

Indian Journal of Modern Research and Reviews

This Journal is a member of the '**Committee on Publication Ethics**'

Online ISSN:2584-184X



Research Article

Agricultural Regionalization Through Measurement of Crop Concentration In Sri Ganganagar District, Rajasthan

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DOI: <https://doi.org/10.5281/zenodo.23219107>

Abstract

The present study attempts to analyze some important characteristics of the agricultural regionalization system by measuring crop concentration in the command area of Ganganagar in northwestern Rajasthan. Crop concentration is a significant indicator of the prevailing cropping pattern in any geographical unit and is therefore a major determinant of the agricultural economy. Similarly, cropping intensity is also an important indicator of agricultural development. Agricultural efficiency explains the yield per unit area of land and is thus a crucial characteristic of the agricultural system. Analysis of the data reveals that the cultivation of wheat, gram, mustard, and cotton is dominant in the Ganganagar region, showing a high level of concentration. Canal irrigation and good soil quality in the district facilitate the cultivation of three seasonal crops – Rabi, Kharif, and Zaid – throughout the year. Several crops such as wheat, rice, maize, gram, mustard, sugarcane, and various vegetables are grown. While some crops are highly concentrated, others are less so. Due to the dominance of certain crops, several other crops are grown simultaneously in the same season. Considering these characteristics of agricultural activities in Ganganagar district, we have studied the crop concentration of three major crops – wheat, gram, mustard, and cotton – which reveals that: I - Wheat, gram, mustard, and cotton are produced abundantly in all parts of the district; II - Wheat, a food grain crop, is produced in all parts of the district; III - The concentration of wheat, gram, mustard, and cotton is at a high level in the study area.

Manuscript Information

- ISSN No: 2584-184X
- Received: 01-01-2026
- Accepted: 30-06-2026
- Published: 10-07-2026
- MRR:4(SP1); 2026: 277-288
- ©2026, All Rights Reserved
- Plagiarism Checked: Yes
- Peer Review Process: Yes

How to Cite this Article

Kumar R, Pal R. Agricultural Regionalization Through Measurement of Crop Concentration in Sri Ganganagar District, Rajasthan. Indian J Mod Res Rev. 2026;4(SP1):277-288.

Access this Article Online



www.mrrjournal.in

KEYWORDS: Agricultural Regionalisation; Crop Concentration; Cropping Pattern; Canal Irrigation; Sri Ganganagar District.

I. INTRODUCTION

"Crop concentration specifically refers to the concentration or density of crop in any area or region." Crop, animal and agricultural-industrial concentration mean to find region clearly dominated by that particular crop without overlapping for example paddy region of eastern India and cotton region of black soil. Higher the crop concentration index denotes more interest of farmer to grow the crop. Spatial diversity (variations) of crop concentration quantity is mainly due to the various physical and socio-economic factors like relief, soil, water, money and also technology. Various qualitative and quantitative techniques and methods are used to calculate the crop concentration. In these quantitative are more appreciated and useful. Some important method is as –

I – First Method-

Location Quotient method of Florence, 1948

In this method location quotient or locational coefficient is used to calculate the crop concentration.

Formula used is as –

$$\frac{Ec}{En} \div \frac{Tc}{Tn} \quad \text{or} \quad \frac{Ec}{En} \div \frac{Tc}{Tn}$$

Where – E_c = Area of the crop in any state or region.

E_n = Area of the crop in the country.

$$\text{Concentration of 'A' crop} = \frac{\text{Area of 'A' crop in regional unit}}{\text{Area of all crops in regional unit}} \div \frac{\text{Area of 'A' crop in the country}}{\text{Area of all crops in the country}}$$

Area of all crops in regional unit Area of all crops in the country

Area of 'A' crop in the country

IV– Fourth Method

Jasbir Singh's Method, 1976

To calculate crop concentration in the country Jasbir Singh, 1976 used this formula. He suggested to use only food crops like Wheat, Rice, Maize, Sugarcane, Jwar and black gram only.

Formula –

$$c = \frac{Pae}{Par} \quad \text{ci} = \frac{Pae}{Par} \times 100$$

Where - C = Crop concentration

Ci = Crop concentration exponent

T_c = Area under all crops in that state or region.

T_n = Area under all crops in the country.

This method is very simple to use but results remains vague as many other factors are also reflect the crop concentration in any area or region except area of that crop.

II – Second Method-

Chisholm's Method, 1962

Method of crop concentration used by Florence further modified Chisholm in 1962. He modified the formula as –

$$\frac{Ec}{En} - \frac{Tc}{Tn}$$

These difference either may be positive or negative. By adding this positive and negative amount severally and dividing them by 100, which can get a coefficient range between 0 to 1.

III – Third Method-

Bhatia's Method, 1965

Bhatia in 1965 used location quotient method to calculate crop concentration.

Formula –

P_{ae} = Percentage of 'A' crop in the cropped area in region or unit.

P_{ar} = Percentage of 'A' crop in the cropped area in country.

Agricultural Region – "It is the part of the land having similarities in the crops it keeps visible variation from nearby region." Region can be easily identified with the help of agricultural regions, but it is very difficult to set its fixed boundary.

In Ganganagar district agricultural regionalization have been done by crop concentration method. This method is used mainly in those regions where life-solidarity agriculture is more common, where most crops are produced to fulfill the daily food needs of the farmers. Here agricultural regions mainly demarcated with the help of ranking and merit of the crops. Indian geographers more dominantly used the food crops for such practices. Here more importance has given to food crops while role of meat, animal husbandry, milk production, poultry considered less important or negligible. This approach was mainly adopted by P.Sen Gupta, S.S. Bhatia, N.P. Ayyar, Prof.

Jasbir Singh, M.F. Siddique all had used crop concentration method for agricultural regionalization. In the study area largest proportion of land is put to agricultural purpose.

Study Area-

Ganganagar district is located in northern part of Rajasthan between $28^{\circ}4'$ to $36^{\circ}6'$ North latitude and $72^{\circ}30'$ to $74^{\circ}16'$ East longitudes and covers about an of 11154.66 sq. K.M. Which is about 3.26 percent of total state area. The district is

bound in north by the state Punjab and in the south, it is bordered by Bikaner district. Its eastern boundary is demarcated by Hanumangarh district. The northern and western boundaries of district are marked by the eastern boundary of Pakistan. At present for the purpose of administration, the district is divided into five sub-divisions and nine tehsils. fig-01

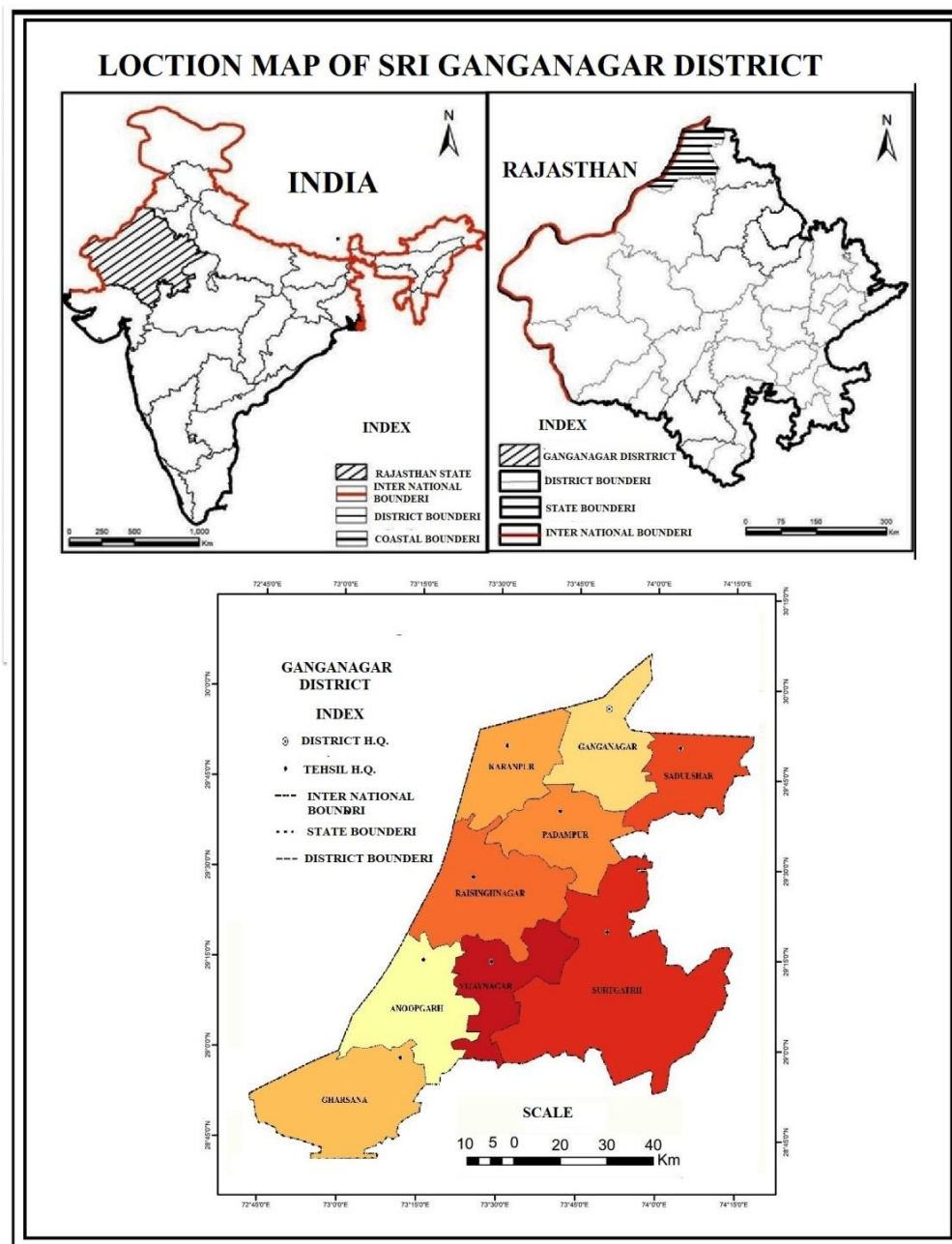


Fig 1

1- OBJECTIVE

- To analyze the cropping pattern of the main crops, wheat, gram, mustard, and cotton in Ganganagar district.
- To analyze crop concentration in Ganganagar district.
- To explain the imbalances in agricultural development through agricultural regionalization using the crop concentration method.

2. Date and Methodology –

This study will utilize secondary data. In this context,

secondary data was collected from the District Statistical Handbook, the Irrigation Department, and private bodies at the tehsil level.

METHODOLOGY

Both qualitative and quantitative techniques and methods are used to calculate crop concentration. Quantitative methods are more precise and reliable, and therefore, they are more widely used. In this research paper, Bhatia's method (1965, pp. 39-56) has been used to calculate crop concentration in the study area.

Formula used is –

$$\text{Index for crop Concentration of crop 'A'} = \frac{\text{Area of crop 'A' in the areal unit}}{\text{Area of all crops in the areal unit}} \div \frac{\text{Area of crop 'A' in the district}}{\text{Area of all crops in the district}}$$

In these spatial values are denoted on the map and crop distribution can be easily compared on similar scale. Regions of

crops, animals and agricultural industries can be identified easily by this method. Result and Discussion.

Table – 1

S. N.	Name of Tehsils	Wheat crop concentration 2012			Wheat crop concentration 2022		
		Net irrigated area	Wheat area in hectares	Wheat crop concentration	Net irrigated area	Wheat area in hectares	Wheat crop concentration
1	Ganganagar	82487	37496	1.48	83544	35204	1.67
2	Karanpur	68917	19764	0.93	71774	19508	1.08
3	Padampur	74866	21672	0.94	75441	20475	1.08
4	Raisinghnagar	112682	27379	0.97	115181	22353	0.77
5	Anoopgarh	75328	28990	1.25	74875	17906	0.95
6	Gharsana	61815	20722	1.09	64201	5740	0.42
7	Vijaynagar	51941	22717	1.42	56880	21697	1.51
8	Suratgarh	174672	36403	0.67	175281	40562	0.92
9	Sadulshahar	67202	20932	1.01	68110	15620	0.91
		769910	236075	1.77	785287	199065	1.21

Source: District Statistics Department, Ganganagar.

Table – 2

S. N.	Name of Tehsils	Gram crop concentration 2012			Gram crop concentration 2022		
		Net irrigated area	Wheat area in hectares	Wheat crop concentration	Net irrigated area	Net irrigated area	Wheat area in hectares
1	Ganganagar	83544	2005	0.71	82487	1617	0.14
2	Karanpur	71774	3157	1.29	68917	5683	0.61
3	Padampur	75441	3261	1.27	74866	9935	0.98
4	Raisinghnagar	115181	5204	1.33	112682	29638	1.94
5	Anoopgarh	74875	1496	0.58	75328	6289	0.61
6	Gharsana	64201	2226	1.07	61815	7423	0.88
7	Vijaynagar	56880	743	0.38	51941	5033	0.71
8	Suratgarh	175281	5845	0.98	174672	31912	1.35
9	Sadulshahar	68110	2677	1.15	67202	6462	0.71
		785287	26614	1.03	769910	103992	0.99

Source: District Statistics Department, Ganganagar.

Table – 3

S. N.	Name of Tehsils	Mustard crop concentration 2012			Mustard crop concentration 2022		
		Net irrigated area	Wheat area in hectares	Wheat crop concentration	Net irrigated area	Net irrigated area	Wheat area in hectares
1	Ganganagar	83544	28860	0.71	82487	34737	1.15
2	Karanpur	71774	31775	0.91	68917	36517	1.44
3	Padampur	75441	33221	0.9	74866	34629	1.26
4	Raisinghnagar	115181	58553	1.05	112682	48492	1.17
5	Anoopgarh	74875	47898	1.32	75328	32748	1.18
6	Gharsana	64201	47874	1.53	61815	26640	1.17
7	Vijaynagar	56880	28868	1.04	51941	18090	0.95
8	Suratgarh	175281	62292	0.73	174672	17459	0.27
9	Sadulshahar	68110	40747	1.23	67202	32096	1.3
		785287	380088	0.97	769910	281408	1.24

Source: District Statistics Department, Ganganagar.

Table – 4

S. N.	Name of Tehsils	Cotton crop concentration 2012			Cotton crop concentration 2022		
		Net irrigated area	Wheat area in hectares	Wheat crop concentration	Net irrigated area	Net irrigated area	Wheat area in hectares
1	Ganganagar	82544	28249	1.42	82487	23566	2.25
2	Karanpur	71774	14163	0.82	68917	8904	1.02
3	Padampur	75441	16736	0.93	74866	11259	1.18
4	Raisinghnagar	105181	22024	0.8	112682	10154	0.71
5	Anoopgarh	64875	20592	1.15	75328	5316	0.55
6	Gharsana	64201	6634	0.52	61815	15389	1.96
7	Vijaynagar	46880	24198	1.78	51941	14820	2.25
8	Suratgarh	105281	42088	1	174672	1006	0.04
9	Sadulshahar	65110	12232	0.75	67202	6948	0.81
		681287	186916	1.02	769910	97362	1.12

Source: District Statistics Department, Ganganagar.

DISCUSSION

Wheat Crop Concentration

1. High Crop Concentration > 1.30

The study area falls under the high category for food grain crops due to being irrigated by a canal irrigation system. In the district, high wheat concentration was recorded in two tehsils, Ganganagar and Vijayanagar, in the years 2012 and 2022, with a concentration exceeding 1.30. The high wheat concentration in these tehsils is attributed to the regular irrigation flow and the presence of the Ghaggar river basin in the area.

2. Medium Crop Concentration > 1.00 to 1.30

In 2012, medium crop concentration was recorded in six tehsils of the district: Karanpur, Padampur, Raisinghnagar, Anoopgarh, Gharsana, and Sadulshahar. In 2022, medium crop concentration was found only in Karanpur and Padampur.

3. Low crop concentration > 1.00 to 1.30 (low)

In the study area, only one tehsil, Suratgarh, had a low concentration of less than 1, while in 2022, low-category concentrations were recorded in five tehsils of the region: Raisinghnagar, Anoopgarh, Gharsana, Suratgarh, and Sadulshahar.

Crop concentration of Gram

1. High Crop Concentration > 1.30

In the district, high chickpea concentration (above 1.30) was recorded in only one tehsil, Raisinghnagar, in both 2012 and 2022. However, in 2022, high chickpea concentration was found in both Raisinghnagar and Suratgarh tehsils.

2. Medium Crop Concentration > 1.00 to 1.30

In 2012, medium crop concentration was recorded in four tehsils of the district: Karanpur, Padampur, Gharsana, and Sadulshahar. However, in 2022, no tehsil recorded a medium crop concentration.

Table – 5

S. N.	Wheat Crop Concentration	Crop Concentration 2012		
		Category	No. of Tehsils	Name of tehsils
1	> 1.30	High	2	Ganganagar, Vijaynagar
2	1.00 to 1.30	Medium	6	Karanpur, Padampur, Raisinghnagar, Anoopgarh, Ghadsana, Sadulshahar
3	< 1.00	Low	1	Suratgarh
S. N.	Gram Crop Concentration	Crop Concentration 2022		
		Category	No. of Tehsils	Name of tehsils
1	> 1.30	High	2	Ganganagar, Vijaynagar
2	1.00 to 1.30	Medium	2	Karanpur, Padampur
3	< 1.00	Low	5	Raisinghnagar, Anoopgarh, Ghadsana, Sadulshahar, Suratgarh
S. N.	Mustard Crop Concentration	Crop Concentration 2012		
		Category	No. of Tehsils	Name of tehsils
1	> 1.30	High	1	Raisinghnagar
2	1.00 to 1.30	Medium	4	Karanpur, Padampur, Ghadsana, Sadulshahar
3	< 1.00	Low	4	Anoopgarh, Ganganagar, Vijaynagar, Suratgarh
S. N.	Cotton Crop Concentration	Crop Concentration 2022		
		Category	No. of Tehsils	Name of tehsils
1	> 1.30	High	2	Raisinghnagar, Suratgarh
2	1.00 to 1.30	Medium	0	-
3	< 1.00	Low	7	Anoopgarh, Ghadsana, Sadulshahar, Ganganagar, Vijaynagar, Karanpur, Padampur

3. Low Crop Concentration < 1.00 to 1.30

In the study area, low chickpea crop concentration was recorded in three tehsils of the district in 2012: Ganganagar, Anoopgarh, and Vijaynagar. In 2022, low concentration was found

Mustard Crop Concentration

1. High Crop Concentration > 1.30

In 2012, two tehsils in the district, Anoopgarh and Gharsana, had a high mustard crop concentration of more than 1.30, while in 2022, high concentration was recorded in Karanpur and Sadulshahar.

2. Medium Crop Concentration > 1.00 to 1.30

Medium concentration of mustard was recorded in Karanpur, Anoopgarh, Vijaynagar, and Suratgarh in 2012, while in 2022, medium concentration was recorded in five tehsils: Ganganagar, Padampur, Raisinghnagar, Anoopgarh, and Padampur.

3. Low Crop Concentration < 1.00 to 1.30

In the study area, four tehsils—Ganganagar, Karanpur, Padampur, and Suratgarh—had low concentration in 2012, while in 2022, low concentration was found in two tehsils: Vijaynagar and Suratgarh.

Cotton Crop Concentration

1. High Crop Concentration > 1.30

Due to the high irrigation provided by the canal irrigation system in the study area, cotton cultivation yields high production. In 2012, the cotton concentration in Ganganagar and Vijaynagar was recorded in the high category, exceeding 1.30. In 2022, high concentration was found in Ganganagar, Gharsana, and Vijaynagar.

3. Medium Crop Concentration > 1.00 to 1.30

In 2012, medium-category cotton concentration was recorded in only one tehsil, Anoopgarh. In 2022, medium cotton crop concentration was recorded in Karanpur and Padampur tehsils.

4. Low Crop Concentration < 1.00 to 1.30

In the research area, only six tehsils—Suratgarh, Karanpur, Padampur, Raisinghnagar, Gharsana, and Sadulshahar—had a low concentration of less than 1. In 2022, low-category cotton crop concentration was recorded in five tehsils of the region: Raisinghnagar, Anoopgarh, Suratgarh, and Sadulshahar. the study area, crop concentration depends on canal irrigation flow and the irregularity and uncertainty of rainfall. Farmers choose

their crops based on these conditions and do not take risks with other crops. The irregular flow of irrigation water in the district has led to a decrease in cotton cultivation, causing farmers to opt for crops like mung beans, guar, and other alternatives. The physiography, climatic conditions and soils are very conducive

for growing crops like Wheat, Barley, Garm, Mustard, Tamira and Castor, Gwar, Bajra, Green Gram, Groundnut, Cotton, Sesame, Flax, Other Kharif & Other Rabi.

Table – 6

S. N.	Wheat Crop Concentration	Crop Concentration 2012		
		Category	No. of Tehsils	Name of tehsils
1	> 1.30	High	2	Anoopgarh, Ghadsana
2	1.00 to 1.30	Medium	3	Raisinghnagar, Vijaynagar, Sadulshahar
3	< 1.00	Low	4	Suratgarh, Padampur, Ganganagar, Karanpur
S. N.	Gram Crop Concentration	Crop Concentration 2022		
		Category	No. of Tehsils	Name of tehsils
1	> 1.30	High	2	Karanpur, Sadulshahar
2	1.00 to 1.30	Medium	5	Padampur, Ganganagar, Raisinghnagar, Anoopgarh, Ghadsana
3	< 1.00	Low	2	Ghadsana,, Suratgarh
S. N.	Mustard Crop Concentration	Crop Concentration 2012		
		Category	No. of Tehsils	Name of tehsils
1	> 1.30	High	2	Ganganagar, Vijaynagar
2	1.00 to 1.30	Medium	1	Anoopgarh
3	< 1.00	Low	6	Raisinghnagar, Karanpur, Padampur, Suratgarh, Sadulshahar, Ghadsana
S. N.	Cotton Crop Concentration	Crop Concentration 2022		
		Category	No. of Tehsils	Name of tehsils
1	> 1.30	High	3	Ganganagar, Ghadsana, Vijaynagar
2	1.00 to 1.30	Medium	2	Karanpur, Padampur
3	< 1.00	Low	4	Raisinghnagar, Anoopgarh, Suratgarh, Sadulshahar

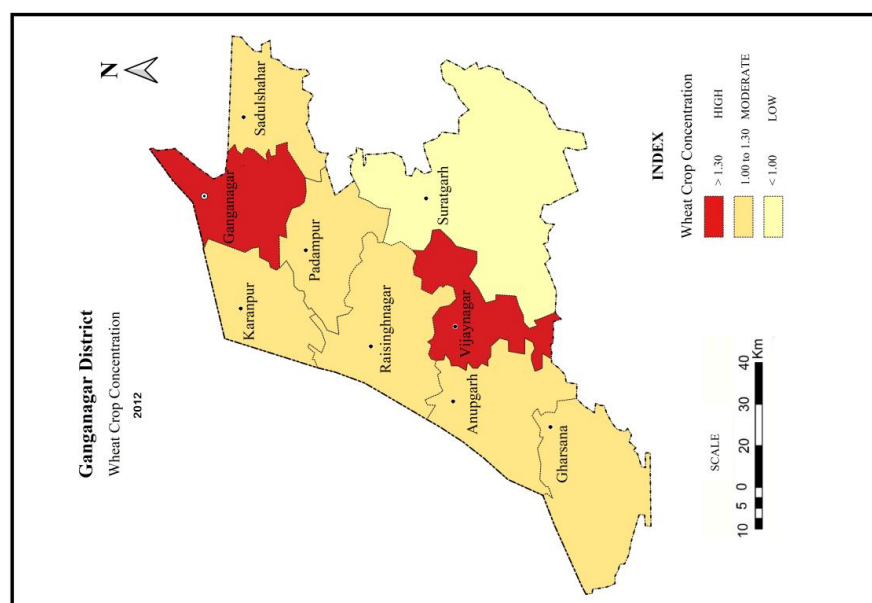


fig 1-2

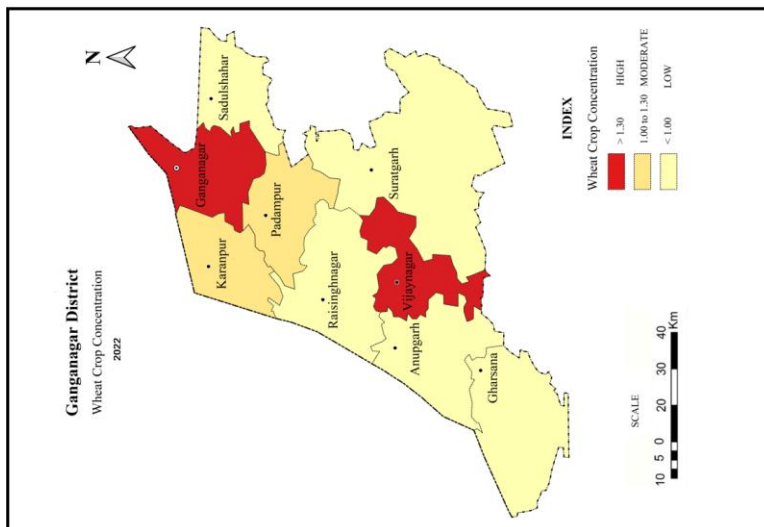


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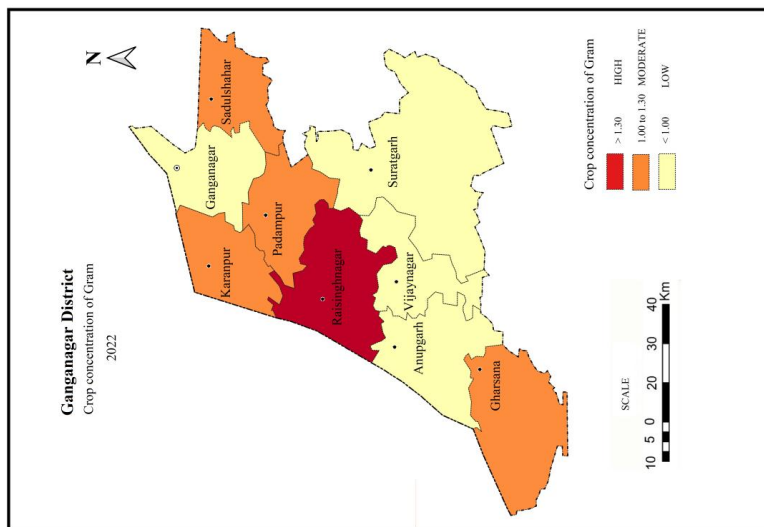


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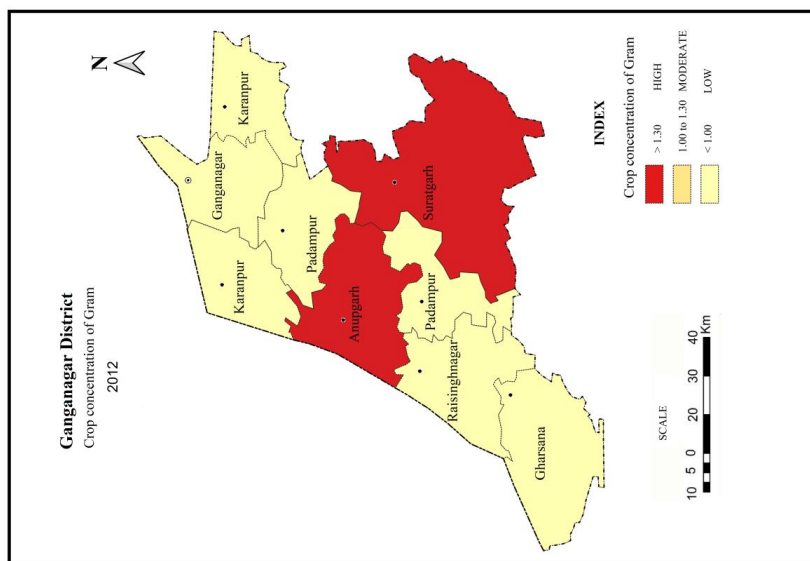


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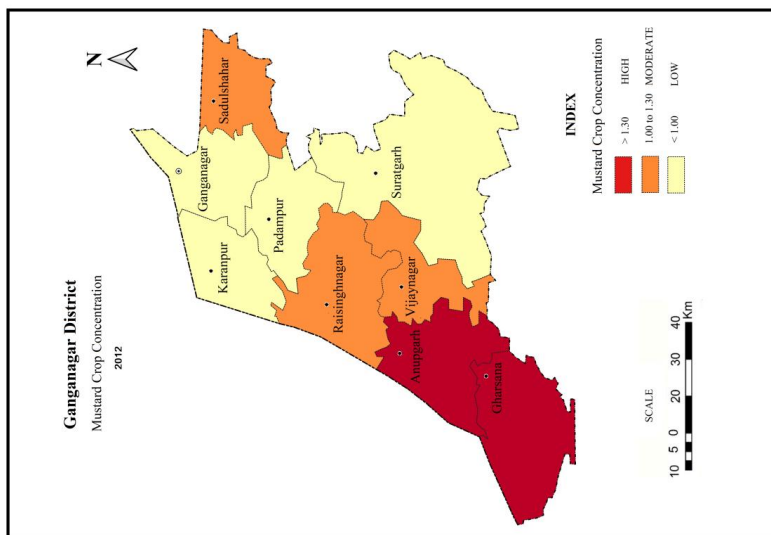


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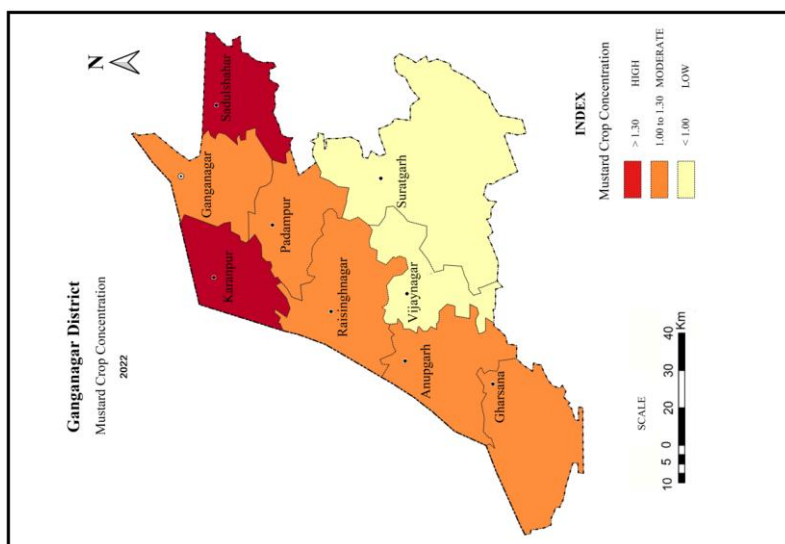


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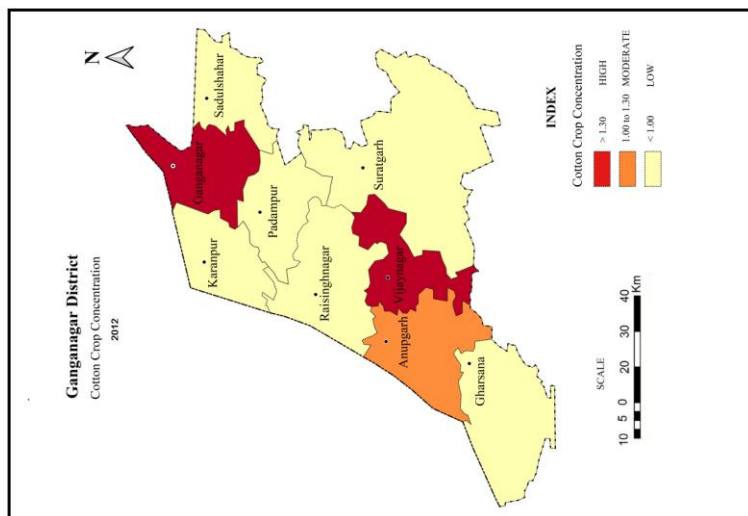


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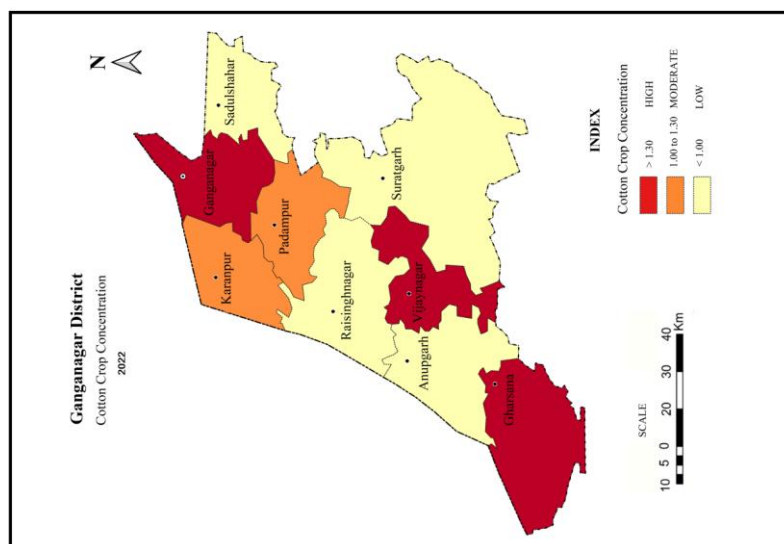


fig 1-9

CONCLUSION

A study of crop concentration by tehsil in the district reveals that some crops have a higher crop concentration index, resulting in higher production of those crops and consequently lower production of other crops. For example, in Ganganagar and Vijaynagar, the wheat crop concentration index was found to be the highest, exceeding 2 in 2022. Therefore, wheat is cultivated in large quantities during the Rabi season and cotton during the Kharif season in these areas, while other crops are grown in smaller quantities. Similarly, in other tehsils, other crops have the highest concentration index, leading to higher production of these main crops and lower production of others. Crop concentration in the region depends on canal irrigation flow, temperature, excessive rainfall, frost, hailstorms, and the irregularity and uncertainty of rainfall. Farmers choose their crops based on these conditions and do not risk cultivate other crops in their fields. The study area is entirely dependent on canal irrigation water. The irregular flow of irrigation water in the district has led to a decrease in the concentration of crops like cotton and sugarcane.

REFERENCES

1. Khinchi SS. Impact of climate on agricultural environment of North-East India: problems and prospects. In: Khinchi SS, Tanwar M, editors. *Global Climate Change and Biodiversity*. New Delhi: VL Media Solutions; 2015. doi:10.2139/ssrn.5028496.
2. Khan S, Yadav S, Singh V, Khinchi SS. Land use change and agro-climatic interactions. In: Kumar P, Aishwarya, editors. *Technological Approaches for Climate Smart Agriculture*. Cham: Springer; 2024. doi:10.1007/978-3-031-52708-1_17.
3. Khinchi SS, Kumar A. Study on the agricultural landscape of possible opportunities and imbalances for the advancement of agriculture in the Jhunjhunu district of Rajasthan, India. *Indian J Sci Technol*. 2024;17(47):4966-74. doi:10.17485/IJST/v17i47.3531.
4. Khinchi SS. Impact of agricultural land use changes on economic and social development. *J Namibian Stud*. 2023. doi:10.3390/IJERPH20054251.
5. Khinchi SS. Issues in agriculture and development [Internet]. 2020 Feb 10 [cited 2026 Oct 7]. Available from: SSRN. doi:10.2139/ssrn.5063911.
6. Khinchi SS, Meena P. Land use pattern in Sawai Madhopur district of Rajasthan (India): a comparative analysis (from 2010-11 to 2019-20) [Internet]. 2022 Jul 11 [cited 2026 Oct 7]. doi:10.2139/ssrn.5001171.
7. Kumar R. Land use and cropping pattern in Gharsana Tehsil. *IC-IRSTM*. 2019;20(Special Issue 04). Conference proceedings; 2019 Apr.
8. Kumar R. Changing land use pattern in District Ganganagar. *IC-SRETPM*. 2019;20(Special Issue 06). Conference proceedings; 2019 Jun.
9. Kumar R. Impact of irrigation development on cropping intensity in Ganganagar district, Rajasthan. *JETIR*. 2019;6(4):64-8.
10. Kumar R. Patterns of crop concentration, crop diversification and crop combination in Ganganagar district, Rajasthan. *IC-IRSTM*. 2019;20(Special Issue). Conference proceedings; 2019 Apr.

11. Kumar R, Rafeek M. A study of crop combination regions in the districts Ganganagar and Hanumangarh: a geographical analysis. *Remarking An Analisation*. 2019;4(1 Part 1):E99-E103.
12. Kumar R, Parkash S. Crop concentration, cropping intensity and agricultural efficiency in command area in Rajasthan. *AJEE*. 2021;6(11).
13. Kumar R, Mishra N. Relevance of ancient education system in 21st century. *Int J Econ Perspect*. 2020;14(1):53-62.
14. Kumar R, Mishra N. Urban planning in India and future approach. *J Asiatic Soc Mumbai*. 2021;95(12 Pt III):108-16.
15. Kumar R, Subhash. Agricultural productivity of food grains in Sri Ganganagar district. *Shodhhritu*. 2021;6(26).
16. Kumar R, Dayaram. Changing pattern of irrigated area according to resources in Hanumangarh district: a geographical analysis. *Int Res J Humanit Interdiscip Stud*. 2021;Special Issue May.
17. Tiwari RC, Singh BN. *Agricultural Geography*. Allahabad: Prayag Pustak Bhawan; 2007.
18. Bhatia SS. Pattern of crop concentration and diversification in India. *Econ Geogr*. 1965;41:39-56.
19. Chisholm M. Problems in the classification and use of farming type regions. *Trans Inst Br Geogr*. 1954;25.
20. Singh J. Spatio-temporal development in land use efficiency in Haryana State. *Geogr Rev India*. 1972;34(4).
21. Tiwari RC. *Geography of India*. Allahabad: Prayag Pustak Bhawan.

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