

A Geographical Study of Agricultural Regionalization in Jashpur District of Chhattisgarh State, India

Rajib Jana*¹ and Anil Kumar Sinha²

^{1,2} Department of Geography, Rajeev Gandhi Government P. G. College Ambikapur, District Surguja - 497 001 Chhattisgarh, India

Received: 07 Jan 2025; Revised accepted: 17 Mar 2025

Abstract

Agricultural regionalization is the process of dividing the earth's surface into areas with distinct agricultural characteristics. These regions are dynamic and change over time and space. Agricultural regionalization also refers to the process of dividing a larger geographical area into smaller regions based on their agricultural characteristics such as climatic condition, soil type, topography and cropping patterns etc. The study area is situated in north-eastern corner of Chhattisgarh state which is basically tribal's populated areas. This research paper has been based on both the primary and secondary data. The main objectives of the present study are to analyze the agricultural regionalization of Jashpur district which is based on the cropping patterns, crop combination, crop diversification, cropping intensity, agricultural productivity and patterns of crop rotation. The main findings of this investigation is agricultural regionalization can help to reduce regional disparities and inequalities, formulate agricultural plans, assess the yield potential of different crops, determine the suitability of different crops for land use, and disseminate research results and agro-technology.

Key words: Agricultural regionalization, Jashpur district, Cropping patterns, Crop combination regions, Agricultural productivity, Formulation of agricultural plans

Agricultural regionalization is the process of dividing the earth's surface into areas with distinct agricultural characteristics. These regions are dynamic and change over time and space. Agricultural regionalization also refers to the process of dividing a larger geographical area into smaller regions based on their agricultural characteristics such as climatic condition, soil type, topography and cropping patterns etc. [1]. Most of the Geographers have been identify the specific region which is based on the physical characteristics as well as cultural characteristics. Agricultural region refers to an uninterrupted area which having some kind of homogeneity with the specifically defined outer limits. The salient features of agricultural regions are that specific location, transitional boundaries, hierarchically arranged and formal or functional [2]. The main significance of agricultural regionalization is that it is help us to formulation of agricultural plans which are removed the regional inequality as well as regional disparities in a particular region [3].

The present study area is mainly tribal areas and economic structure of the study area is based on agricultural activities and predominantly agro-based industry. It is situated in north-eastern corner of Chhattisgarh state in India and the three district of state (Balrampur - Ramanujganj, Sarguja and Raigarh) are adjoining with Jashpur district. Jashpur district is geographically located in between 22°17' North to 23°15' North latitudes and 83°30' East to 84°24' East longitudes. The total Geographical area of Jashpur district is 5838.00 sq. km. The north-south length of this study area is about 150 kms. and its east-west breadth is 85 kms. The district having eight Tahsils

which are namely - tahsil Bagicha, tahsil Duldula, tahsil Jashpur, tahsil Kansabel, tahsil Kunkuri, tahsil Manora, tahsil Pathalgaon and tahsil Farsabahr.

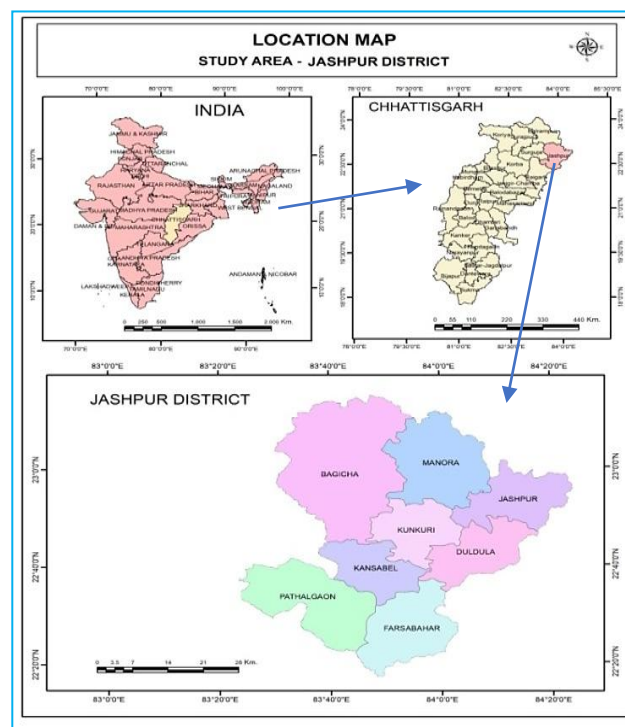


Fig 1 Location map of the study area

*Correspondence to: Rajib Jana, E-mail: rajibgeo1990@gmail.com; Tel: +91 8319616143

Citation: Jana R, Sinha AK. 2025. A geographical study of agricultural regionalization in Jashpur district of Chhattisgarh State, India. *Res. Jr. Agril. Sci.* 16(2): 159-168.

Agriculture is the backbone of rural economies, and its spatial distribution is influenced by geographical, climatic, and socio-economic factors. Jashpur District, located in the northeastern part of Chhattisgarh, has a diverse topography and agro-climatic conditions that shape its agricultural practices. This study aims to analyze agricultural regionalization in Jashpur District by examining land use patterns, crop distribution, soil types, climatic conditions, and socio-economic influences.

The main objectives of the present study are to analyze the agricultural regionalization of the study area which is based on cropping patterns, crop combination regions, crop diversification index, cropping intensity pattern, agricultural productivity index & patterns of crop rotation.

MATERIALS AND METHODS

Sources of data and collection of data

This research paper has been based on both the primary and secondary data. Primary data is obtained through schedule survey method and secondary data is collected from the district statistical handbook (reference year: 2019-20) and district census handbook (Census year - 2011). The obtained primary data and collected secondary data have been processed through the editing, coding, classification and tabulation method and analysis through the computer as well as the processed data are analyzed with the help of quantitative techniques and systematically presented through the cartographic techniques by Arc GIS software and using different maps and diagrams to make a significant interpretation of different variables as well as to bring out the reaching conclusion.

(i) Cropping patterns of the study area has been analyzed through the gross cropped area (Ha) under the major crops which is based on observation year from 2015-16 to 2019-20.

(ii) Crop combination of the study area has been analyzed with the help of Weaver's Crop Combination Method (1954).

(iii) The Gibbs - Martin index of diversification (1962) has been adapted for the determination of crop diversification in the study area.

(iv) For the determination of cropping intensity in the study area the following formula has been used:

$$\text{Cropping Intensity} = (\text{Gross cropped area} / \text{Net sown area} \times 100)$$

(v) Enyedi's (1964) formula of productivity index is used for the determination of agricultural productivity in the study area.

(vi) Patterns of crop rotation have been finding out through the growing of various crops one after another with regular succession on the same agricultural field.

RESULTS AND DISCUSSION

Agricultural regionalization in the study area

The scenarios of agricultural regionalization in the study area are expressed by the following methods such as – (i) Cropping patterns (ii) Crop combination (iii) Crop diversification (iv) Cropping intensity (v) Agricultural productivity (vi) Patterns of crop rotation.

(i) Cropping patterns

Cropping patterns defined that the proportions of an area under the various crops at a given point of time. The proportions of geographical area under different crops are changeable due to various factors. The cropping patterns of specific regions are closely affected by the socio-economic factors, geographical factors, cultural factors, historical factors and political factors [4]. The variability of cropping patterns depends on topography, terrain features, climatic conditions (temperature, rainfall and humidity), soils, slope, water availability and irrigational facilities etc. The suitability of cropping patterns has been judged on the basis of following points - (a) The various crops should not exhaust on some specific plat nutrients from a particular depth of the soil. (b) The crops have not been affected by the certain diseases as a result of fixed continuous crop rotation method. (c) The crops should be improved the soil fertility as well productivity. (d) The crops should ensure the water availability or irrigation, optimum use of fertilizers, pesticides, insecticides and use of technology in the field.

Table 1 Area under major crops in Jashpur district (Reference year: 2019-20)

Observation year	Area under major crops (Hectares)												
	Paddy	Wheat	Jowar	Maize	Kodo - kutki	Pulses	Sugar cane	Fruits	Vegetables	Chili spices	Oilseeds	Fibers	Drugs & narcotics
2015-16	180626	993	105	5451	2063	22851	138	775	8566	676	29541	90	00
2016-17	181149	1084	96	5572	1945	24562	113	774	9546	677	32935	105	00
2017-18	183914	907	93	5435	1811	22553	104	806	5007	753	31887	101	00
2018-19	180077	858	104	5205	1644	20255	103	828	9356	738	29777	94	00
2019-20	184271	928	80	5587	1547	22698	111	861	9624	812	27117	67	00

Source: District statistical handbook, Ref. Year: 2019 - 20, Land records branch of Jashpur district (Chhattisgarh)

According to district statistical hand book of Jashpur district which is published by land record department or branch of Jashpur district (reference year 2019-20) - the gross cropped area is 255489 hectares in the observation year 2015-16, the gross cropped area is 257637 hectares in the observation year 2016-17, the gross cropped area is 254813 hectares in the observation year 2017-18, the gross cropped area is 250349 hectares in the observation year 2018-19 and the gross cropped area is 254937 hectares in the observation year 2019-20 under

the major crops cultivation of Jashpur district, which are shown in the (Table 1) cartographically represented in the (Fig 2).

The agricultural landscape of Jashpur has undergone moderate changes over the years, with paddy maintaining dominance, while pulses, vegetables, and spices are gradually increasing. However, the fluctuating gross cropped area highlights the need for sustainable agricultural practices, improved irrigation, and market linkages to ensure consistent agricultural growth in the region.

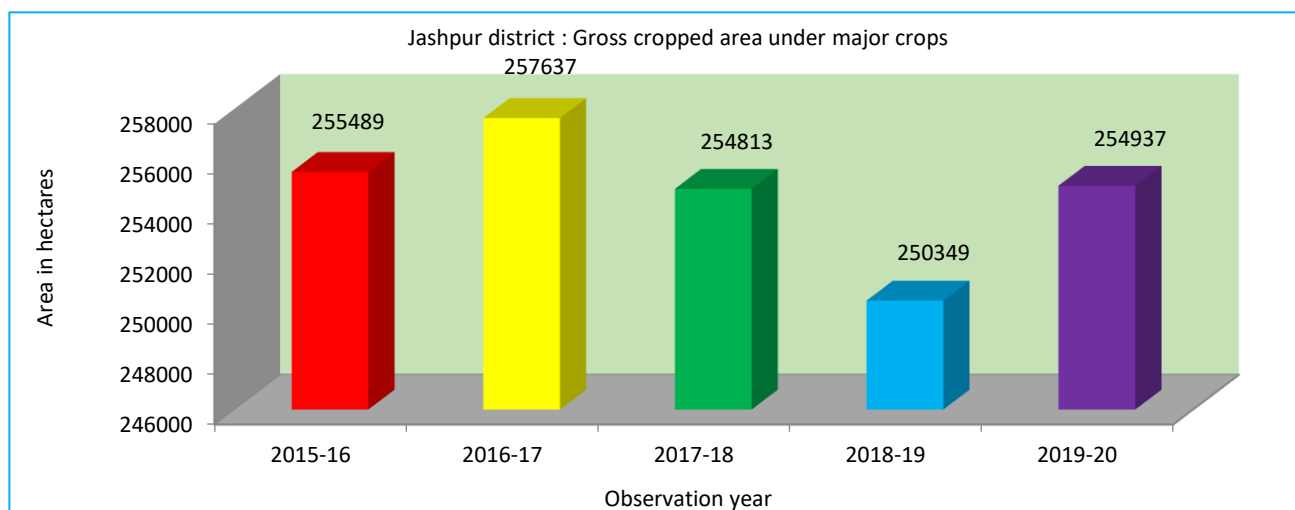


Fig 2 Gross cropped area under major crops of Jashpur district

The (Table 2) shows that the tahsil wise area under major crops such as Paddy, Wheat, Jowar, Maize, Kodo-kutki, Pulses, Sugarcane, Fruits, Vegetables, Chili Spices, Oilseeds, Fibers and Drugs & Narcotics. The total cropped area or gross cropped area is 52689 hectares, 25027 hectares, 24119 hectares, 25472

hectares, 28071 hectares, 18302 hectares, 29535 hectares and 51718 hectares in tahsil Bagicha, Kansabel, Jashpur, Manora, Kunkuri, Duldula, Farsabahar and Pathalgaon respectively under the major crops cultivation which are cartographically represented in the (Fig 3).

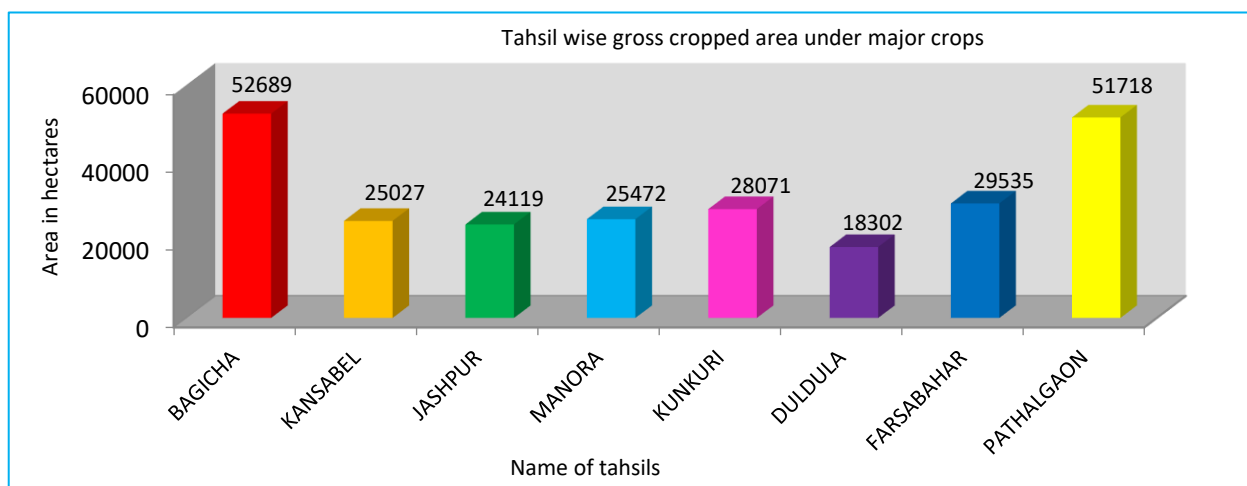


Fig 3 Tahsil wise gross cropped area under major crops

Table 2 Tahsil wise area under major crops (Reference year: 2019-20)

Name of tahsils	Area under major crops (Hectares)													Gross cropped area (Hect.)
	Paddy	Wheat	Jowar	Maize	Kodo-kutki	Pulses	Sugarcane	Fruits	Vegetables	Chili spices	Oilseeds	Fibers	Drugs & Narcotics	
Bagicha	32548	380	07	3827	1211	2722	67	181	1563	249	8836	12	00	52689
Kansabel	18241	12	08	220	03	3159	01	56	562	68	2694	03	00	25027
Jashpur	18345	21	33	78	138	2378	01	192	313	38	2487	00	00	24119
Manora	18357	79	08	553	168	1281	00	55	419	90	4425	04	00	25472
Kunkuri	21998	167	03	211	06	2492	00	142	477	63	2498	09	00	28071
Duldula	12483	29	04	86	19	2686	01	132	949	65	1835	02	00	18302
Farsabahar	24023	55	08	118	00	2919	00	56	1028	54	1272	02	0	29535
Pathalgaon	38276	185	09	494	02	5061	41	47	4313	185	3070	35	00	51718

Source: District statistical handbook, Ref. Year: 2019 - 20, Land records branch of Jashpur district (C.G.)

(ii) Crop combination

Crop combination defined that the total or aggregate of different crops cultivated / grown in a region at a given point of time. The concept Crop combination is a process of cultivated various crops in the same field in an agricultural year. It is helps to the cultivators for harvesting the more than one crop in various crop seasons. The different crops are generally grown in combinations and it is rarely that a particular crop found a

position of total isolation other crops in a given geographical area at a given point of time [5]. The standard deviation method was used by weaver for the determination of the minimum deviation between the actual crop percentages and hypothetical percentages of crops. Weaver pointed out that the relative, not absolute value being significant and square roots were not extracted, that's why the following actual formula was used - $d = \sum d^2 / n$, whereas d = it is the difference between the actual

crop percentages in a given area unit and the appropriate percentage in the theoretical curve, n = it is the number of crops in a given combination of the study area. For the analysis of crop combination in the study area the percentages of five major crops are taken for the determination of the which types of crop combinations is found in Jashpur district in a reference year 2019-20 according to the descending order which as follows paddy crop is 72.28%, oilseeds are 10.64%, pulses are 8.90%, vegetables are 3.78% and Maize is 2.19%.

Monoculture (single / one crop): Rice is the leading crop in the study area and it is showing highest coverage in the district. It is grown 184271 hectares (72.28 %) in the reference year 2019-20. It is the result of a most of the peoples of the study area are economically depends on agriculture and most parts of the district covered with the Red -Yellow Soil (Matashi) which has been considered as the best soil for the cultivation of paddy crop. According to weaver's method the 'd' of monoculture crop is lower than the two crops, three crops and four crops combination and higher than the five crops combination. So, it is the second-best crop combination of the study area.

Double crops (two crops) combination: According to

weaver's crop combination method the paddy crop (72.28%) and oilseeds (10.64%) is falls under the two crops combination in the study area where the 'd' of two crop combination is higher than the other crops combination which is not a suitable crop combination for the study area.

Three crops combination: According to Weaver's crop combination method the paddy crop (72.28%), oilseeds (10.64%) and pulses (8.90%) is entered under the three crops combination in the study area.

Four crops combination: Under this crops combination of the study area the four crops are entered which is namely paddy crop (72.28%), oilseeds (10.64%), pulses (8.90%) and vegetables (3.78%).

Five crops combination: According to weaver's crop combination method the paddy crop (72.28%), oilseeds (10.64%), pulses (8.90%), vegetables (3.78%) and Maize (2.19%) is the main crops of this category of the study area in the reference year 2019-20 where the 'd' of five crop combination is lower than the other crops combination. Therefore, it is the best suitable crops combination in the study area, which is shown in the (Table 3).

Table 3 Crop combinations in Jashpur district (Reference year: 2019-20)

Types of crop combination	Monoculture (single / one crop)	Double crops (two crops)		Three crops combination			Four crops combination				Five crops combination				
Hypothetical % (A)	100	50	50	33.33	33.33	33.33	25	25	25	25	20	20	20	20	20
% of the crops land occupy (B)	72.28	72.28	10.64	72.28	10.64	8.90	72.28	10.64	8.90	3.78	72.28	10.64	8.90	3.78	2.19
Deviation (d) (A - B)	27.72	- 22.28	39.36	- 38.95	22.69	24.43	- 47.28	14.36	16.1	21.22	- 52.28	9.36	11.1	16.22	17.81
d^2	768.40	496.40	1549.21	1517.10	514.84	596.82	2235.40	206.21	259.21	450.29	2733.20	87.61	123.21	263.09	317.20
Σd^2	768.40	2045.61		2628.76			3151.11				3524.31				
$d = \Sigma d^2 / n$	768.40	1022.81		876.25			787.78				704.86				

Source: Crop Combinations of the study area is calculated by the researchers

For the determination of crop combinations in tahsil wise, the %ages share of five major crops to the total cropped

area in a reference year 2019-20. The percentages of five major crops area are arranged according to descending order.

Table 4 Tahsil wise area and percentages of major crops (Reference year: 2019-20)

Name of tahsils	Area under major crops (Hectares)													
	Paddy	Wheat	Jowar	Maize	Kodo-kutki	Other cereals	Pulses	Sugarcane	Fruits	Vegetables	Chili spices	Oilseeds	Fibers	Drugs & Narcotics
Bagicha	32548	380	07	3827	1211	1086	2722	67	181	1563	249	8836	12	00
%	61.77	0.72	0.01	7.26	2.30	2.06	5.17	0.13	0.34	2.97	0.47	16.78	0.02	0.00
Kansabel	18241	12	08	220	03	00	3159	01	56	562	68	2694	03	00
%	72.89	0.05	0.03	0.88	0.01	0.00	12.62	0.00	0.22	2.25	0.28	10.76	0.01	0.00
Jashpur	18345	21	33	78	138	95	2378	01	192	313	38	2487	00	00
%	76.06	0.09	0.14	0.32	0.57	0.39	9.86	0.00	0.80	1.30	0.16	10.31	0.00	0.00
Manora	18357	79	08	553	168	33	1281	00	55	419	90	4425	04	00
%	72.07	0.31	0.03	2.17	0.66	0.13	5.03	0.00	0.22	1.64	0.35	17.37	0.02	0.00
Kunkuri	21998	167	03	211	06	05	2492	00	142	477	63	2498	09	00
%	78.37	0.59	0.01	0.75	0.02	0.02	8.88	0.00	0.51	1.70	0.22	8.90	0.03	0.00
Duldula	12483	29	04	86	19	11	2686	01	132	949	65	1835	02	00
%	68.21	0.16	0.02	0.46	0.10	0.06	14.67	0.01	0.72	5.19	0.36	10.03	0.01	0.00
Farsabahr	24023	55	08	118	00	00	2919	00	56	1028	54	1272	02	00
%	81.34	0.19	0.03	0.40	0.00	0.00	9.87	0.00	0.19	3.48	0.18	4.31	0.01	0.00
Pathalgaon	38276	185	09	494	02	00	5061	41	47	4313	185	3070	35	00
%	74.01	0.36	0.02	0.96	0.00	0.00	9.78	0.08	0.09	8.34	0.36	5.93	0.07	0.00

Source: District statistical handbook, Ref. Year: 2019 - 20, Land records branch of Jashpur district (C.G.)

Table 5 Tahsil wise crop combination by J.C. Weaver method in Jashpur District (Reference year: 2019-20)

S. No.	Name of tahsils	Types of crops combination	Name of the crops
1	Bagicha	Five crops combination	Paddy, Oilseeds, Maize, Pulses, Vegetables
2	Kansabel	Five crops combination	Paddy, Pulses, Oilseeds, Vegetables, Maize
3	Jashpur	Monoculture	Paddy
4	Manora	Five crops combination	Paddy, Oilseeds, Pulses, Maize, Vegetables
5	Kunkuri	Monoculture	Paddy
6	Duldula	Five crops combination	Paddy, Pulses, Oilseeds, Vegetables, Fruits
7	Farsabahr	Monoculture	Paddy
8	Pathalgaon	Monoculture	Paddy

Source: Tahsil wise crop combinations of the study area is computed by the researchers

On the basis of weaver's technique in tahsil Bagicha the deviation of the actual percentages from the theoretical curve (hypothetical percentages) is seen to be the lowest for 5-crops combinations. This result established the identify and the number of crops in the basic combination for the tahsil Bagicha as paddy (61.77%) - oilseeds (16.78%) - maize (7.26%) - pulses (5.17%) - vegetables (2.97%). In tahsil Kansabel the deviation of the actual percentages from the theoretical curve (hypothetical percentages) is seen to be the lowest for 5-crops combinations. This result established the identify and the number of crops in the basic combination for the tahsil Kansabel as paddy (72.89%) - pulses (12.62%) - oilseeds (10.76%) - vegetables (2.25%) - maize (0.88%). In tahsil Jashpur the deviation of the actual percentages from the theoretical curve (hypothetical percentages) is seen to be the lowest in monoculture (one / single crop dominated) type of combination. This result established the identify and the number of crop in the basic combination for the tahsil Jashpur as paddy crop (76.06%). In tahsil Manora the deviation of the actual percentages from the theoretical curve (hypothetical percentages) is seen to be the lowest for 5-crops combinations. This result established the identify and the number of crops in the basic combination for the tahsil Manora as paddy (72.07%) - oilseeds (17.37%) - pulses (5.03%) - maize (2.17%) - vegetables (1.64%). In tahsil Kunkuri the deviation of the actual percentages from the theoretical curve (hypothetical percentages) is seen to be the lowest in monoculture (one / single crop dominated) type of combination. This result established the identify and the number of crop in the basic combination for the tahsil Kunkuri as paddy crop (78.37%). In tahsil Duldula the deviation of the actual percentages from the theoretical curve (hypothetical percentages) is seen to be the lowest for five crops combinations. This result established the identify and the number of crops in the basic combination for the tahsil Duldula as paddy (68.21%) - pulses (14.67%) - oilseeds (10.03%) - vegetables (5.19%) - fruits (0.72%). In tahsil Farsabahr the deviation of the actual percentages from the theoretical curve (hypothetical percentages) is seen to be the lowest in monoculture (one / single crop dominated) type of combination. This result established the identify and the number of crop in the basic combination for the tahsil Farsabahr as paddy crop (81.34%). In tahsil Pathalgaon the deviation of the actual percentages from the theoretical curve (hypothetical percentages) is seen to be the lowest in monoculture (one / single crop dominated) type of combination. This result established the identify and the number of crop in the basic combination for the tahsil Pathalgaon as paddy crop (74.01%), which are shown in the (Table 4-5) and cartographically represented in the (Fig 4).

According to weaver's formula that the minimum deviation from the normal curve is the five crops region and therefore the study area falls under the five crop combination regions (Paddy, Oilseeds, Pulses, Vegetables and Maize). The main goal of agricultural land utilization as revealed by the

composition and distribution pattern of crop combination regions is the maximum production of paddy (rice) particulars for consumption by the local villagers in the study area. The crop combination based on statistical technique is a very important device to access the dominating position of various crops in different tahsils of Jashpur district.

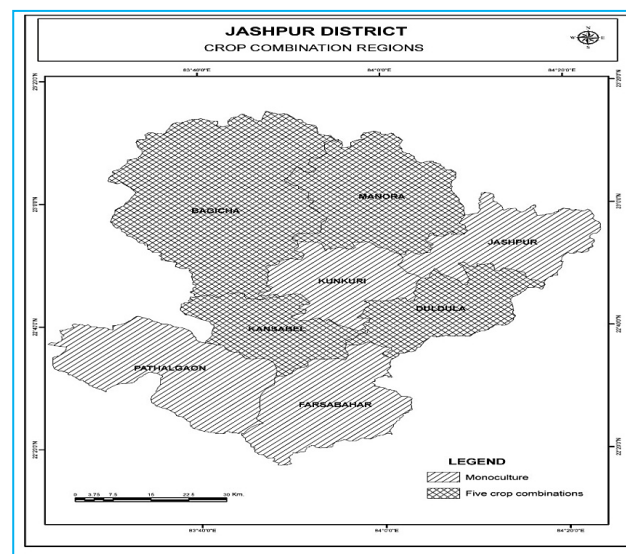


Fig 4 Tahsil wise crop combination regions in Jashpur district according to J.C. Weaver's Method (Reference year: 2019-20)

(iii) Crop diversification

Crop diversification refers to the number of crops grown in a geographical region within a specific period of time and it is an indicator of agricultural activities which indicates the intense comparison among various crops for space. Crop diversification is now almost a normal feature of stable agriculture and progressive farm management in most of the extensive agricultural parts of the world [6]. Crop diversification is an opposite concept of crop specialization and most of the farmers of developing countries in all over the world try to grow the various crops on their agricultural landholdings in a particular agricultural year. The levels of crop diversification are largely depending on geo-climatic, socio-economic conditions and development of technology in a region. In general way higher the level of agricultural technology, lesser the degree of crop diversification.

The Gibbs - Martin index of diversification (1962) have been adapted for the determination of crop diversification in the study area.

$$\text{Crop diversification index} = 1 - \frac{\sum x^2}{(\sum x)^2}$$

Where, x = It is the percentage of total cropped area occupied by each individual crop

Table 6 Tahsil wise crop diversification Index (Reference year: 2019-20)

S. No.	Name of the tahsils	Crop diversification index
1.	Bagicha	0.58
2.	Kansabel	0.44

3.	Jashpur	0.40
4.	Manora	0.45
5.	Kunkuri	0.37
6.	Duldula	0.50
7.	Farsabahr	0.33
8.	Pathalgaon	0.43

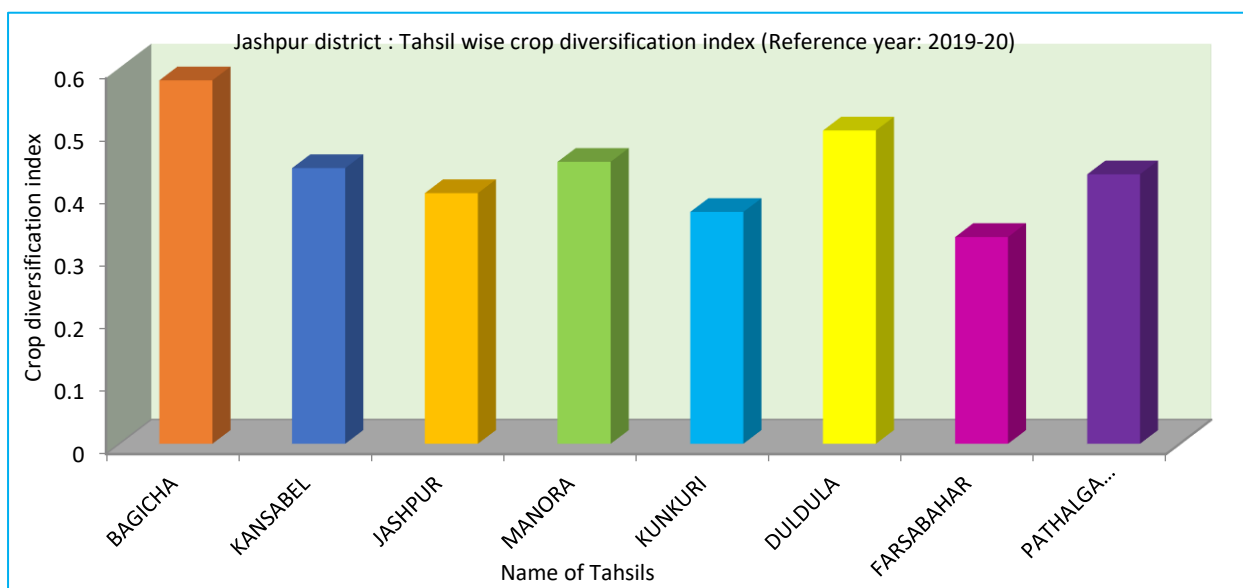


Fig 5 Tahsil wise crop diversification index of Jashpur district

Table 7 Crop diversification Index of the study area by Gibbs-Marín Method (1962)

Range of diversification index	Category of diversification	Name of the Tahsils
> 0.45	High	Bagicha, Duldula
0.35 – 0.45	Moderate	Manora, Kansabel, Pathalgaon, Jashpur, Kunkuri
< 0.35	Low	Farsabahr

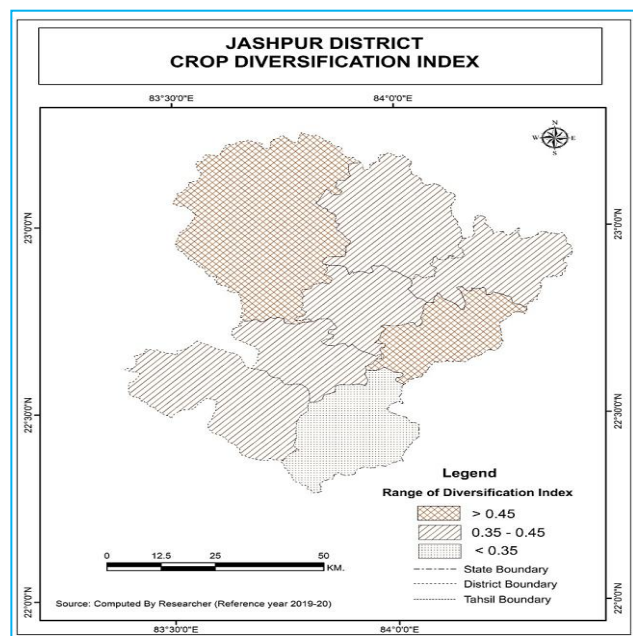


Fig 6 Crop diversification Index of Jashpur district by Gibbs-Marín Method (1962)

Crop diversification index (tahsil wise) of the study area have been shown in the (Table 6) which is cartographically represented in the (Fig 5, Fig 6) and it is categorized into three levels of diversification (High, Moderate and Low) on the basis of crop diversification index of each tahsil.

High degree of crop diversification (> 0.45): A high degree of crop diversification is found in the two tahsils of Jashpur district such as Bagicha and Duldula.

Moderate level of crop diversification (0.35 - 0.45): The moderate level of crop diversification is found in the five tahsils of Jashpur district such as Manora, Kansabel, Pathalgaon, Jashpur and Kunkuri

Low degree of crop diversification (< 0.35): Only one tahsil (Farsabahr) of the study area are falls under the low degree of crop diversification, which is shown in the (Table 7).

In the study area, the poor farmers are mainly interested to the diversification of crops rather than the rich farmers due to the following causes - (i) In the areas of highly variable and erratic rainfall where adequate irrigation is not available, the farmers growing the several crops in a particular season for requiring different quantities of moisture. It is being done mainly to get something from their agricultural fields as well as even in the case of extreme weather conditions such as floods and drought. (ii) The farmers grow various crops to meet their family requirements under the subsistent farming systems. (iii) Crop diversification is generally done by the farmers to enhance nitrogen in the soil as well as to replenish the soil fertility. It also increases the sustainability of the arable land of a given region. (iv) Crop diversification has given the more employment opportunities to the farmers throughout the year. (v) Crop diversification of a region enables the farmers to

provide a reasonable quantity of costly inputs to their crops or agricultural fields.

The tahsils of the study area which have a high degree of diversification are generally found due to erratic rainfall and most of the peoples are lived in rural areas as well as they are economically depends on agriculture. Variability of the degree of crop diversification among three categories is closely influenced by the soil moisture, soil characteristics, amount of rainfall received, the accessibility of the arable land, the availability of irrigation facilities and the technology developed by the villagers in the study area.

(iv) Cropping intensity

Cropping intensity refers to rising of a number of crops from the same field during one agricultural year. The Cropping intensity of an area largely depends on terrain features, temperature (maximum, minimum and optimum), moistures conditions, soil characteristics, use of high yield variety of seeds, productivity level of soil, irrigation facility, modern technology and facility of market etc. Delineation of cropping intensity regions helps in ascertaining the areas where a particular crop grows well even with the help of minimum inputs, and thus it has great significance for agricultural development and planning of a particular region [7]. The cropping intensity has direct correlated with assured irrigation

which enables farmers to go for multiple cropping and use higher dose of fertilizers and HYV seeds. Cropping system in irrigated areas can be developed to make the best use of all the resources available in a particular situation. For the determination of cropping intensity in the study area the following formula is used:

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

The (Table 8) shows that, tahsil wise gross cropped area and net sown area (area in hectares) in the study area which is based on the data of reference year 2019-20. In tahsil Bagicha the gross cropped area is 52689 hectares and the net sown area is 48609 hectares. In tahsil Kansabel the gross cropped area is 25027 hectares and the net sown area is 24168 hectares. In tahsil Jashpur the gross cropped area is 24119 hectares and the net sown area is 23817 hectares. In tahsil Manora the gross cropped area is 25472 hectares and the net sown area is 24597 hectares. In tahsil Kunkuri the gross cropped area is 28071 hectares and the net sown area is 27349 hectares. In tahsil Duldula the gross cropped area is 18302 hectares and the net sown area is 17984 hectares. In tahsil Farsabahar the gross cropped area is 29535 hectares and the net sown area is 28682 hectares. The gross cropped area is 51718 hectares and the net sown area is 46926 hectares has been found in tahsil Pathalgaon.

Table 8 Tahsil wise cropping intensity of Jashpur district (Reference year: 2019-20)

S. No.	Name of Tahsils	Area in hectares		Cropping intensity (%)
		Gross cropped area	Net sown area	
1.	Bagicha	52689	48609	108.39
2.	Kansabel	25027	24168	103.55
3.	Jashpur	24119	23817	101.27
4.	Manora	25472	24597	103.56
5.	Kunkuri	28071	27349	102.64
6.	Duldula	18302	17984	101.77
7.	Farsabahar	29535	28682	102.97
8.	Pathalgaon	51718	46926	110.21

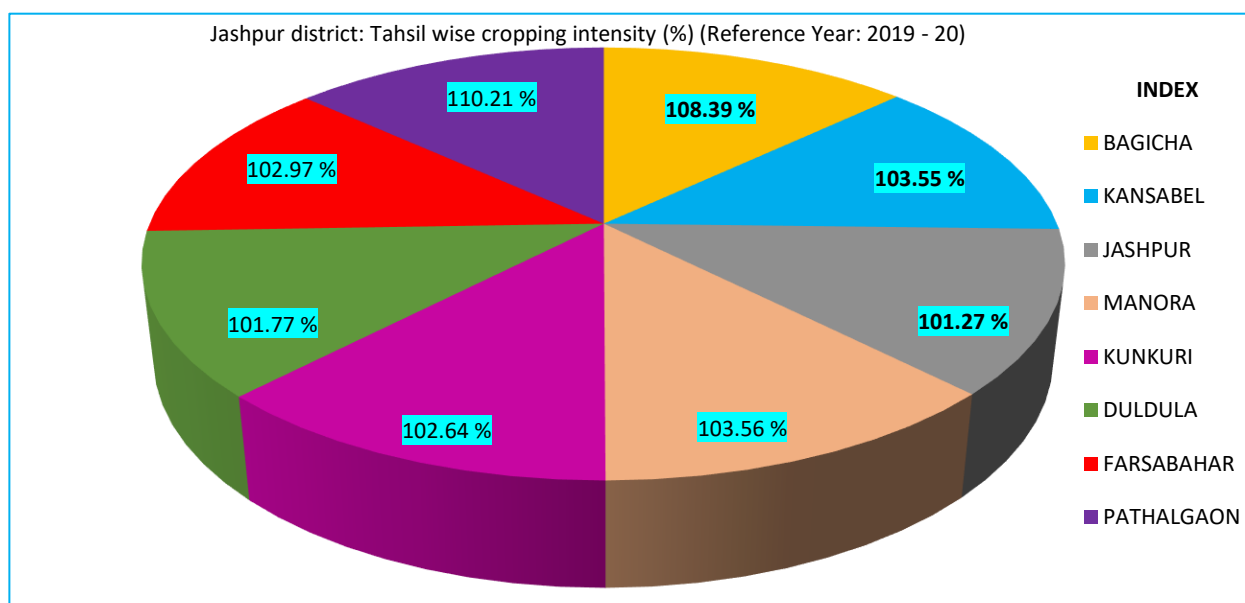


Fig 7 Tahsil wise cropping intensity of Jashpur district

On the basis of above table (Table 8) the cropping intensity of tahsil Bagicha, Kansabel, Jashpur, Manora, Kunkuri, Duldula, Farsabahar and Pathalgaon is 108.39%, 103.55%, 101.27%, 103.56%, 102.64%, 101.77%, 102.97% and 110.21% respectively while the cropping intensity of the

Jashpur district is 105.29% (Gross Cropped Area is 254937 hectares / Net Sown Area is 242132 hectares \times 100) which is based on reference year 2019-20, which is cartographically represented in the (Fig 7).

Table 9 Cropping intensity Index in different tahsils under Jashpur district

Cropping intensity index (%)	No. of the Tahsils	Name of the Tahsils	Remarks
Above 104.00	02	Bagicha, Pathalgaon	High cropping intensity
102.00 - 104.00	04	Kansabel, Manora, Kunkuri, Farsabahar	Moderate cropping intensity
Below 102.00	02	Jashpur, Duldula	Low cropping intensity

High cropping intensity (Above 104.00%): Two tahsil (Bagicha and Pathalgaon) of Jashpur district are lies under this category. The Bagicha and Pathalgaon tahsil having high cropping intensity index because the fertile soil is large proportionally found, use of modern agricultural technology, irrigational facility, use of high yield variety of seeds, use of chemical fertilizer, development of transportation system as well as educated farmers is found in those tahsils.

Moderate cropping intensity (102.00 - 104.00%): Under this category four tahsil are found which as namely Kansabel, Manora, Kunkuri and Farsabahar. The major factors of moderate cropping intensity of those tahsils are fertile soil are partially found, lack of high transportation system, moderate soil capability and medium irrigational facility as well as the carrying capacity of land is low (land-man ratio is moderate to high).

Low cropping intensity (Below 102.00%): Under low cropping intensity the two tahsils are found which as namely Jashpur and Duldula. The main factors of low cropping intensity in those tahsils are that the unfertile soil, size of land holdings, lack of agricultural labours, very poor irrigational facility and urban population etc. which is shown in the (Table 9).

(v) Agricultural Productivity

Agricultural productivity refers to as the output from the agricultural land in per unit of input or per unit of an area and it is the result of input-output ratio of agricultural land. Agricultural productivity of a particular region largely depends on the so many factors such as geographical factors (relief features, climatic conditions, water availability and soil characteristics), social factors, economic factors, institutional factors, political factors and organizational factors. Agricultural productivity is an outcome of the inter-relationship between the cultural and physical variables of a specific region and it is also influenced by the farmer's attitudes towards their work on

agricultural land as well as farmer's aspirations for better standard of living [8]. The computation of agricultural productivity helps us to know about the areas which are representing the less efficiency index in compared to other areas. The proper agricultural planning may be draw up for minimize or remove the regional disparities / inequalities through determined the areas of high agricultural productivity, medium agricultural productivity and low agricultural productivity of a specific region. Enyedi's (1964) formula of productivity index is used for the determination of agricultural productivity in the study area.

$$\text{Productivity index} = \frac{Y}{Y_n} \div \frac{T}{T_n} \times 100$$

Where, Y = Production of selected crop in a unit area, Y_n = Total production of selected crop in entire region, T = Area under selected crop in a unit area AND T_n = Area under selected crop in entire region

Productivity index of paddy (rice) crop

On the basis of reference year 2019-20, the high productivity index (Above 105.00%) of paddy crop is found in two tahsils (Bagicha and Duldula) of Jashpur district and it is influenced by the fertile soil, use of modern technology, irrigational facility, use of high yield variety of seeds and use of chemical fertilizer etc. In the other hand, Moderate productivity index (100.00- 105.00%) of paddy crop is found in three tahsils (Kansabel, Manora and Farsabahar) of Jashpur district due to fertile soil are partially found, moderate irrigational facility, medium use of high yield variety of seeds and medium use of chemical fertilizer etc. Low productivity index (Below 100.00%) of paddy crop is found in three tahsils (Jashpur, Kunkuri and Pathalgaon) of Jashpur district which is controlled by the unfertile soil, lack of irrigational facility, not use of high yield variety of seeds and use of traditional agrarian methods etc. which are shown in the (Table 10).

Table 10 Productivity index of paddy (rice) crop under different tahsils

Productivity index (%)	No. of the tahsils	Name of the Tahsils	Remarks
Above 105.00	02	Bagicha and Duldula	High Productivity
100.00 - 105.00	03	Kansabel, Manora and Farsabahar	Moderate Productivity
Below 100.00	03	Jashpur, Kunkuri and Pathalgaon	Low Productivity

Productivity index of wheat crop

On the basis of reference year 2019-20, the high productivity index (Above 200.00%) of Wheat crop is found in two tahsils (Kansabel and Jashpur) of Jashpur district. While moderate productivity index (100.00 - 200.00%) of Wheat crop

is found in two tahsils (Manora and Farsabahar) of Jashpur district. On the other hand, low productivity index (Below 100.00%) of Wheat crop is found in four tahsils (Bagicha, Kunkuri, Duldula and Pathalgaon) of Jashpur district, which are shown in the (Table 11).

Table 11 Productivity index of wheat crop under different tahsils

Productivity index (%)	No. of the tahsils	Name of the Tahsils	Remarks
Above 200.00	02	Kansabel and Jashpur	High Productivity
100.00 - 200.00	02	Manora and Farsabahar	Moderate Productivity
Below 100.00	04	Bagicha, Kunkuri, Duldula and Pathalgaon	Low Productivity

Productivity index of maize crop

On the basis of reference year 2019-20, the high productivity index (Above 150.00%) of maize crop is found in two tahsils (Kansabel and Jashpur) of Jashpur district. While

moderate productivity index (100.00 - 150.00%) of Maize crop is found in two tahsils (Farsabahar and Pathalgaon) of Jashpur district. On the other hand, low productivity index (Below 100.00%) of maize crop is found in four tahsils (Bagicha,

Manora, Kunkuri and Duldula) of Jashpur district, which are shown in the (Table 12). The maize productivity index in

Jashpur district (2019-20) shows significant spatial variations, with the highest productivity in Kansabel and Jashpur.

Table 12 Productivity index of maize crop under different tahsils

Productivity index (%)	No. of the tahsils	Name of the Tahsils	Remarks
Above 150.00	02	Kansabel and Jashpur	High Productivity
100.00 – 150.00	02	Farsabahal and Pathalgaon	Moderate Productivity
Below 100.00	04	Bagicha, Manora, Kunkuri and Duldula	Low Productivity

Productivity index of urad dal

On the basis of reference year 2019-20, the high productivity index (Above 150.00 %) of urad dal is found in two tahsils (Bagicha and Farsabahal) of Jashpur district. While moderate productivity index (100.00 - 150.00 %) of Urad Dal

is found in one tahsil (Pathalgaon) of Jashpur district. On the other hand, low productivity index (Below 100.00 %) of Urad Dal is found in five tahsils (Kansabel, Jashpur, Manora, Kunkuri and Duldula) of Jashpur district, which are shown in the (Table 13).

Table 13 Productivity index of urad dal under different tahsils

Productivity index (%)	No. of the tahsils	Name of the Tahsils	Remarks
Above 150.00	02	Bagicha and Farsabahal	High Productivity
100.00 – 150.00	01	Pathalgaon	Moderate Productivity
Below 100.00	05	Kansabel, Jashpur, Manora, Kunkuri and Duldula	Low Productivity

Productivity index of groundnut

The (Table 14) shows that the productivity index of groundnut under different tahsils in Jashpur district. The high productivity index (Above 130.00%) of Groundnut is found in one tahsil (Jashpur) of Jashpur district. While moderate

productivity index (80.00 - 130.00%) of Groundnut is found in three tahsils (Manora, Farsabahal and Pathalgaon) of Jashpur district. On the other hand, low productivity index (Below 80.00%) of Groundnut is found in four tahsils (Bagicha, Kansabel, Kunkuri and Duldula) of Jashpur district.

Table 14 Productivity index of groundnut under different tahsils

Productivity index (%)	No. of the tahsils	Name of the Tahsils	Remarks
Above 130.00	01	Jashpur	High Productivity
80.00 - 130.00	03	Manora, Farsabahal and Pathalgaon	Moderate Productivity
Below 80.00	04	Bagicha, Kansabel, Kunkuri and Duldula	Low Productivity

(vi) Patterns of crop rotation

Crop rotation refers to the growing of various crops one after another with regular succession on the same agricultural field. Leguminous crops (Beans, Soybeans, Peas, Green Gram, Lentils etc.) are very useful for a crop rotation because those kinds of crops enhancing the nitrogen levels in the soil of agricultural field as well as reduce the use of nitrogen chemical fertilizer by the farmers. Restoration of soil productivity, declining water- table and soil fertility depletion are major problems associated with the crop rotation method [9]. On the basis of field observation as well as household's survey in sample villages of eight tahsils in Jashpur district, the use of

crop rotation method is low to moderately found in the study area, which is cartographically represented in the fig. no. 08 and use of crop rotation method on agricultural field in sample villages is largely influenced by the soil characteristics, lack of irrigational facility, uneven distribution of monsoonal rainfall, traditional agrarian method and most of the villagers are economically backward in nature etc. Therefore, it is very essential to demarcation of the regions under crop rotation in the study area as well as identifies the problems which are arising out from the crop rotation practiced by the villagers for the development of agricultural activities.

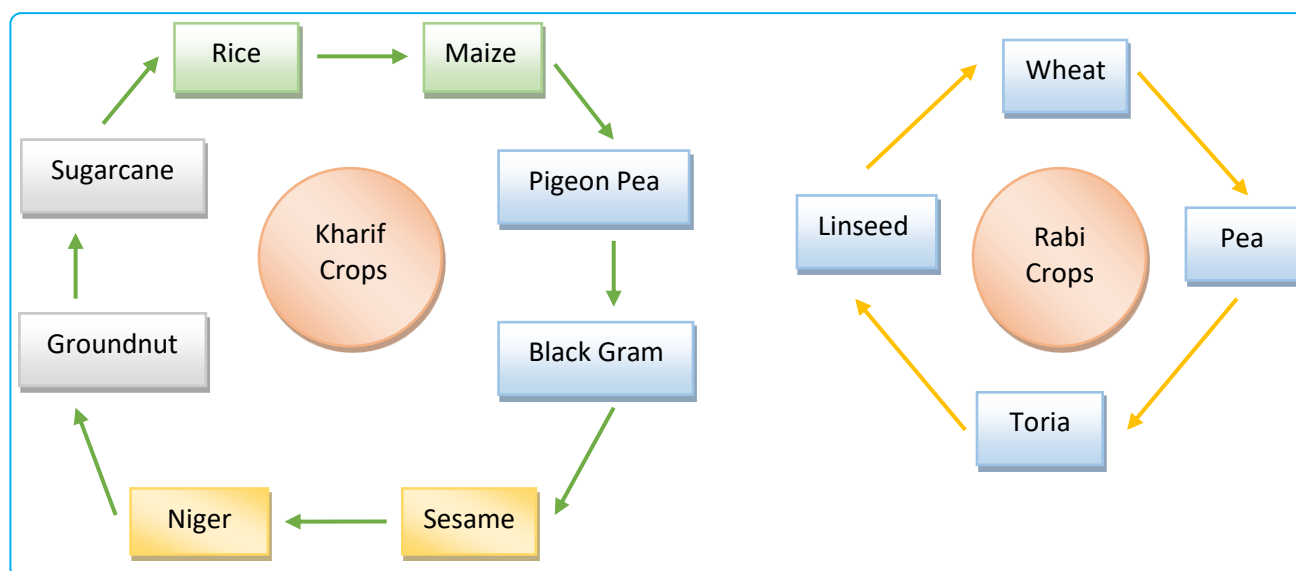


Fig 8 Crop rotation system in the study area during Kharif and Rabi seasons

CONCLUSION

The variability of cropping patterns depends on topography, terrain features, climatic conditions (temperature, rainfall and humidity), soils, slope, water availability and irrigational facilities etc. According to weaver's method the study area falls under the five crop combination regions (Paddy, Oilseeds, Pulses, Vegetables and Maize). A high degree of crop diversification is found in the two tahsils of Jashpur district such as Bagicha and Duldula. The Bagicha and Pathalgaon tahsil having high cropping intensity index because the fertile soil is large proportionally found, use of modern agricultural technology, irrigational facility, use of high yield variety of seeds, use of chemical fertilizer, development of transportation system as well as educated farmers is found in those tahsils. The high productivity index of various crops is influenced by the fertile soil, use of modern technology, irrigational facility, use of high yield variety of seeds and use of chemical fertilizer etc. The crop rotation method is low to moderately found in the study area and crop rotation method in sample villages is largely

influenced by the soil characteristics, lack of irrigational facility, uneven distribution of monsoonal rainfall, traditional agrarian method and most of the villagers are economically backward in nature etc. The main significance of agricultural regionalization is that it is help us to formulation of agricultural plans or schemes of a study area for removed the inequality as well as regional disparities.

Conflict of interest

There is no conflict of interest in this present research paper. This research work is not a part of any other studies and it is our original work.

Acknowledgements

We are expressing our heartiest gratitude and thankfulness to all the members of Land records office / branch of Jashpur district (C.G.) as well as district statistical department for their extremely helpfulness and providing relevant information regarding to this research paper. We have also highly obliged to all the local peoples in the study area those who are co-operate with us during the field observation.

LITERATURE CITED

1. Dayalan N. 2018. Analysis of the agricultural regionalization status using geographical information techniques in Tiruchirappalli district (Tamil Nadu State, India) 2014-15. *Transactions Institute of Indian Geographers* 40(2): 271-284.
2. Ghosh S. 2023. Agricultural regionalization with special reference to cropping intensity using geospatial technique - A case study of Birbhum district, West Bengal, India. *International Journal of Creative Research Thoughts (IJCRT)* 11(7): 776-783.
3. Gautam A. 2016. *Agricultural Geography*. Allahabad: Sharda Pustak Bhawan.
4. Hebbar A, Suma AP. 2024. Importance of cropping pattern and crop diversification in agriculture - A review. *Paripex - Indian Journal of Research* 13(4): 39-41.
5. Phalphale AK. 2018. A delineation of crop combination region: A case study of Bawada Circle in Indapur Tahsil (Pune District). *Review of Research* 7(10): 1-5.
6. Dala S, Shankar T. 2022. Crop diversification and its importance in agriculture: A review. *Indian Journal of Natural Sciences* 13(72): 44540-44548.
7. Negi G, Ballabh C. 2018. A study on cropping intensity index and irrigation intensity in district Dehradun. *International Journal of Creative Research Thoughts (IJCRT)* 6(1): 150-156.
8. Samantaray LL. 2015. A study on the current trend of agricultural productivity in India and its future prospects. *International Journal of Humanities Social Sciences and Education* 2(4): 16-21.
9. Ball BC, Bingham I, Rees RM, Watson CA, Litterick A. 2005. The role of crop rotations in determining soil structure and crop growth conditions. *Canadian Journal of Soil Science* 85(5): 557-577.