~~Case study~~

GEOGRAPHICAL ANALYSIS OF CROP CONCENTRATION AND CROP DIVERSIFICATION OF THE DHULE DISTRICT IN THE ~~(~~MAHARASHTRA STATE, INDIA~~)~~

Abstract-

The study of crop concentration and crop diversification is an important factor of agriculture ~~region~~ of any region or ~~any~~ state. The ~~variations in the density of any crop in a region at a given point of time i~~variation in the density of any crop in a region at any given point of time is~~ts~~ known as crop concentration. The crop concentration of an area largely depends on~~: its~~ topography, climate, soil and local conditions. Each crop required a maximum, minimum and optimum temperature.[1] It has a tendency to have high concentration in the areas of ideal agro-climatic conditions and the density declines as the geographical conditions become less conducive. ~~It~~ This is because of the suitability of agro-climatic conditions~~ that c~~ for instance, cotton has a high concentration in the black earth region, ~~Wheat~~ wheat dominates in Punjab and Haryana, ~~Bajara~~ bajara in Rajasthan, ~~Sugarcane~~ sugarcane in Maharashtra and Utter Pradesh, ~~Tea~~ tea in Assam, and ~~Rice~~ rice is the leading crop in West Bengal, Orissa, Coastal Andhra Pradesh, Tamil Nadu and Kerala, Jute in West Bengal. ~~Delineation~~ The delineation of crop concentration regions helps in ascertaining the areas where a particular crop grows well even with the help of minimum inputs, and thus has great significance for agricultural development and planning.[2] ~~C~~crop ~~Diversification~~ diversification means a variety of crops involving intensity of composition among~~st~~ field crops for agriculture land. The crop diversification ~~in~~ is a structural form~~s~~ of agriculture such as cropping pattern, livestock, structure or agricultural enterprises.

Dhule district is an important agriculture district in Maharashtra~~.~~ where ~~Cotton~~cotton, ~~Bajara~~bajara, ~~Maize~~maize, ~~Gram~~gram, ~~Sugarcane~~sugarcane, ~~Jawar~~jawar and~~, O~~nion~~,~~ ~~has~~ are the major crop~~—~~types in the Dhule district. The cropping patterns, ~~crop concentration~~concentration and ~~–~~diversification play ~~on~~ important roles for agriculture planning and development. ~~Present~~ The present paper attempted an assessment ~~to~~ of the geographical analysis ~~to~~ of crop concentration and crop diversification in the Dhule district in period of 2020-2021.

~~(~~Keywords~~–:~~ Crop, ~~Agriculture~~agriculture, ~~Crop~~ crop ~~Concentration~~concentration, ~~Crop~~ crop ~~Diversification~~diversification, Percentage of Cropped Area.~~)~~

Introduction-

The meaning of crop concentration is spatial and temporal variations in the density of any crop in a region. The main objective of the study of crop concentration is to differentiate the area of high and low density of individual crop in a different part of study region. Each and every crop demands particular geographical condition. It has a tendency to have high concentrations in the areas of ideal agro- climatic conditions and the density declines as the geographical conditions become less conductive. The concept of ~~Crop~~ crop diversification is

Comment [B1]: Abstracts section are written without any citations. Take all these citations to the introduction.

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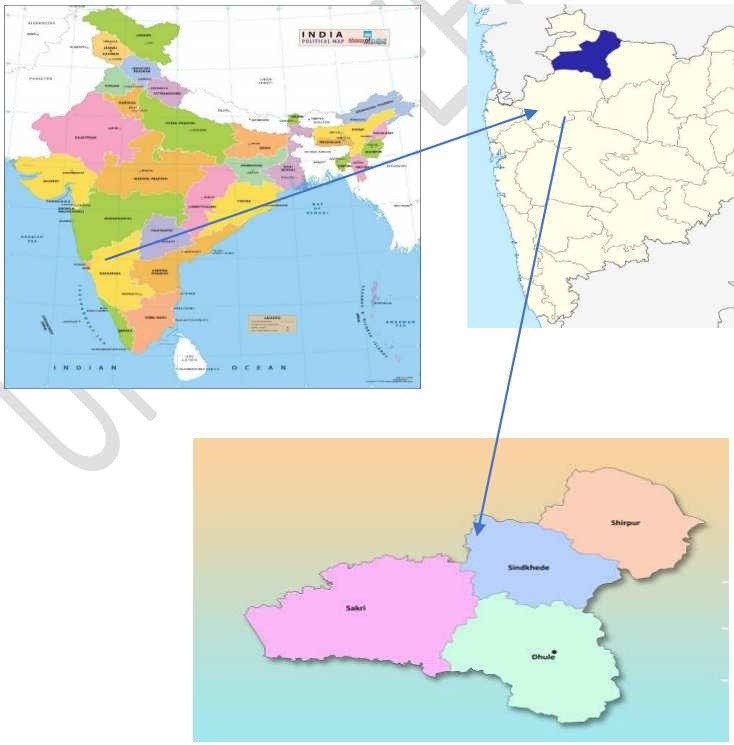
Comment [B2]: Rearrange the abstract taking majority of this write-up to the introduction. The abstract begins with a sentence stating the main problem statement, the main research objective, research methods, the results and recommendation in one single block paragraph of not more than 250 words.

~~a~~ opposite to crops concentration. Crop diversification means growing of a variety of crops in particular region. The greater number of crops led to greater competition, the higher is the magnitude of diversification and vice versa. The study of crop concentration and ~~crop~~ diversification has great significance from the agricultural development and planning point of view. The study ~~if crop concentration and crop diversification play on~~is also important ~~role~~ for agriculture development and future planning.

Study area-

Dhule district, has is important district in Maharashtra. The Dhule district is located between latitude 20^0 38' to 21^0 39" North of the Equator ~~latitude~~ and longitude $73^0$50" to 75^0 13" East ~~longitude~~ of the Greenwich Meridian. It covers a geographical area of 7195 ~~Sq.~~ Km^2 and a total population of ~~20,50,862~~ 2,050,862 as per the 2011 census. The population density of ~~population~~ the Dhule district is 254 persons per ~~sq.~~ km^2. There are 04 tahsil ~~were~~ included in the Dhule district. Satpura ranges presented to the north of the study area. Because of the 'Satpura' ranges Dhule district is separated from Madhya Pradesh state, while 'Satmala' ranges separate the district from western Maharashtra. ~~t~~The Dhule district is surrounded by Jalgaon district in the east, Madhya Pradesh state in north, Nashik district in the South, Nandurbar district and Gujarat State on the West as seen on Figure 1. The climate of the district is generally dry ~~expect~~ except during the monsoon season the average annual rainfall of the district as a whole is 544 mm.

Fig1: Map showing study location



Comment [B3]: The background should be integrated with literature from other parts of the world to guide this present study. The concepts of crop concentration and crop diversification should be well explain here as cited by other authors, the significance and at the end state the problem statement of this study.

Comment [B4]: How does climate affect crop concentration and diversification in the study area and what about the other parameters like topography and soil.

Comment [B5]: The title is vague as it failed to indicate the study area, the state and the country. The title should as well comes under and not above the map.

Objectives of the study

The analysis of this study is guided by the following objectives.

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

Comment [B6]: Indicate the name of the study area

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Data source and Methodology

This study is based on secondary data. The present study required statistical information ~~is~~ obtained from census handbook, the record of the local ~~bodies'~~ bodies, the Statistical Department of the Government of Maharashtra Region, the Meteorological Department as well as the socio-economic abstract of Dhule District ~~in~~ for the year 2020 and 2021. The collected data ~~was~~were processed, edited and analyzed ~~by~~ through the ~~applying~~ application of different statistical methods and ~~it's~~ the results presented in the form of ~~though tables~~Tables and ~~maps~~Figures.

For calculating crop concentration, the ~~by use~~ study made use of the Bhatia method ~~for~~ to determine the location quotient ~~may be~~as expressed ~~as under~~in the formula below:

$$Crop\ concentration\ of\ crop\ a = \frac{Area\ of\ crop\ a\ in the\ component\ areal\ unit}{Area\ of\ all\ crop\ in\ the\ component\ areal\ unit} / \frac{Area\ of\ crop\ a\ in the\ entire\ region}{Area\ of\ all\ crop\ in\ the\ entire\ region}$$

The crop concentration is grouped under four heads:

1) Very High Concentration (Above 2%)

2) High Concentration (1% to 2%)

3) Moderate Concentration (0.75% to 1%)

4) Low Concentrations (Below 0.75%)

For calculating crop diversification, ~~by uses of~~ the study use the Jasbir Singh's (1976) formula ~~is used as given below~~as presented below:

$$\text{Index of Crop diversification} = \frac{Percentage\ of\ total\ cropped\ area\ in\ N\ crop}{Number\ of\ N\ Crop}$$

Where 'n' crops are those, which individually occupy 5% or more of the total cropped area in tahsil

Results and discussions –

Crop concentration

Crop concentration means that, area under different crops, livestock or agricultural enterprises ~~when~~ are viewed together by superimposition which reveal areas wherein their regional concentrations do not overlap.[3] Crop concentration means the variations in the density moderate level of any crop in a region at a given point of time.

Comment [B7]: What are the link of concentration to the various factors stated in your introduction

a) **Wheat**:

Table ~~no~~ 2 indicates that, Shirpur (1.20), Sakri (1.20) and Shindhkheda (1.00) tahsil have recorded high degree crop concentration under ~~Wheat~~ wheat crop~~.~~ while moderate concentration (0.75% to 1%) was found in Dhule Tahsil has 0.65.

Comment [B8]: Where is the result presentation on table 1

b) Jowar:

Very High degree (above 2%) of Jowar concentration was found in Shirpur tahsil (2.15)~~,~~ while high degree (1 % to 2 %) of Jowar concentration was found in Dhule tahsil (1.02). ~~Modrate~~Moderate crop concentration was found in Shindhkheda Tahsil (0.92), and low concentrations (below 0.75%) ~~are~~ were recorded in sakri tahsil (0.02).

Table ~~no~~ 1 – Area under the crop

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Sr.no	Tahsil	Area under the crop								Total
		Wheat	Jawar	Bajara	Maize	Gram	sugarcane	Onion	Cotton	
1	Shirpur	14700	5126	6062	8595	8650	630	1000	65582	110
2	Shindhkheda	13505	2384	10970	11400	9236	943	2000	70107	120
3	Sakri	16212	54	24767	33515	10996	1165	20000	14854	121
4	Dhule	9661	2922	13567	16440	4575	13	12000	73914	133
	Total	54078	10486	55366	69950	33457	2751	35000	224457	485

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Source~~-~~: Socio-economic abstract (Dhule district, 2020-21)

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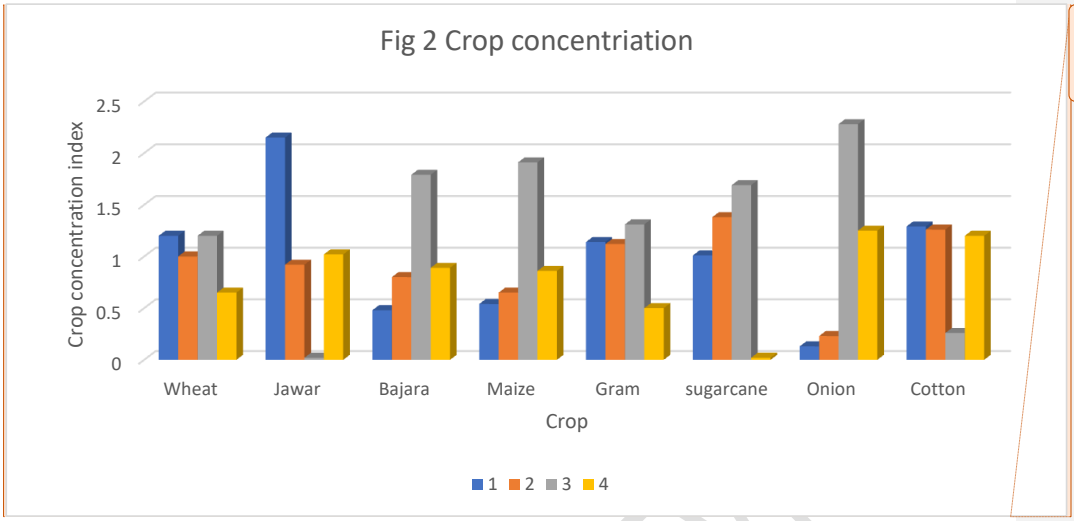
Table no 2 -Crop concentration of study region

Sr.no	Tahsil	Crop concentration							
		Wheat	Jawar	Bajara	Maize	Gram	sugarcane	Onion	Cotton
1	Shirpur	1.20	2.15	0.48	0.54	1.14	1.01	0.13	1.29
2	Shindhkheda	1.00	0.92	0.80	0.65	1.12	1.38	0.23	1.26
3	Sakri	1.20	0.02	1.79	1.91	1.31	1.69	2.28	0.26
4	Dhule	0.65	1.02	0.89	0.86	0.50	0.02	1.25	1.20

Source: Compiled by the Researcher



Comment [B9]: The title of a figure is written below the figure. The figure is not mentioned in the write-up and not interpreted.

c) Bajara:

High degree (1% to 2%) of Bajara crop concentration was found in Sakri tahsil (1.79), ~~otherwise~~ moderate degree (0.75 % to 1 %) of Bajara crop concentration was found in Dhule (0.89) and Shindhkheda (0.80) tahsil. While low concentration (below 0.75%) are recorded in Shirpur tahsil (0.48).

d) Maize:

The crop concentration ~~of maize~~of maize crop in Sakri tahsil has recorded ~~H~~high concentration ~~is~~ of 1.91~~.~~ ~~while~~ moderate degree of Maize crop concentration was found in Dhule tahsil (0.86)~~.~~ and low crop concentration was found in Shindhkheda tahsil (0.65), and Shirpur tahsil (0.54).

e) Gram:

The crop concentration of gram crop Sakri (1.31), Shirpur (1.14) and Shindhkheda tahsil (1.12) has recorded High concentration. ~~w~~While low degree of crop concentration was found in Dhule tahsil (0.50).

f) Sugarcane:

High degree (1% to 2%) of sugarcane crop concentration was found in Sakri (1.69), Shindhkheda (1.38) and Shirpur tahsil (1.01), otherwise low degree (below 0.75 %) of sugarcane crop concentration was found in Dhule (0.02).

g) Onion:

The crop concentration of onion crop Sakri tahsil has recorded very ~~H~~high concentration is 2.28. W~~w~~hile high degree of onion crop concentration was found in Dhule tahsil (1.25). ~~I~~Low crop concentration was found in Shindhkheda tahsil (0.23), and Shirpur tahsil (0.13).

h) Cotton:

Cotton is an important crop in the study region, the crop concentration of cotton crop in Shirpur (1.29), Shindhkheda (1.29) and Sakri tahsil (1.20) ~~has recorded~~are ~~H~~high ~~concentration.~~ , while low degree of cotton crop concentration was found in Sakri tahsil (0.26).

Comment [B10]: After explaining the degree of concentration of the different crops In the different regions, give the reasons why? That is where you bring in the aspects of climatic parameters, soil and topography that made it high, low or moderate.

Crop diversification-

Crop diversification is a concept~~,~~ which is opposite to crop concentration. crop diversification means a variety of crops involving intensity of composition amongst field crops for arable land. The diversification in structural forms of agriculture such as cropping pattern, structure or agricultural enterprises, explain why it is possible or necessary to raise a variety of these forms, which possess nearly or even proportion. Essentially, it is an indicator of multiplication of agricultural activities, which obviously involve intense competition among various activities for space.

Table ~~no~~ 3- Percentage area of cropped area

Sr.no	Tahsil	Percentage area of cropped area							
		Wheat	Jawar	Bajara	Maize	Gram	sugarcane	Onion	Cotton
1	Shirpur	13.32	4.64	5.49	7.79	7.83	0.57	0.91	59.52
2	Shindhkheda	11.20	1.97	9.10	9.45	7.66	0.78	1.65	58.15
3	Sakri	13.33	0.04	20.37	27.57	9.04	0.95	16.45	12.21
4	Dhule	7.25	2.19	10.19	12.35	3.43	0.009	9.01	55.53
	Total	11.13	2.15	11.40	14.40	6.89	0.56	7.20	46.22

Source: Compiled by the Researcher

Comment [B11]: Before presenting a table make sure you mention or introduce the table and interpret it to the readers.

Table ~~no~~ 4- Crop Diversification Index

Sr.no	Tahsil	No. of crop	% Area	Crop Diversification Index
1	Shirpur	05	93.95	18.79
2	Shindhkheda	05	95.56	19.11
3	Sakri	06	98.97	16.49
4	Dhule	05	94.33	18.86
	Total	06	97.24	19.44

Source: Compiled by the Researcher

Indices of crop diversification are calculated for the period ~~, i.e.,~~between 2020-2021. Table ~~No. 4~~ shows the indices of crop diversification, which are grouped into following four categories:

i) Areas of very high diversification (Below 14%)
ii) Areas of high diversification below (14% to 16%)
iii) Areas of moderate diversification (16% to 18%)
iv) Areas of low diversification (Above 18%)

The total crop diversification index of Dhule district is 19.44, it~~s~~ shows low diversification. Tahsil wise Areas of low crop diversification was found in Shindhkheda (19.11), Dhule (18.86) and Shirpur (18.79). W~~w~~hile the area of moderate crop diversification is observed in Sakri tahsil ~~its~~ with 16.49.

Comment [B12]: Link this to the various factors that have accounted for these low and moderate diversifications.

Conclusion-

It is concluded from the above study that crop concentration of Shirpur tahsil has recorded very high concentration of Jawar crop while Wheat, Gram, Sugarcane and Cotton crop has recorded high crop concentration. In Shindhkheda tahsil has recorded high crop concentration in Wheat, Gram, Sugarcane and Onion crop. Another crop has recorded moderate and low crop concentration. Sakri tahsil has recorded very high crop concentration of Onion crop on the other hand Wheat, Bajara, Maize, and Sugarcane crop recorded high crop concentration and Jawar, Cotton crop has recorded low concentration.in Dhule tahsil has Jawar, Onion and Cotton crop are recorded high concentration. Other crop like Wheat,

Bajara, Maize and gram has recorded moderate concentration. Thus Cotton, Gram, Wheat and Maize crop has recorded high or moderate crop concentration all tahsil of study region. Thus, eastern part of study region has highest concentration of cotton crop while western part has highest concentration of onion crop.

Crop diversification index of Dhule district is found low diversification. Shindhkheda, Dhule and Shirpur Tahsil has found low crop diversification. while in Sakri tahsil has found moderate crop diversification. Topography, climate, soil, market price and demand play important role on crop concentration and diversification in study region.

Comment [B13]: These factors have not come out clearly in your results on crop concentration and diversification.
What are the implication of these to the agricultural planning and sustainable development of the area
What are the way forward to ensure optimal crop output or yield in the area

References-

1) Hussain, M (1979) – Agricultural Geography, inter-indie Delhi P-45
2) Singh, Jasbir and S.S. Dhillan (1989): "Agricultural Geography" Tata Mc Graw Hill Publishing Co. Ltd. Delhi. P-218.
3) Govt.of India Dhule district census handbook 2011
4) Chouhan, T.S. (1987): Agricultural Geography; A case study of Rajshthan State, Academic Publication, Jaipur. p.258.
5) Socio-economic abstract of the Dhule District 2020-21 P-78 to 80
6) Government of Maharashtra- Gazetteer of Dhule district
7) www.dhule.nic.in