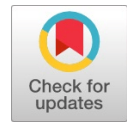


Crop Concentration and Diversification in Latur District of Maharashtra: A Case Study

Kiran Dilip Khalangre, M. V. Suryawanshi



Abstract: The present study is an attempt to explain the crop concentration and diversification in agriculture of the Latur district of Maharashtra. Here, a detailed study has been done to know the dominant crop as well as the ranking of the crops in the cropping pattern of the study area. The study is based on secondary data sets that have been collected from the district statistical handbook 2020-21. Using Bhatia's method, the crop concentration indices for all blocks of the district have been calculated for crops like Soybean, Sugarcane, Tur, Gram, Jowar, Mung and Udid. Crop concentration and Crop diversification indices have been calculated by using index for all the tehsil of the district. This study attempted to delineate the tehsils of high and low crop diversification and crop concentration.

Keywords: Crop Concentration, Crop Diversification, Crop Diversification Index, Percentage of Cropped Area.

I. INTRODUCTION

Even after 75 years of independence, agriculture continues to be a major factor in the economic development of developing nations like India. In India, about 50% of the population still depends on agriculture for a living. The paradox of the Indian economy, however, is that the proportion of workers employed in agriculture to the entire labor force is decreasing more slowly than the proportion of agriculture's GDP that has been shrinking in recent years [1][22]. Equilibrating the growth process and connect the rural-urban divide, inadequate infrastructural support, especially limited irrigation facilities coupled with policy bias. Different levels of investment in rural infrastructure and technological developments tend to magnify the regional differences in agricultural development [2][19][20][21][23].

The two principal elements of agricultural [3] geography are crop concentration and crop diversity, as these two indices provide very detailed information about a region's agricultural practices. For this reason, understanding a region's crop concentration and diversification may be crucial to properly planning agricultural land use [4]. Crop concentration can be defined as the change in any crop's density in a given area during a predetermined period of time, or as the spatial density of a single crop.

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Contrarily, agricultural diversification entails growing a range of crops from the soil. As such, it describes the cultivation of different types of crops within an area or on the same farm. Basically, there was a push for a diversified agricultural system during the late sixties green revolution to revitalize the agricultural economy [5]. To that end, it became necessary to diversify cropping patterns in order to meet the nation's expanding demand and to boost income through the exchange of foreign exchange [6].

There is no research in the Latur district which focuses on crop concentration and crop diversification. So this study is unique in the sense that it tries to investigate the crop diversification level which reveals the tehsil wise spatial variation in Latur district. This study also attempted to delineate the tehsils of high and low crop diversification and crop concentration of major crops in this region.

II. OBJECTIVE

The aims of the present study is to investigate the following objectives:

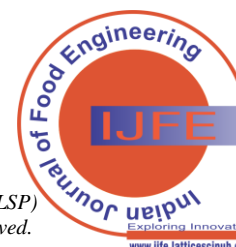
- 1) To analyses the area under the various crop in study region.
- 2) To analyses the crop concentration in study region.
- 3) To study crop diversification in study region.

III. STUDY AREA

Latur lies in the Marathwada region of Maharashtra, India, located between 17°52' to 18°50' latitudes North and between the 76°18' to 79°12' longitudes East in the Deccan plateau. The district is situated on the Maharashtra Karnataka boundary on the eastern side of the Latur is Bidar district of Karnataka, whereas Nanded is situated on the Northeast, Parbhani on the Northern side, and Beed and Osmanabad on the Northwest and Western & Southern side respectively. The entire district of Latur is situated on the Balaghat Plateau, 540 to 638mts from the mean sea level. In 2011, Latur had population of 2,454,196 of which male and female were 1,273,140 and 1,181,056 respectively and rural population comprises 1829216 whereas urban population comprises 624980. There are around 945 villages & 786 Gram Panchayats in the district. There are six Vidhan Sabha constituencies in Latur District.

IV. DATABASE AND METHODOLOGY

The present study mostly relies on secondary data collected through the Agriculture Department and the district statistical department of Latur and the socio-economic abstract of Latur District. For the present investigation, districts are selected in general and tahsil in particular.



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The crop concentration has been calculated first in the study using Bhatia's method, and in order to measure the crop diversification, Bhatia's (1965) formula has been used. Here, it should be mentioned that the higher index Values represent high concentration, and vice versa. On the other hand, if the value of diversification comes close to 1, the diversification will be higher. In order to assess the crop combination, the following formula has been adopted.

Crop Concentration Index =

$$\frac{\text{Area of Particular crop in the unit}}{\text{Total cropped are in the unit area}} \div \frac{\text{Area of Particular crop in the region}}{\text{Total cropped are in the region}}$$

Index Diversification

$$= \frac{\% \text{ of Total Cropped are under 'N'Crop}}{\text{Nuber of 'N' Crops}}$$

V. RESULTS AND DISCUSSION

A. Crop Concentration

Crop concentration means a real density of individual crop or crop concentration reveals the variation in the density of any crop in a given region at a point of time [7]. The

geographer's pioneer work of Florence (1948), Chisholm (1962), Bhatia (1965), Jasbir Singh (1976) these are the contributors to marking the agricultural region with the help of the quotient method. It is significantly impacted by soil properties, rainfall patterns, and topography. It is crucial to understand the regions where various crops predominate while studying cropping patterns. This aids in decision-making for upcoming agricultural planning. For this reason, different crops are ranked in order to compare their relative strengths [8]. Crops can be distinguished by one or more nuclei of concentration as well as by a more widely dispersed low density distribution when it comes to concentration types [9] Therefore, the demarcation of crop concentration regions plays a crucial role in agricultural growth and planning by assisting in identifying the locations where a given crop develops well even with the least amount of inputs [10]. The crop concentration zones within the study area have been defined using the following formula.

Here, in the table 1 the high index values represent high concentration and low values show lower level of concentration. Using the mentioned method, the crop concentration indices for all tehsils have been calculated for major crops like Soyabean, Sugarcane, Tur, Gram, Jowar, Mung, Udid etc. [11].

Table 1: Crop Concentration in Latur District: 2020-21

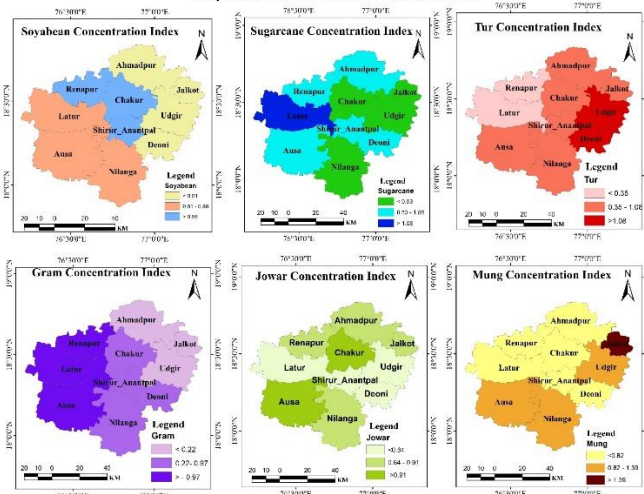
S. No	Tehsils	Soyabean	Sugarcane	Tur	Gram	Jowar	Mung	Udid
1	Latur	0.87	2.11	0.18	1.32	0.64	0.34	0.18
2	Renapur	0.95	1.083	0.35	1.35	0.83	0.54	0.34
3	Ahmadpur	0.73	0.96	1.08	0.035	0.91	0.67	0.53
4	Jalkot	0.77	0.53	0.96	0.14	0.81	1.92	1.97
5	Chakur	0.93	0.35	1.011	0.81	1.07	0.48	0.34
6	Shirur A, pal	0.91	0.87	0.84	0.93	0.56	0.52	0.42
7	Ausa	0.88	0.73	0.82	1.3	1.17	1.04	1.45
8	Nilanga	0.88	0.43	1.05	0.97	0.88	1.06	1.02
9	Deoni	0.81	0.83	1.31	0.76	0.64	0.82	0.73
10	Udgir	0.8	0.48	1.25	0.22	0.63	1.39	1.46

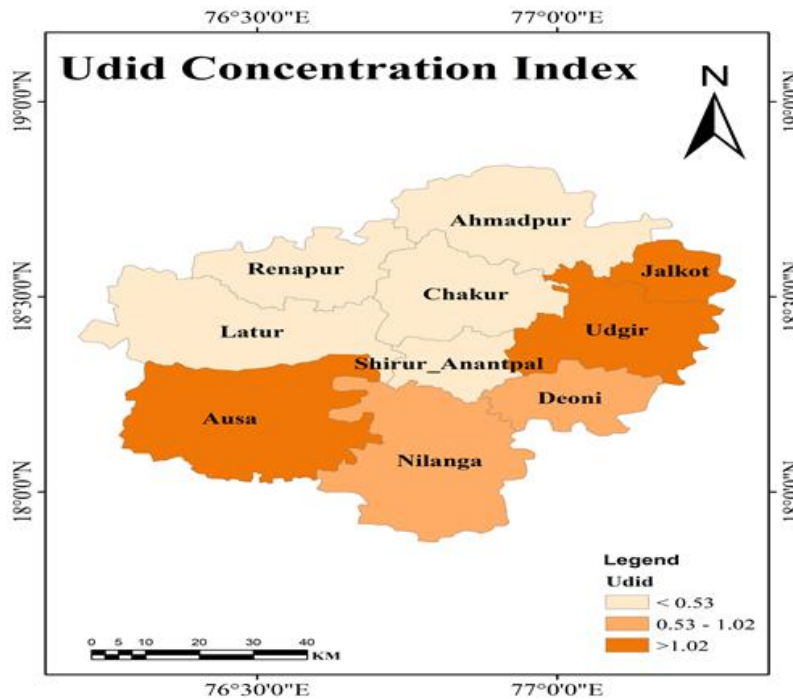
Source: Completed by Researcher

Map 1 shows that Soyabean is the leading crop of the district and Soyabean cultivation is highly concentrated in all the tehsils of the district. Renapur, Chakur, and Shirul-Anantpal tehsils are showing high concentration of Soyabean because these tehsils provide ideal conditions required for the crop in 2020-21. Latur, Ausa, and Nilanga tehsils belongs to the moderate zone of Soyabean concentration. In Udgir, Deoni, Ahmadpur and Jalkot tehsils low Soyabean concentration were observed due to irregularity in monsoonal

rainfall specially extended monsoon break period and adverse climate during sowing season of Soyabean is common in these tehsils. As far as Sugarcane cultivation is concerned, the highest concentration is found in Latur tehsil followed by Ausa, Renapur, Ahmadpur, Shirur-Anantpal and Deoni have moderate Sugarcane concentration since these tehsils have suitable conditions and infrastructure like sugar industries and connectivity. Comparatively lower concentration is found in Nilanga, Chakur, Udgir, Jalkot tehsil.

Crop Concentration Index for Latur District





Map: 1

The table -1 indicates that high concentration of Tur is found in Udgir and Deoni tehsils. During 2020-21, due to the favorable climatic and soil condition, furthermore its drought resistance nature results tehsil-wise moderate concentration of Tur in AUSA, Nilanga, Shirul-Anantpal, Chakur, Ahmadpur, Jalkot tehsils. On the other hand low concentration is found in remaining two tahsil namely Renapur, Latur where excess rainfall with high temporal variability is observed during monsoonal months of 2020-21. The high concentration of Gram is found in Renapur, Latur and AUSA tehsil due to rainfall activity due to delayed monsoonal rainfall in September, October during 2020-21 so the land is capable to grow successive rabbi crop i.e. Gram, the moderate concentration of Gram is recorded in Chakur, Shirul-Anpal, Deoni and Nilanga tehsil, whereas it is low in Ahmadpur, Jalkot and Udgir Tehsil since Gram is rabbi crop and these tehsils do not have adequate soil moisture due to low rainfall farmers hesitate to or have not cable to sow Gram in these tehsils.

During the period under review low to moderate shift of Gram concentration is found in Deoni tehsil, whereas moderate to low concentration in Ahmadpur Tehsil, Moderate to high concentration shift of Gram is observed in Latur Tehsil, in the rest of Tehsils there is no change in Gram concentration [12]

The table -1 indicates that high degree of concentration of Jowar is recorded in AUSA and Chakur tehsil during 2020-21 due to suitable agro climatic soil condition. Furthermore Jowar is drought resistance crop. The moderate concentration of jowar is found in Renapur, Ahmadpur, Jalkot and Nilanga Tehsils While Low concentration is recorded in Latur, Shirul-Anpal, Udgir and Deoni tehsils because of fertile Soil and

irregularity of rainfall so most of the farmers of these tehsils refrain devote their land to Jowar.

Moderate concentration shift of Mung and Udid is observed in Jalkot due to development of surface irrigation facilities. The a change from moderate to low concentration shift is found in Latur tehsil due to high yielding variety of Mung and Udid whereas high concentration shift is found in Jalkot and AUSA ,Udgir, Jalkot tehsils. Moderate concentration shift is recorded in AUSA, Nilanga, Udgir and Nilanga, Deoni tehsils.

B. Crop Diversification Index:

The Crop Diversification Index (CDI) is a metric used in agriculture to assess the variety of crops grown within a specific area over a defined period. It provides valuable insights into the degree of diversification in agricultural practices, which is crucial for sustainable farming and food security [13]. The CDI is typically calculated by considering the distribution of cultivated land among different crop types or categories. A higher CDI indicates greater crop diversity, implying reduced dependence on a single crop and potentially mitigating risks associated with pests, diseases, and market fluctuation [14].

This index is particularly relevant in the context of promoting resilient agricultural systems, as it encourages farmers to adopt more diverse cropping patterns. Governments, policymakers, and agricultural organizations often use CDI as a tool for monitoring agricultural development, designing effective policies, and promoting sustainable farming practices [15]. Overall, the Crop Diversification Index serves as a valuable indicator of agricultural sustainability, resilience, and the capacity to adapt to changing environmental and market conditions [16].

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Table 1: Crop Diversification Index in Latur District: 2020-21

S. No	Tehsils	Soyabean	Sugarcane	Tur	Gram	Jowar	Mung	Udid	total percentage	total crop	Crop Diversification Index
1	Latur	13.12	31.83	2.73	19.88	9.72	5.19	2.82	79.74	5	15.948
2	Renapur	9.33	10.53	3.43	13.19	8.11	5.27	3.35	46.43	5	9.286
3	Ahmadpur	9.13	11.95	13.43	0.43	11.37	8.4	6.62	60.9	6	10.15
4	Jalkot	4.3	2.94	5.35	0.82	4.5	10.64	10.53	26.52	3	8.84
5	Chakur	10.26	3.89	11.11	8.96	11.84	5.35	3.79	47.42	5	9.484
6	Shirur A.pal	5.19	4.98	4.79	5.35	3.24	2.98	2.43	10.54	2	5.27
7	Ausa	17.74	14.8	16.6	26.2	23.58	21.07	29.33	149.32	7	21.331
8	Nilanga	15.75	7.63	18.68	17.24	15.64	18.79	18.17	111.9	7	15.986
9	Deoni	5.41	5.54	8.8	5.12	4.28	5.52	4.92	30.39	5	6.078
10	Udgir	9.73	5.87	15.03	2.75	7.67	16.75	71.59	126.64	6	21.107

Source: Completed by Researcher

The tehsil level analysis of crop diversification in Latur district reveals a unique pattern as compared to the district as a whole. Though the variation of the index values for 2020-21 is as has been noted earlier, the inter tehsil variations are quite significant. Based on index values, the tehsils has been grouped into high, medium and low diversification levels. Table 2 shows that the Areas of high diversification observed in Latur, Nilanga, Ausa and Udgir. Medium diversification was observed in Renapur, Chakur, Jalkot and Ahmadpur tehsils cropped 3 crops. Whereas areas of low diversification were found in, Shirul-Anantpal and Deoni tehsils are cropped only 4 crops [17] The crop diversification index for Latur district is 5.23 in 2020-21. Because the number of crops treated at all points of time has been changed. Therefore, the increase in the index value is directly related to a decrease in the area under a few crops at the cost of others. The crops that have become more profitable in due course of time with the introduction of high-yielding variety seeds and assured market through state trading and support prices have recorded considerable increases in their area [18].

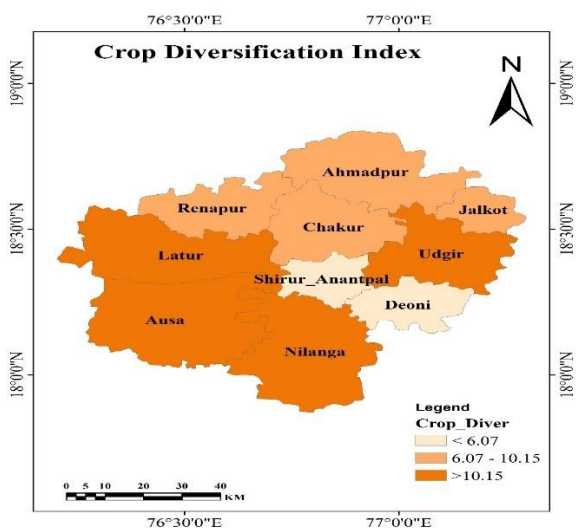
district the area bears the cultivation of Sugarcane throughout the district.

DECLARATION STATEMENT

Funding	No, I did not receive.
Conflicts of Interest	No conflicts of interest to the best of our knowledge.
Ethical Approval and Consent to Participate	No, the article does not require ethical approval and consent to participate with evidence.
Availability of Data and Material	Not relevant.
Authors Contributions	All authors having equal contribution for this article.

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Map: 2

VI. CONCLUSION

The cropping pattern of Latur district is Sugarcane oriented as Jowar is the main staple food of the district. A high concentration of Soyabean is found in all the blocks of the district. Although several crops like Soyabean, Sugarcane, Tur, Gram, Jowar, Mung, Udidi etc. are cultivated in the

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