the remaining 31.30 percent of the area is distributed to all other crops. This led to a sharp decline in the areas of all other crops. The agronomic environment also supported the cultivations of these crops. This has led to a crop specialization that is Bajara.

Koregaon, wai and Satara tahsils are under medium diversification index with 0.61, 0.66, 0.67 in 2009-10 and Patan and Phaltan tahsils are under medium diversification index with 0.53 and 0.56 in 2019-20, has medium crop diversification index. However, the slight decrease in crop diversification index is due to the increased price of oil seeds and vegetables. That has stimulated to the farmers to grow this crop. The above said Patan and Phaltan tahsil is considered as areas of medium diversification were cereals and oil seeds concentration significantly occupying more than 80 percent of the crop land. High and less rainfall have black and red soils which support cereals and oil seeds cultivation. High yields, short peered and relatively higher prices for this crop are some of the stronger features which have led the cereals and oil seeds as predominant crop.

The remaining two tahsils are namely Karad and Mahabaleshwar are coming under the high Diversification of crops with 0.78 and 0.48 in 2019-20 and 0.75, 0.48 in 2009-10 respectively. It is mainly because of high rain fall and Karad is high irrigation facilities. Strobery of Mahabaleshwar and sugarcane of Karad this crops to occupy in high position.

Table No. 1.1: Crops and its Diversification of Satara District (in percentage) 2009-10.

Sr. No.	Region	Crops							1- $\Sigma x^2$ ( $\Sigma x$ ) <sup>2</sup>	Index
		Creals	Pulses	Oil Seeds	Cash Crops	Fruit Crops	Vegetable Crops	Fodder Crops		
1	Mahabaleshwar	28.87	0.80	0.50	oo	8.20	27.38	34.25	2824.32 (100) <sup>2</sup>	0.72
2	Wai	54.07	9.68	15.54	4.26	3.11	5.08	8.26	3380.58 (100) <sup>2</sup>	0.66
3	Khandala	68.13	8.21	7.58	2.97	3.17	3.86	6.08	4837.25 (100) <sup>2</sup>	0.51
4	Phaltan	62.11	6.66	4.41	8.66	3.66	2.63	11.87	4157.62 (100) <sup>2</sup>	0.58
5	Man	63.40	17.94	2.21	4.96	3.14	3.53	4.82	4416.42 (100) <sup>2</sup>	0.55
6	Khatav	68.09	12.38	5.66	5.42	2.16	3.15	3.14	4875.33 (100) <sup>2</sup>	0.51
7	Koregaon	57.92	16.65	10.26	6.46	1.98	5.75	2.98	3805.79 (100) <sup>2</sup>	0.61
8	Satara	50.83	10.28	20.77	5.17	3.24	4.67	5.04	3205.15 (100) <sup>2</sup>	0.67
9	Jawali	66.47	8.03	10.46	2.86	2.35	5.06	4.77	4654.19 (100) <sup>2</sup>	0.53
10	Patan	60.75	6.79	20.92	5.55	1.93	1.32	2.74	4218.06 (100) <sup>2</sup>	0.57
11	Karad	73.26	6.00	16.80	15.04	1.55	1.84	21.51	2407.02 (100) <sup>2</sup>	0.75

Source- District Socio-economic Abstract, Satara. Note- Crop area in given in hecters.

**Table No. 1.2: Crop and its Diversification of Satara District (in percentage) 2019-20.**

Sr. No.	Region	Crops							1- $\Sigma x^2$ ( $\Sigma x$ ) <sup>2</sup>	Index
		Cereals	Pulses	Oil Seeds	Cash Crops	Fruit Crops	Vegetable Crops	Fodder Crops		
1	Mahabaleshwar	69.1	1.78	19.22	2.25	2.11	2.24	3.30	5172.78 (100) <sup>2</sup>	0.48
2	Wai	46.12	9.92	30.23	12.64	0.08	0.14	0.91	3295.76 (100) <sup>2</sup>	0.67
3	Khandala	67.52	23.57	3.74	3.77	0.77	1.30	0.03	5143.98 (100) <sup>2</sup>	0.48
4	Phaltan	62.44	12.39	9.64	14.29	0.71	0.58	0.04	4350.21 (100) <sup>2</sup>	0.56
5	Man	73.65	17.47	7.74	0.98	0.45	0.07	0.05	5790.38 (100) <sup>2</sup>	0.42
6	Khatav	70.14	20.80	5.64	3.07	0.05	0.24	0.06	5393.53 (100) <sup>2</sup>	0.46
7	Koregaon	38.52	24.64	29.21	7.41	0.14	0.07	0.01	2999.05 (100) <sup>2</sup>	0.70
8	Satara	40.80	1.75	23.07	15.14	0.02	18.30	0.92	2764.86 (100) <sup>2</sup>	0.72
9	Javali	69.98	3.23	15.55	4.04	0.02	0.07	7.11	5216.30 (100) <sup>2</sup>	0.47
10	Patan	64.23	3.22	20.96	1.57	8.06	0.12	1.84	4645.99 (100) <sup>2</sup>	0.53
11	Karad	16.42	1.22	23.11	27.54	0.06	8.13	23.52	2182.89 (100) <sup>2</sup>	0.78

Source- District Socio-economic Abstract, Satara. Note- Crop area in given in hectors.

**Figure No. 1.2: Crop Diversification of Satara District: 2009-10**

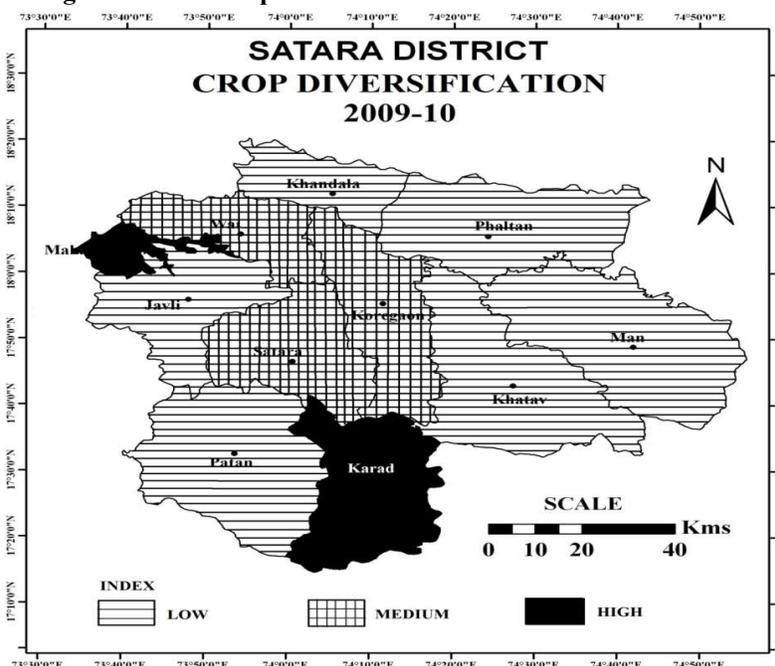
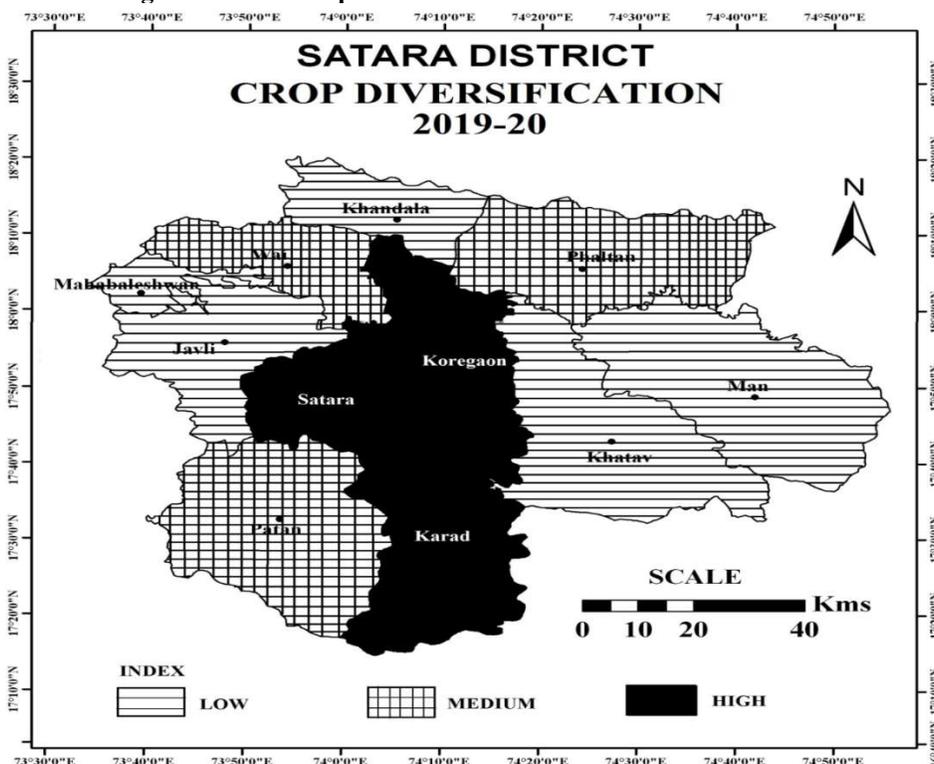




Figure No. 1.3: Crop Diversification of Satara District: 2019-20



## Conclusion

This paper is an attempt to study spatial analysis of crop diversification in Satara district. The cropping pattern of Satara district is fairly diversification are mainly located in eastern part of the district, which is the semi-arid tract. Where, the cultivation of (cereal crops) bajara is predominant. The significant concentration of Bajara relegation the other crops to very lower position resulted in lower diversification. The diversification of crops is increase from arid tahsils to Koregaon and Phaltan tahsil. The agricultural development in Satara district is advancement, due to diversified nature of land use pattern and cropping pattern of the Satara district, has increased the production capacity and cropping intensity of the land. In the present scenario need to strengthen the irrigation facilities, soil and moisture conservation, agronomic practices, changing in the cropping pattern, development of medium, adoption of bio-technology, afforastation, rural communications, livestock development, small and marginal farmers and agricultural laborers and setting up agro-based industries.

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