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A Geographical Analysis Of Spatio - Temporal Variation In Cropping Intensity & Concentration Of Irrigated Crops In Dhule & Nandurbar Districts (ms). Nandurbar Districts (ms).

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Abs tract:-*Cropping intensity means the ratio of Net Area Sown to the Gross Cropped Area. There are only two ways to satisfy the increasing food and other agricultural demands of country's rising population; either expanding the net area under cultivation or intensify cropping over the existing area. The net sown area of the country has risen by about 20 % since independence and has reached a point where it is not possible to make any appreciable increase. Thus; raising the cropping intensity is the only viable option left. Thus, higher cropping intensity means that a higher portion of the net area is being cropped more than once during one agriculture year. During triennium of 1991-93, the index of intensity of cropping for the study area as a whole is 107.65 per cent. Shirpur tahsil has the highest cropping intensity of 15.46 per cent, followed by Akkalkuwa 110.09 per cent and Taloda tahsil 110.39 per cent. During 2001–03, index of cropping intensity were 104.27 per cent. Shahada tahsil has the highest cropping intensity of 107.96 per cent, followed by Shindkheda tahsil 106.38 per cent and Shirpur tahsil 104.60 per cent. It shows declined in cropping intensity during investigation period. In general, higher the crop concentration index, higher is the level of interest in the production of that crop. Here only those irrigated crops have been analyse whose index value is 1.00 and more than 1.00 for the period of triennium 2001-03.*

Keyw ords:Cropping Intensity, Gross Cropped Area, Correlation, Irrigation

INTRODUCTION

The intensity of cropping means gross cropped area divided by net sown area may be assumed at that point where there is most advantageous combination of land, labour, capital and organisation. As the size of farm increase, decreases in area under net sown therefore cropping intensity cannot uniform in any agricultural region. It is control by various factors such as irrigation facilities, soil types, inputs capacity of farmers and types of crops. The concentration of individual crops is largely influenced by the degree of development, irrigation facilities and high yielding varieties of crops. An attempt is made here to review the changes occurred in the important crops by considering percentage occupancy strength of each crop and correlate irrigated area with hectarage in spatial distribution of that particular crop at tahsil level.

OBJECTIVES

to analyze of change in cropping intensity between the periods of 1991-93 to 2001-2003.
to identify pattern of crop concentration for major irrigated crops.

Hypothesis

As extent in area under net sown increases in intensity of cropping.

Source of Data and Methodology

This paper is entirely based on secondary data which has obtained from the Socio-economic abstract and government publications. For avoid seasonal fluctuation calculate triennium average of gross cropped area, net sown area and area under individual irrigated crops for the year 1991-93 and 2001-03.The collected data processed with the help of statistical methods and tahsil wise results are shown by different cartographic techniques.

Study area

Dhule and Nandurbar district lies between 20038' to 220 03' N and 73 0 47' to 75 0 11 'E, spreading over an area of 13,150 sq km, which is 4.3% to the state of Maharashtra. Dhule & Nandurbar district comprise ten tahsil namely Dhule, Sakri, Taloda, Shindkheda, Shirpur, Shahada, Nandurbar, Nawapur, Akkalkuwa and Akrani. The relief of the region has been grouped into four zones based on the basis of regional characteristics. The Satpura region, the Tapi valley, the Region of dykes and residual hills, the Sahyadri scarps. Tapi is the main river traversing through the central part of the study area. The highest temperature goes up to 45c in summer where as minimum temperature is observed up to16C in winter season. The average annual rainfall of the study area is 780 mm. The soil of this region is deep fertile soil to coarse shallow to stony soils away from the river either

northwards towards the Satpura or southwards towards the residual hills and dykes.As per the census of 2001, total population of the region was 30, 19,656. & as per 2011, were 3019656 people lives in this region.

Cropping Intensity, 1991-93 and 2001-03

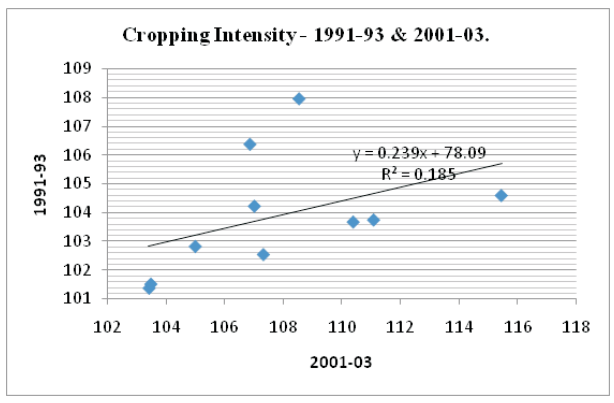
Cropping intensity may be the important parameter for assessment of net sown area and analysis of land use change. In order to obtain cropping intensity index following formula has been used.

$$\text{Cropping intensity} = \frac{\text{Gross cropped area (GCA)}}{\text{Net sown area (NSA)}} \times 100$$

Table 1Tahsil wise index of cropping intensity, 1991-93 and 2001-03

Tahsil	Index of Cropping Intensity						Volume of Change 1991-93 to 01-03
	1991-93			2001-03			
	Gross cropped Area	Net sown Area	Cropping Intensity	Gross cropped Area	Net sown Area	Cropping Intensity	
Dhule	122983	117137	104.99	117810	114567	102.83	- 2.16
Sakri	143150	133774	107.01	135717	130211	104.23	-2.78
Nawapur	47137	45583	103.41	52837	52117	101.38	- 2.03
Nandurbar	82094	76493	107.32	80422	78421	102.55	- 4.77
Taloda	25505	23105	110.39	24274	23413	103.68	-6.71
Akkalkuwa	39133	35227	111.09	38336	36950	103.75	-7.34
Akrani	18928	18293	103.47	18222	17949	101.52	-1.95
Shahada	90506	83386	108.54	84088	77887	107.96	-0.58
Shirpur	75389	65294	115.46	83777	80091	104.60	-10.86
Shindkheda	103429	96788	106.86	112019	105300	106.38	- 0.48
Total	748254	695080	107.65	747502	716906	104.27	-3.38
Correlation coefficient between cropping intensity 1991 -93 and 2001-03 = 0.43							

Compile By Researcher



Correlation coefficient between cropping intensity index of 1991-93 and cropping intensity index of 2001-03 has amounting r = + 0.43 and moderate linear correlation. The't'value for r = + 0.43 is 1.3471, which is lower than critical values of 1.86 and 2.31 at significant level. It means statistically H1 hypothesis is accepted. It shows resemblance in index of cropping intensity between 1991-93 and 2001-03.The values depicted in table no.1 shows in study area as a whole has cropping intensity index was 107.65 during triennium 1991-93 and 104.27 during triennium 2001-03.It is decreases by 3.38 per cent. In Shirpur (115.46 %), Taloda (110.39 %) and Akkalkuwa (111.09 %) has cropping intensity is more than 110 %.Medium cropping intensity represent by Sakri, Nawapur, Shahada and Shindkheda tahsil and low intensity shows by Dhule (104.99) Nawapur (103.41) and Akrani tahsils (103.47) during triennium 1991-93.During 2001-03, Shahada tahsil has maximum cropping intensity of 107.96 per cent followed by Shindkheda tahsil 106.38 per cent and 104.60 in Shirpur tahsil and minimum in Nawapur tahsil with 101.38 per cent. Taloda, Akkalkuwa and Shirpur has shown variation in cropping intensity.

Crop Concentration – 2001-03

In order to determine the regional crop concentration of crops, Bhatia (1965) used the following location quotient method may be expressed as given below,

$$\text{Index for determining Concentration of crop 'a'} = \frac{\text{Area of crop 'a' in the Component aerial unit}}{\text{Area of all crops in the Component aerial unit}} \div \frac{\text{Area of crop 'a' in the Entire country or region}}{\text{Area of all crops in the entire country or region}}$$

By applying the above technique, following result is obtained. In general, higher the crop concentration index, higher is the level of interest in the production of that crop. Here only those crops have been analyse whose index value is 1.00 and more than 1.00 for the period of triennium 2001-03.In *Dhule tahsil* during the study period, the five most concentrated crops are (a) Gram (b) Groundnut (c) Wheat (d) Chili and (e) Cotton. In *Sakri tahsil* observed (a) Rice (b) Wheat and (c) Gram. In *Nawapur tahsil* has a concentration of (a) Jowar (b) Groundnuts (c) Rice and (d) Maize. In Nandurbar tahsil only two crops concentrated such as (a) chili and (b) Gram. In *Taloda tahsil* reveals a concentration of (a) Sugarcane (b) Jowar (c) Rice and (d) Wheat. However, in *Akkalkuwa tahsil* (a) Rice (b) Jowar (C) Gram. In *Akrani tahsil* (a) Groundnut (b) Maize and (c) Jowar. In *Shahada tahsil* (a) Maize (b) cotton (C) Sugarcane. In the Shirpur tahsil (a) Sugarcane (b) Wheat (c) Cotton (d) Groundnut (e) Gram. In *Shindkheda tahsi*l (a) Gram (b) Cotton (c) Groundnut (d) Chili. Akrani tahsil has poorer concentration of irrigated crop. Sugarcane has concentrated only in Taloda and Shirpur tahsil.

Table 2 Crop Concentration Index, 2001-03

Tahsil	CropConcentration Index, 2001-03								
	Wheat	Rice	Maize	Jowar	Chilli	Sugarcane	Groundnut	Gram	Cotton
Dhule	**1.70**	0.00	0.17	0.45	**1.25**	0.34	**1.50**	**1.80**	**1.08**
Sakri	**2.20**	**3.67**	0.81	0.20	0.92	0.71	0.77	**1.37**	0.29
Nawapur	0.48	**1.83**	**1.42**	**2.88**	0.31	0.53	**2.03**	0.37	0.33
Nandurbar	0.50	0.00	0.00	0.91	**4.29**	0.55	0.11	**1.70**	0.33
Taloda	**1.00**	**2.17**	0.14	**2.49**	0.27	**3.76**	0.21	0.76	0.23
Akkalkuwa	0.40	**3.33**	**1.46**	**2.56**	0.17	0.04	0.46	**1.75**	0.15
Akrani	0.10	0.54	**1.78**	**1.13**	0.00	0.00	**5.34**	0.83	0.00
Shahada	0.44	0.12	**1.54**	0.46	0.90	**1.04**	0.14	0.56	**1.59**
Shirpur	**1.64**	0.00	0.21	0.63	0.98	**2.29**	**1.32**	**1.00**	**1.38**
Shindkheda	0.93	0.00	0.07	0.39	**1.40**	0.12	**1.45**	**2.06**	**1.63**

(Compiled by researcher)

In general, higher the crop concentration index, higher is the level of interest in the production of that crop. Here only those crops have been analysing whose index value is 1.00 and more than 1.00 for the period of triennium 2001-03.As per values shown in table 2 suggest that concentration of few major irrigated crops has been observed and discusses crop wise in below;

A)Wheat: Considerable concentration of wheat crop has been seen in Dhule (1.70), Taloda (1.00), Sakri (2.20) and Shirpur tahsil (1.64) tahsil.
B)Rice: In Sakri (3.67), Nawapur (1.83), Taloda (2.17) and Akkalkuwa (3.33).
C)Maize: Nawapur (1.42), Akkalkuwa (1.46), Akrani (1.78) and Shahada (1.54)
D) Jowar: Nawapur (2.88), Taloda (2.49), Akkalkuwa (2.56) and Akrani (1.13)
E)Chilli: Dhule (1.25), Nandurbar (4.29), Shindkheda (1.40)
F)Sugarcane: Taloda (3.76), Shahada (1.04) and Shirpur (2.29)
G)Groundnut: Dhule (1.50), Nawapur (2.03), Akrani (5.34), Shirpur (1.32), Shindkheda (1.45).
H)Gram: Dhule (1.80), Sakri (1.37), Nandurbar (1.70), Akkalkuwa (1.75), Shirpur (1.00) and Shindkheda (2.06)
I)Cotton: Dhule (1.08), Shahada (1.59), Shirpur (1.38), Shindkheda (1.0)

CONCLUSION –

In the district efforts are made to find out the spatial and temporal variations in net sown area. During investigation, index of cropping intensity varies between 100 to 110.And slightly increase and decrease in index of cropping intensity among all tahsil during investigation period. Akkalkuwa, Shahada, Taloda and Shirpur tahsils have fertile soils, assured rainfall and irrigation facilities. Hence farmers have taken rabbi crop and areal extension in area under cotton crop.In Dhule tahsil during the study period, the five most concentrated crops are (a) Gram (b) Groundnut (c) Wheat (d) Chili and (e) Cotton. In Sakri tahsil observed (a) Rice (b) Wheat and (c) Gram. In Nawapur tahsil has a concentration of (a) Jowar (b) Groundnuts (c) Rice and (d) Maize. In Nandurbar tahsil only two crops concentrated such as (a) chili and (b) Gram. In Taloda tahsil reveals a concentration of (a) Sugarcane (b) Jowar (c) Rice and (d) Wheat. However, in Akkalkuwa tahsil (a) Rice (b) Jowar (C) Gram. In Akrani tahsil (a) Groundnut (b) Maize and (c) Jowar. In Shahada tahsil (a) Maize (b) cotton (C) Sugarcane. In the Shirpur tahsil (a) Sugarcane (b) Wheat (c) Cotton (d) Groundnut (e) Gram. In Shindkheda tahsil (a) Gram (b) Cotton (c) Groundnut (d) Chili. Akrani tahsil has poorer concentration of irrigated crop. Sugarcane an irrigated crop concentrated found only in Taloda and Shirpur tahsil. Other tahsil has negligible crop concentration in the context of sugarcane. It has happened due to decline in area under irrigation, decline in underground water, drought, absence of canal irrigation and poorer source of well and bore well irrigation.

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