



LAND USE AND CROPPING PATTERN IN SATARA DISTRICT

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Abstract: The physic-cultural conditions are responsible for variation in regional patterns of agricultural activity in an area. As a result there is marked regional disparities in land use pattern, cropping pattern, crop combination etc. in an areal unit at a point of time. Agriculture occupies an important status in Indian economy. It provides food, fodder and raw material and thus contributes to overall economic growth. Maharashtra is a leading state in agriculture, where varieties of crops are grown. In this study attempt has been made to analyse the land use and cropping pattern of Maharashtra. The region having 10492 sq.km. area comprises 11 tahsils of Satara district. This study is based on secondary data collected from socio-economic abstract Satara district. An endeavour is made here to study the crop combination and crop Diversification regions in Satara district for the year 2020-2021. The crop data has been computed with the help of Doi's technique of crop combination and Crop diversification based on Gibbs and Martin Index of Diversification. Physiography, rain-

fall, soil and drainage influence impact on agricultural landuse pattern in district. Forty one crops have been considered for crop combination and Crop diversification analysis. Among these cereals, cash crops, oil seeds, vegetable crops, fruit crops, fodder crops, flowers and Pulses are major crops. Crop combination, Crop diversification in Satara district has identified four crop combination and Crop diversification. Such type of study represents real situation of cropping pattern in Satara district and helps to planners and agricultural scientist for agricultural planning and tahsil level.

Key Words: Land use pattern, crop pattern, crop combination, Crop diversification, planning and development.

Introduction:

The study of crop combination and Crop diversification regions constitutes important aspects of agricultural geography as it provides a good basic for agricultural regionalization. Crops are generally grown in combination and Crop diversification in any region and the crops have its relative position in terms of crop combination and Crop diversification. Farmers are growing numerous crops in the field rather than single crops. The distributional patterns of crops in any region are an outcome of predominance of certain or combination of crops. This is in term of emergence of typical crop combination. The statistical techniques provide accurate techniques for the study of agricultural landuse and cropping pattern various methods have used by scholars, scientists and planners. Weaver in 1954 has applied least standard deviation technique for crop combination regions. This method is based on the comparison of the actual percentage of cropped areas occupied by the different field crop with theoretical distribution is taken to formulate the crop combination. For a comprehensive and clear understanding of the agricultural mosaic of an agro-climatic region and for the planning and development of its agriculture, a systematic study of crop

combinations is of great significance.

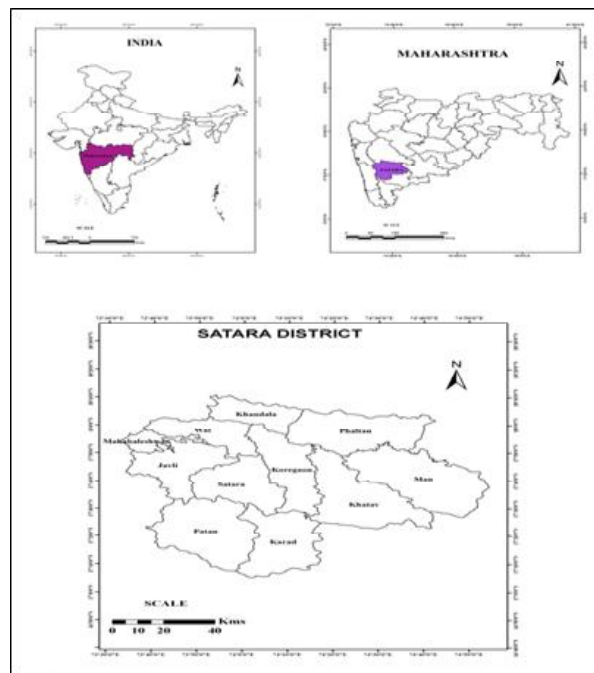
Crop diversification patterns, like that of crop concentration, have great relevance in the agricultural land use studies. Crop diversity is an important component of the crop geography of a region. It refers to crop variety. Larger the number of crops grown in an area during a year with each occupying 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 west part in Maharashtra state. This district consists of eleven tahsils covering 1547 villages. The total area extent is of 10,492 square kilometer extending from 17°5' to 18°11' north latitude and 73°33' to 74°54' 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 a 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, Sugercane, oil seeds and pulses are mainly cultivated in the district.

Location Map: Satara District



Objective:

The main objective of the present investigation is to assess the land use pattern and crop combination regions in Satara district.

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 study 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 2020-2021. Tahsil wise land use data collected from socio-economic abstract, Satara district and district census handbook in Satara referred to collect related information. Topographical maps and survey of India sheets are used for physiographical study. Simple statistical method has used to compute the least sum of squared deviation and variance and lowest standard deviation and coefficient of variation analysis (weaver) for cropping in the present study. 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:

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

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.

Crop combination analysis:

Crop combination is a dynamic concept. Cropping patterns and crop associations change in space and time. Recently the crop combination, analysis geographical studies has gained momentum and its important is increasing day by day. According to this method for present study in weavers crop combination (minimum deviation method) and calcu-

lating from 2018-2019 season data. The tahsil level crop combination has computed in this study. Table No. 2 shows combination like cereals, pulses, oilseeds, cash crops, fruits.

According to this method for present study in weaver crop combination (Minimum Deviation Method) and calculating from all seasons data (Table No. 2). The least sum of squared deviation and variance and lowest standard deviation and coefficient of variation formula was selected for this study and analysis from (2018-2019) seasons. Crops, vegetable crops, flower crops and fodder crops in the district. It is important to note that the environmental constraints owing to geographic situation, soil and climate have put the limit on diversified agricultural productivity. This is reflected in obtained resulted in the crop combination analysis.

Table No. 2: Crop combination region in Satara district

Sr. No.	Crop Combination	Name of Tahsil	Name of crop group
1	Monoculture	Khandala, Phaltan, Man, Khataav, Javali	Cereals
2	Two Crop Region	Koregaon, Satara Patan	Cereals + Pulses Cereals + oilseeds Cereals + oilseeds
3	Three Crop Region	Mahabaleshwar	Cereals + vegetable + fodder
4	Four crop region	Karad	Cereals + oilseeds + cash crops + fodder crops

Source: Computed by Authors (2020-21)

Devisions of Crop Combination:

1) Monoculture:

One crop group dominance or monoculture was practiced in Khandala, Phaltan, Man, Khataav and Javali Tahsil in Satara district. Jawar, bajara, rice, wheat and other cereals crops of the in tahsil. Jawar and bajara performs better in the arid and semi-arid areas. Rice grows well in the wet and warm areas in Javali tahsil. Jowar is cultivated in this region because in this region belonging to pore region. Rainfall is less in monsoon season.

2) Two crop combination region:

In this district two crop combination is found in Koregaon, Satara and Patan tahsil having combination of cereals, pulses and oilseeds crops groups. Cereals crops group is dominant crop are jawar, rice and wheat. Pulses crops group is dominant crop grown are Tur, and Oilseeds crops group is dominant crop grown are groundnut, sunflower, soyabean and kardai. Jawar, bajara and wheat are observed as dominant crop in Koregaon tahsil. The constituent crop of two crop combination, however, vary from region to region owing to great variations in the temperature and moisture conditions.

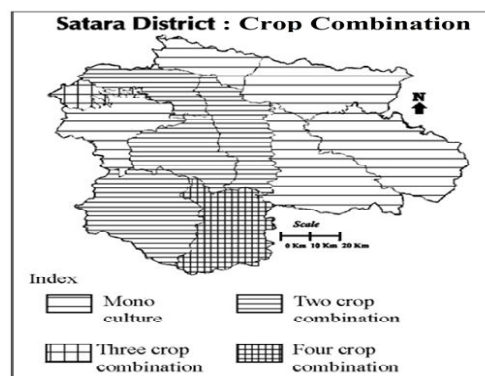


Figure No. 2: Satara District Crop Combination Method Distribution

3) Three crop combination region :

The northern and western parts in the district in Mahabaleshwar tahsil have dominance of three crop group combination region. In this crops group combination are found cereals, vegetable and fodder crops group. Mahabaleshwar tahsil is situated in western part of Satara district. Such information both spatial and temporal is a prerequisite for understanding the agricultural potential of a region. Mahabaleshwar at top gets highest annual rainfall (6000 millimeters). Summers and quite warm while the winter are cool. Cereals, vegetable and fodder crops group is a combi-

nation which suits well to the prevailing agro-climatic conditions of the region.

4) Four crop combination region :

Four crops group combination is identified in Karad tahsil. Crops group like cereals, oilseeds, cash crop and fodder crops. The four crop combinational areas units of Karad tahsil grow jawar, groundnut, sugarcane, wheat and fodder crops in the Kharip and Rabi are the constituent crops. The cropping patterns of these region are likely to remain highly ramified unless provision of irrigation are developed or new seeds are developed which may suit to the prevailing environmental conditions of the region.

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 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 revels a unique scene as compared to the dis-

tract 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, Mahahableshwar, 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 crops. 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 lead 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. Strawberry of Mahabaleshwar and sug-

arcane of Karad this crops to occupy in high position.

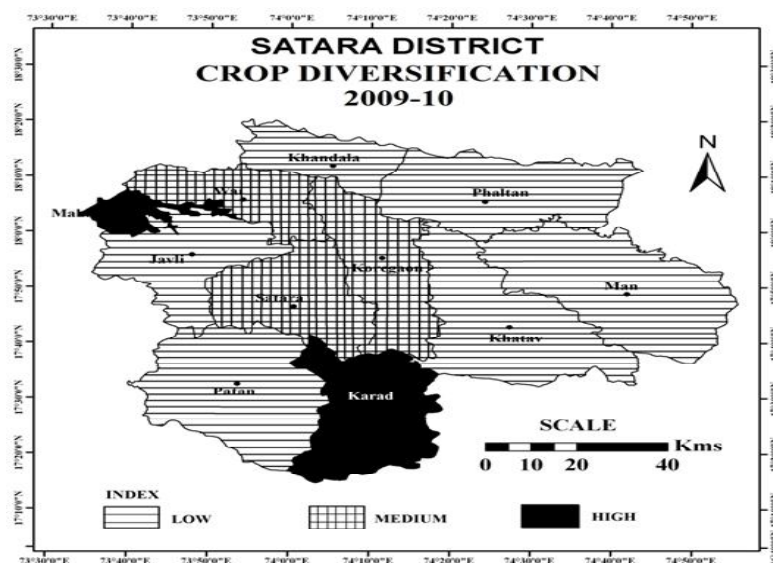
Table No. 1.1: Crops and its Diversification of Satara District (in percentage) 2009-10.

Sr. No.	Region	Crops							1- Σ ?2 (Σ ?Y2	Index
		Cereals	Pulses	Oil Seeds	Cash Crops	Fruit Crops	Vegetable Crops	Fodder Crops		
1	Mahabaleshwar	28.87	0.80	0.50	00	8.20	27.38	34.25	2824.32 (100)2	0.72
2	Wai	54.07	9.68	15.54	4.26	3.11	5.08	8.26	3380.58 (100)2	0.66
3	Khandala	68.13	8.21	7.58	2.97	3.17	3.86	6.08	4837.25 (100)2	0.51
4	Phaltan	62.11	6.66	4.41	8.66	3.66	2.63	11.87	4157.62 (100)2	0.58
5	Man	63.40	17.94	2.21	4.96	3.14	3.53	4.82	4416.42 (100)2	0.55
6	Khatav	68.09	12.38	5.66	5.42	2.16	3.15	3.14	4875.33 (100)2	0.51
7	Koregaon	57.92	16.65	10.26	6.46	1.98	5.75	2.98	3805.79 (100)2	0.61
8	Satara	50.83	10.28	20.77	5.17	3.24	4.67	5.04	3205.15 (100)2	0.67
9	Javali	66.47	8.03	10.46	2.86	2.35	5.06	4.77	4654.19 (100)2	0.53
10	Patan	60.75	6.79	20.92	5.55	1.93	1.32	2.74	4218.06 (100)2	0.57
11	Karad	73.26	6.00	16.80	15.04	1.55	1.84	21.51	2407.02 (100)2	0.75

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

Divisions of Crop Diversification of Satara District: 2009-10

1	low	Patan, Javali, Khatav, Man, Khandala, Phaltan
2	medium	Koregaon, Wai, Satara
3	High	Karad, Mahabaleshwar

Figure No. 1.2: Crop Diversification of Satara District: 2009-10**Table No. 1.2: Crop and its Diversification of Satara District (in percentage) 2019-20.**

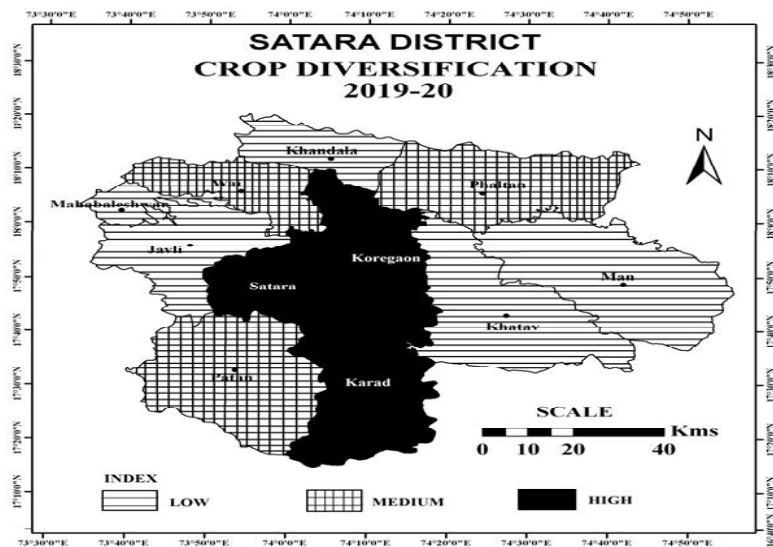
Sr. No.	Region	Crops							1- Σ22 (2772)	Index
		Cereals	Pulses	Oil Seeds	Cash Crops	Fruit Crops	Vegetable Crops	Fodder Crops		
1	Mahabaleshwar	69.1	1.78	19.22	2.25	2.11	2.24	3.30	5172.78 (100)2	0.48
2	Wai	46.12	9.92	30.23	12.64	0.08	0.14	0.91	3295.76 (100)2	0.67
3	Khandala	67.52	23.57	3.74	3.77	0.77	1.30	0.03	5143.98 (100)2	0.48
4	Phaltan	62.44	12.39	9.64	14.29	0.71	0.58	0.04	4350.21 (100)2	0.56
5	Man	73.65	17.47	7.74	0.98	0.45	0.07	0.05	5790.38 (100)2	0.42
6	Khatav	70.14	20.80	5.64	3.07	0.05	0.24	0.06	5393.53 (100)2	0.46
7	Koregaon	38.52	24.64	29.21	7.41	0.14	0.07	0.01	2999.05 (100)2	0.70
8	Satara	40.80	1.75	23.07	15.14	0.02	18.30	0.92	2764.86 (100)2	0.72
9	Javali	69.98	3.23	15.55	4.04	0.02	0.07	7.11	5216.30 (100)2	0.47
10	Patan	64.23	3.22	20.96	1.57	8.06	0.12	1.84	4645.99 (100)2	0.53
11	Karad	16.42	1.22	23.11	27.54	0.06	8.13	23.52	2182.89 (100)2	0.78

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

Divisions of Crop Diversification of Satara District: 2019-20

1	low	Javali, Khatav, Man, Khandala, Mahabaleshwar
2	medium	Wai, Patan, Phaltan,
3	High	Karad, Koregaon, Satara,

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



Conclusion:

Weavers technique has identified four crops group combination in study region. Cereals as monoculture has found in Khandala, Phaltan, Man, Khatav and Javali tahsil. Jawar, bajara and wheat as monoculture has found in study region. Two crops group combination entered cereals and pulses, and cereals and oilseeds crop group. Three crops group combination appeared concentration in Mahabaleshwar tahsil. In this region cereals, vegetable and fodder crops group is

most important and leading crop. Four crops group combination is identified in Karad tahsil. In this crop combination crops group like cereals, cash crop, oilseeds and fodder crops.

This study 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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