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An estimation of the proportion of land under various crops cultivation in Rajasthan: A case study of Bharatpur region

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Abstract

Rajasthan is the largest state of India in terms of area, it accounts for 5.67% of the total population of India, whereas this state has only 10.4% of the total geographical area. There are 7 divisions and 33 districts in the state of Rajasthan. Agriculture and allied activities play an important role in the economy of the state, although its contribution to NSDP is continuously declining, yet agriculture and allied sectors form the backbone of the state's economy. Change in cropping pattern is an important and robust tool in agriculture for minimizing risk and maximizing farmers' profits. Change in cropping pattern means to change the ratio of area of different crops so that desired and beneficial objectives can be fulfilled. In the present study a systematic attempt has been made to analyze the cropping pattern through cross section data of production of major crops in Rajasthan. The above analysis is based on the analysis of data collected primarily for the year 2019-20 of Bharatpur division. Out of 4 districts of Bharatpur division, 120 prescribed farms have been studied, which have been divided into highly irrigated, medium irrigated and low irrigated farms and data has been obtained on random basis. The results of the above study related to cropping pattern clearly indicate that along with increasing the certainty of irrigation, the area under cash crop and Rabi season crop was increasing. The results of the study show that with the increase in the assuredness and certainty of irrigation, the percentage of cropped area under food grains has been increasing gradually and at the same time an increase in the area of oilseed crops has been achieved. It is also clear from the present study that on Low irrigated, medium irrigated and high irrigated farms, the crop intensity was getting increasing by work which was 158.51%, 168.69% and 175.09%.

Keywords: Cropping pattern, crop, area, crop diversification, cropping intensity, land use pattern, crop rotation

Introductions

Agriculture sector has been the cornerstone of Indian economy. Its growth in areas and crops is important for ensuring food security, achieving self-sufficiency, supplying raw materials to industries and creating effective demand in the economy through linkages. Despite concerted efforts by the central government to outlay through planned development, there has been little structural change in the agriculture sector in India. Even today, about 56% of the work force in India is related to the agriculture sector and contributes only to 16% of the GDP.

Rajasthan is the largest state in India with a vast geographical area of 342.7 lakh hectares. The state is primarily an agricultural state with about 73% of its population living in rural areas and engaged in agriculture and allied activities. Agriculture is the single largest sector of the economy of the state of Rajasthan which provides direct and indirect employment to 70% of the labor force. Agriculture and animal husbandry is the mainstay of the state. The share of agriculture and allied sectors in the Gross State Domestic Product of the state of Rajasthan was about 21% during 2014-15. Physical, social, and economic considerations all influence a farmer's crop production decision. They may plant a variety of crops on their farms and rotate a specific crop combination throughout time. Farmers choose crops for cultivation based on a variety of criteria including physical, social, and economic considerations. They may plant a variety of crops on their farms and rotate a specific crop combination throughout time. However, it is worth noting that the best farming techniques always include certain cropping patterns and cropping systems to increase productivity and maintain soil fertility. The cropping patterns in different regions of the state of Rajasthan are inefficient in terms of utilization of available resources and are unstable from the point of view of natural resource utilization.

This leads to misallocation of resources, efficiency loss, and indiscriminate use of land and water resources, which adversely affects long-term production prospects. Selection of cropping pattern at the divisional and regional level is a challenge which can be addressed by using optimum crop planning. Keeping in view the above considerations, the present study examines the land use pattern of Bharatpur division of Rajasthan. Mustard, wheat and bajra are the main crops in this division of the state of Rajasthan which cover about 82% of the gross cropped area of the division. In this study, on the basis of irrigation facilities in different districts of the division, the area covered by crops on the basis of less irrigated area, medium irrigated area and highly irrigated area along with cropping intensity has also been calculated. This study related to cropping pattern has been done by collecting primary data on different farms divided on the basis of irrigation potential in which farm cropped area and percentage to gross cropped area have been calculated.

Cropping Pattern

A cropping pattern refers to the proportion of land under cultivation of various crops at different points of your time. This indicates the time and arrangement of crops during a particular acreage. Changing cropping pattern would cause:

Change within the proportion of land under different crops

Change in space sequence and time of crops.

The cropping pattern in India is mostly determined by the average rainfall, temperature, climate, technology, and the type of soil used for agriculture. The different patterns of cropping are practised to obtain the maximum yield. A cropping pattern that evolves across time and space, is a dynamic idea. It can be defined as the percentage of land covered by diverse crops at any given period. In other terms, it is a yearly pattern of sowing and fallowing on a certain region. Cropping patterns in India are influenced by rainfall, climate, temperature, soil type, and technology.

Types of Crop Patterns- Monocropping

In agricultural land, when one agricultural species is produced at a time, it is called monocropping. Monocropping can reduce soil fertility and destroy its structure. Chemical fertilizers are needed to upgrade agricultural production and achieve higher production. This practice allows the spread of pests and diseases. Both monocropping and monoculture are expressed in the same sense.

Mixed Cropping

When two or more crops are grown together in the same land then it is called mixed crop. For example, growing wheat and gram on an equivalent land at an equivalent time is mixed cropping. The practice of this method helps to minimize the risk of the failure of one of the crops and provides insurance against the crop failure due to abnormal weather conditions. The maturity period and water requirement of crops grown together under mixed cropping should be different. Under mixed crop, one crop should be tall growing and the other should grow dwarf crop. Nutrients required for one crop should also be essential nutrients for other crop. Roots of one crop should be deep while that of other crop should be shallow. Meeting all these

criteria can lead to a successful and good mixed cropping pattern.

Intercropping

Intercropping is the practice of growing quite one crop on an equivalent field at an equivalent time during a definite row pattern. After one row of the most crop, three rows of intercrops are often grown. This increases productivity per unit area. Inter cropping can be of different types such as row inter cropping, strip intercropping and relay intercropping.

Crop Rotation

In this pattern, different crops are grown on equivalent land in pre-planned succession. The crops are classified based on the time they are rotated one-year rotation, two-year rotation, and three-year rotation, depending upon their duration. In order to increase soil fertility, pulses are included in the crop rotation program. Crops that require certain fertility levels are often grown after legumes. Crops that require lower costs often go after crops that require higher costs.

Materials and Methods

Objectives of the Study

1. To estimate of share of different crops in Kharif and Rabi season on different farms according to irrigation potential
2. To determine of the share of different crops in the gross cropped area on the basis of irrigation potential according to the crop season
3. To estimate cropping intensity on farms with different irrigation potentials

Sampling Structure

A four-stage sampling technique is used for selecting the sample farms. Bharatpur region comprises of Bharatpur, Dholpur, Karauli and Sawai Madhopur districts. From the 4 district, 8 tehsils are selected on the basis of highest operation holdings. Out of these 8 tehsils, 24 villages (3 from each tehsils) and 5 farmers from each village are randomly selected (120 farmers approximately) in this study. From these selected farmers a list of them is prepared, enlisting operational holding and irrigation systems followed by them. The farms are classified under different categories i.e. low, medium and highly irrigated farms depending upon the irrigation facilities in the study area. Apart from the irrigation facility, the size of the holding was also used in the classification of the farms and according to the size of the farm, they were classified into small farms, medium farms and large farms. Under this classification, small farmers are those who are farming on land less than 2.0 hectares, medium farmers are farming on land between 2.1 to 4.0 hectares and farmers farming on land more than 4.0 factors are considered large farmers. The farmers are selected randomly within each category.

Collection of Data

The sample farmers are personally interviewed and the information for the agricultural year 2019-20 is collected on pre-tested specially structured schedule. Secondary data regarding other relevant information of the Bharatpur region are compiled from annual year plan of the district and other government Publications.

$$\text{Cropping Intensity} = \frac{\text{Gross Cropped Area}}{\text{Net Cultivated Area}} \times 100$$

Result and Discussion

According to the irrigation potential in Bharatpur division, the percentage share occupied by farms and crops under different agricultural seasons is displayed in Table No. 1, 2

and 3. Bajra, jowar fodder, guar seeds etc are the major crops grown in the wharf season. In the Rabi season the same area produce some important crops like wheat, mustard, sesamum and gram etc. Thus we have found that the cropping pattern varies from Low irrigated to medium irrigated to highly irrigated farms.

Table 1: Cropping Pattern on Low Irrigated Farms in Bharatpur Region. (2019-20)

Sr. No.	Name of crops	Cropped Area per farm (Ha.)	Percentage to Gross Cropped Area
Kharif Crops			
1	Bajra	0.514	30.52
2	Jowar seed	0.039	2.31
3	Guar Seed	0.033	1.96
4	Cotton	0.012	0.70
5	Jowar Fodder	0.019	1.13
6	Jowar + Bajra Fodder	0.020	1.16
7	Urad	0.012	0.70
8	Other Kharif Crops	0.052	3.07
	Total Kharif Crops	0.700	41.55
Rabi Crops			
9	Wheat	0.381	22.64
10	Mustard	0.526	31.21
11	Sesamum	0.018	1.07
12	Barley	0.024	1.44
13	Gram	0.027	1.63
16	Other Rabi Crops	0.008	0.46
	Total Rabi Crops	0.985	58.45
	Gross Cropped area	1.685	
	Net Cultivated area	1.063	
	Cropping intensity	158.51	

Low Irrigated Farms

The cropping pattern on low irrigated farms in Bharatpur region is shown in Table-1. The perusal of the table shows that Kharif crops occupied 41.55 percent and Rabi crops 58.45 percent of the total area cropped. Bajra was an important crop in the Kharif season, occupying about 30.52 percent of the cropped area. Bajra is followed by jowar seed and guar seed, which were sown on 2.31 percent and 1.96 percent of the gross cropped area, respectively. The largest occupied area among the Rabi season crops was that of mustard crop, which accounted for 31.21 percent of the gross cropped area, followed by wheat, which accounted for 22.64 percent of the gross cropped area. Table-1 also shows that during the study year 2019-20, food grain crops such as millet and wheat accounted for about 55.39 percent of the total cropped area and non-food grain crops mustard accounted for 31.21 percent of the total cropped area. The net cultivated area under low irrigated farms was about 1.063 hectares while the gross cropped area was about 1.685 hectares, thus cropping intensity in low irrigated farms was estimated as 158.51 percent.

Medium Irrigated farms

The existing cropping pattern on medium irrigated farms for study area Bharatpur division is presented in Table--2. The perusal of the table shows that the area under all Kharif season crops is 35.93 percent and the total cropped area under Rabi season crops is 64.08 percent. Bajra is the most

prominent crop among all Kharif season crops covering 26.63 percent of the gross cropped area. Jowar seed, jowar fodder and guar seed were the other important crops of the season with an estimated area of 1.77 percent, 1.74 percent and 1.66 percent respectively. Mustard was the largest area under Rabi season, which was 30.33 percent of the gross cropped area, followed by wheat, which accounted for 26.85% of the gross cropped area. Other Rabi crops on this type of farms are barley, sesame, gram and lentils which occupied 0.56 percent, 1.21 percent, 1.2 1 percent and 0.67 percent of the total cropped area respectively. 55.28 percent area was covered under total food grains which was more than half of the total cropped area. In the study area, the net cultivated area on medium irrigated farms was 1.038 hectares while the gross cropped area was 1.751 hectares, thus the cropping intensity was calculated to be 168.69 percent.

Highly Irrigated Farms

The existing cropping pattern under highly irrigated farms in Bharatpur division is presented in Table No. 3. It is clear from the table that the share under Kharif and Rabi crops was 32.34 percent and 67.66 percent respectively. Bajra was once again seen as the dominant crop in Kharif season, occupying about 22.88 percent of the gross cropped area. Jowar fodder and guar seed were the other important crops of the season accounting for 1.42 percent and 1.26 percent of the estimated area respectively.

Table 2: Cropping Pattern on Medium Irrigated Farms in Bharatpur Region. (2019-20).

Sr. No.	Name of crops	Cropped Area per farm (Ha.)	Percentage to Gross Cropped Area
Kharif Crops			
1	Bajra	0.467	26.67
2	Jowar seed	0.031	1.77
3	Jowar Fodder	0.034	1.74
4	Cotton	0.009	0.51
5	Guar Seed	0.029	1.66
7	Ground Nut	0.011	0.60
8	Other Kharif Crops	0.052	2.97
	Total Kharif Crops	0.629	35.92
Rabi Crops			
9	Wheat	0.470	26.85
10	Mustard	0.531	30.33
11	Sesamum	0.021	1.21
12	Barley	0.009	0.56
13	Gram	0.021	1.21
14	Masoor	0.011	0.67
16	Other Rabi Crops	0.056	3.25
	Total Rabi Crops	1.122	64.08
	Gross Cropped area	1.751	
	Net Cultivated area	1.038	
	Cropping intensity	168.69	

Table 3: Cropping Pattern on Highly Irrigated Farms in Bharatpur Region. (2019-20).

Sr. No.	Name of crops	Cropped Area per farm (Ha.)	Percentage to Gross Cropped Area
Kharif Crops			
1	Bajra	0.418	22.88
2	Paddy	0.015	0.83
3	Sugarcane	0.014	0.77
4	Cotton	0.012	0.69
5	Jowar Fodder	0.026	1.42
6	Gaur Seed	0.023	1.26
7	Ground Nut	0.014	0.75
8	Other Kharif Crops	0.068	3.74
	Total Kharif Crops	0.591	32.34
Rabi Crops			
9	Wheat	0.539	29.49
10	Mustard	0.524	28.68
11	Sesamum	0.022	1.25
12	Barley	0.012	0.66
13	Gram	0.018	1.01
14	Potato	0.019	1.04
15	Brinjal	0.014	0.77
16	Other Rabi Crops	0.087	4.76
	Total Rabi Crops	1.237	67.66
	Gross Cropped area	1.828	
	Net Cultivated area	1.044	
	Cropping intensity	175.09	

Other Kharif season crops like paddy, sugarcane, cotton, and groundnut occupied 0.83 percent, 0.77 percent, 0.69 percent and 0.75 percent of the total cropped area respectively. The table clearly shows that wheat occupied the largest area of 29.49 percent of the gross cropped area in Rabi season. Oilseed crops such as mustard and sesame accounted for 28.68 percent and 1.25 percent of the gross crop area respectively on highly irrigated farms. The table clarifies that the other crops of the Rabi season are barley, gram, potato and brinjal, whose share in the total cropped area is 0.66 percent, 1.01 percent, 1.04 percent and 0.77 percent respectively. Net cultivated area on highly irrigated farm is 1.044 hectares while gross cropped area is 1.828 hectares resulting in cropping intensity of 175.09 percent, which is the maximum among all irrigation systems. Vegetable cultivation was also being done on these farms due to high irrigation potential.

Conclusion

Agriculture plays an important role in the economy of a country, following different cropping patterns is important for a good economy and is influenced by various factors of farming. Thus we can conclude that economic factors play a major role in determining the cropping pattern in Indian agriculture. Crop patterns determine the level of agricultural production as well as reflect the agricultural economy of any region. Crop Pattern Change in agricultural policy is based on the availability of agricultural inputs and improvement in technology, so cropping pattern is very important for improving soil fertility by increasing the yield of crops. It ensures crop protection and availability of nutrients to the crops. The cropping pattern depends on the geographical features such as soil, climate and rainfall. It is also highly dependent on the nature and availability of irrigation facilities. Rajasthan is the largest state in India in terms of

area with a share of 10.4% of the total geographical area of India. The present study analyze the cropping pattern based on primary data for the year 2019-20 of Bharatpur division of Rajasthan. In this study the cropping pattern of 120 prescribed farms out of 4 districts of Bharatpur division has been studied according to the irrigation potential. This study related to cropping pattern makes it clear that with increasing irrigation potential, the area under cash crops and their number has increased as well as the increase in area under vegetable crops has been found in the same order. The present study also makes it clear that along with the increase in irrigation potential, an increase in the area of food grains and oilseed crops has been achieved and the cropping intensity has also increased. From the results of this investigation, it can be concluded that by expanding irrigation facilities in the state of Rajasthan, cropping pattern can be tailored, which can improve the economic condition and standard of living of the majority of the population.

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