Cropping Pattern, Crop Combination and Agriculture Development: A Case Study of Pratapgarh District of Rajasthan

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Abstract

An area's cropping pattern shows how much (in proportion) grossed cropped area is devoted to different crops during an agriculture year. The cropping pattern for a region can be as curtained by combining both the physical and cultural factors. The thorough study of cropping pattern is vital to get the in-depth understanding of agriculture system and the earnings of the people because of it. Cropping patterns becomes important as it gives an idea of nature of the crops i.e. the crops grown are traditional or modern, Crops value (low vs high) and usage of the crops (Domestic or commercial purpose). In addition to the cropping pattern, the crop combination of a region shows the level of crop diversification by showing if that region comes under mono-crop region, two-crop region, three-crop region or a diversified crop region. The cropping pattern and the crop combinations help in identifying the elements of agriculture development in a specific area. Generally, when the diversified cropping pattern and larger number of crops figure in the crop combinations, it becomes a reflection of agriculture development. The current paper tries to explain the cropping pattern and identifies the crop combination regions in Pratapgarh district of Rajasthan. Based on the cropping pattern and crop combinations, attempts have been made to find the important elements of agriculture development in the aforementioned areas. The Primary data collection in this study has been done through field survey.

Keywords: Crop combination; Crop pattern; Agriculture development

Introduction

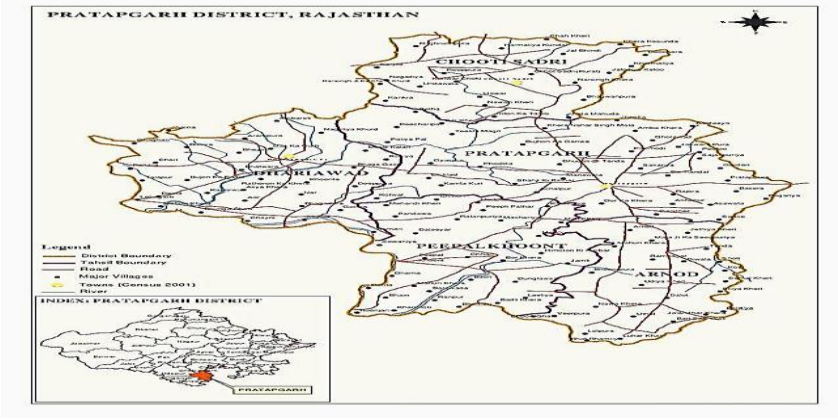
Agriculture is one of the leading occupations in India and it plays a vital role in shaping the economic condition of the farmers as well as the whole country. It contributes about 16 per cent of total GDP and 10 per cent of total export. Over 60 per cent of total land of the country is arable making it the second largest country in term of total arable land. Agriculture provides food to the masses, green fodder for livestock and supplies raw material to various agro-based industries. Hence, systematic, scientific, and proper cropping pattern and crop combinations are the most important aspect for better out-put in agriculture. Cropping pattern indicates the proportion of area under various crops at a point of time whereas the crop combination indicates to grow different types of crops under the same agriculture field. Both Cropping pattern and combination area dynamic concept as it changes over space and time. Terrain, topography, slope, temperature,

amount and reliability of rainfall, soil and availability of water for irrigation are some factors responsible for the cropping pattern and combination in any area. Cropping pattern and combination are also the part of behavioral approach in geography, because it reflects the performance of the farmer for various crops sown in an agricultural field. Hence, by considering the facts related to better cropping pattern, the present research has been attempted to analyzing the irrigation facilities, cropping pattern, crop combination and agriculture development in Pratapgarh district of Rajasthan.

Study Area

On 26 january 20008 Pratapgarh got the proud of being 33 district shown on the map of Rajasthan. It is created by the area taken from Udaipur, Banswara and Chittorgarh districts. As a newly created district Pratapgarh includes the tehsils area Arnod, Pratapgarh, and Chotisadri from Chittorgarh district, Dhariawad from Udaipur district and Pipalkhoont from Banswara district. Pratapgarh is situated in the Southern part of Rajasthan. The area adjoins Udaipur, Banswara and Chittorgarh districts of Rajasthan and Ratlam, Mandsaur and Neemuch districts of Madhya Pradesh. It is situated at the junction of the Aravali mountain ranges and the Malwa Plateau; hence the characteristics of both prominently feature in the area. The Pratapgarh district geographically located between the north latitudes 23°31¹ to 24°30¹ and the east longitudes 74°13¹ to 74°78¹. It has total 4117.36 sq. km geographical area. It has an average elevation of 491 meters. Well known for pure gold and glass-inlay handmade unique jewellery called "Thewa". Covered with natural beauty and lifestyle of Vagad, Mewad and Malwa this new district is famous by the name of Kanthal.

The climate here is mild, and generally warm and temperate. There is significant rainfall throughout the year in Pratapgarh. Even the driest month still has a lot of rainfall. The Köppen-Geiger climate classification is Cfa. The soils, due to the variation in topography, intensity of erosion, parent material, and other factors, exhibit variations in many characteristics like texture, depth, colour, drainage, moisture status etc. The soil is mainly highly fertile Black Cotton Soil made of magma of volcanos. The plain area is formed by alluvial deposits of the Jakham River and its tributaries.



Objectives

The major objectives of the study are:

a. To assess the cropping pattern and crop combination
b. To study the Agriculture development

Data Sources and Methodology

The data used for analysis in this paper has been drawn from the relevant official reports published by the Government of Rajasthan and the available literature on the performance of the state's agriculture sector. For examining the performance of growth in terms of changes in production, the paper uses the data from the government sources for the period 2009-10 and 2016-17. Other data sources are the Directorate of Economic and Statistics of Rajasthan. The study is based on the proportion of cropland under major crops, which are divided into two categories-Kharif crops and Rabi crops. To study the cropping pattern, a comparison of the relative strength of various crops is made according to the percentage of crops production.

Cropping Pattern

The crops of the watershed area are divided into two main categories viz. Kharif and Rabi. The former one is the summer season harvest and the latter is the winter season harvest. Any crop, which does not strictly fall within these two categories, is known as zaid crop and its harvest is called the zaid-Rabi or zaid-Kharif, according to the harvest with which it is assessed. Toria (an oilseed) is cultivated as zaid Kharif and vegetables, melon and green fodder as zaid Rabi. According to the field study and the data collected from Agriculture Departments of Rajasthan, total agriculture land in watershed is approximately more than 50% of the whole area. The result is a low yield per hectare, but the increase in the adaptation of new technology and use of inputs has substantially increased the agriculture production. In the present watershed, more than 99 percent of total agriculture land is double cropped area, which is cultivated in both Kharif and Rabi season. Only one percent of agriculture land is single cropped and follow land area. Some crops have also harvested in hilly areas of watershed, but its area is negligible.

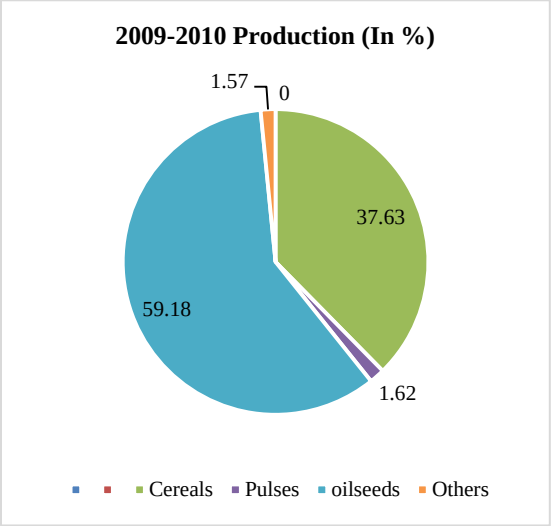
Crop of Kharif Season

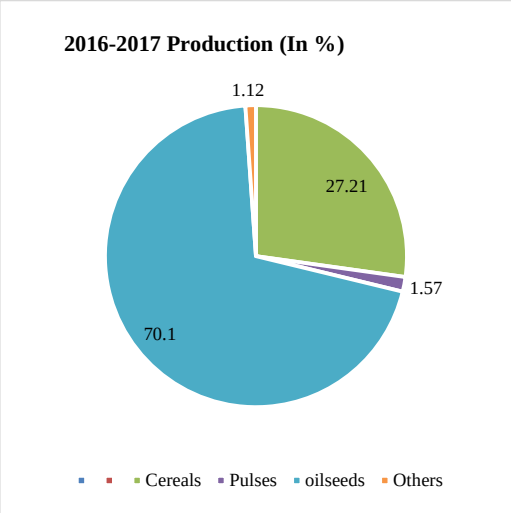
Kharif is a very important cropping season during June to October. It occupies more than Rabi cropped area in the watershed. Maize and Soyabean are very common crops of this season.

Table no. 1 : Crops production and production percentage under Kharif season, 2018

	2009-2010		2016-2017	
Crops	**Production (in Tonnes)**	**Production (In %)**	**Production (in tonnes)**	**Production (In %)**
Cereals	99761	37.63	67777	27.21
Pulses	4304	1.62	3908	1.57
oilseeds	156889	59.18	174605	70.10
Others	4151	1.57	2801	1.12
Total	**265105**	**100**	**249091**	**100**

Source: *Rajasthan Agricultural Statistics at a glance 2010-2011 and 2016-17, Commissionerate of Agriculture, Rajasthan, Jaipur*





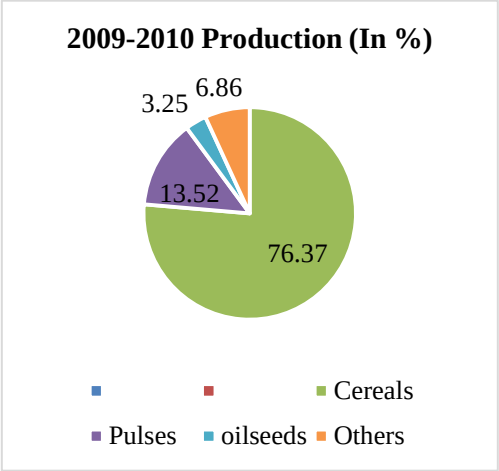
Crop of Rabi Season

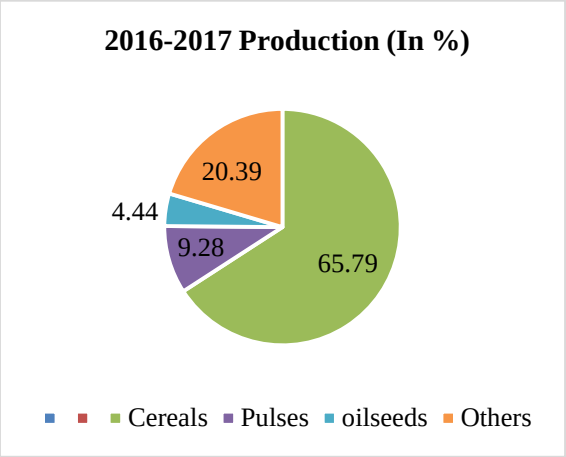
The Rabi crops are cultivated with the advent of the winter season, generally from the end of October to beginning of November. The main Rabi crops are Wheat, Gram, Barley, Pulses and the commercial crops are Groundnut, Oilseeds, and Cotton. In the study area, only Wheat is predominated Rabi crop on whole agriculture land.

Table no. 2 : Crops production and production percentage under Rabi season, 2018

Crops	2009-2010		2016-2017	
	Production (in tonnes)	Production (In %)	Production (in tonnes)	Production (In %)
Cereals	162728	76.37	246190	65.79
Pulses	28799	13.52	34622	9.28
oilseeds	6935	3.25	16596	4.44
Others	14616	6.86	76191	20.39
Total	**213078**	**100**	**373599**	**100**

Source: *Rajasthan Agricultural Statistics at a glance 2010-2011 and 2016-17, Commissionerate of Agriculture, Rajasthan, Jaipur*





Crop Combination

Crop combination is a process of cultivating multiple crops in the same field. This practice helps farmers to harvest more than one crop in different seasons. Crop combination also nurtures the soil and increases its fertility. Importantly corp combination offers the highest returns in farming. The crop combination reflects the variable position of the individual crops within themselves. It can also be helpful in interpreting some aspects of economic and social geography (Mohammad, 1978). A number of statistical methods have been applied by the geographers to study the crop combination. The study of corp combination regions constitute an important aspect of agriculture geography as is provides a good basis agricultural regionalization. The corps are generally grown in combinations (Weaver, 1954). A number of quantitative and qualitative methods have been developed for determination of corp combination regions.

For the analysis of crop combination, first the percentage of different crops, during the Kharif and Rabi season, to the total cropped area has been calculated. The crops having a real coverage of less than one percent are not included in the analysis of crop combination as they are insignificant as compared to dominated crops. In Crop combination analysis method usually uses the Weavers method modified by Doi after substituting $\sum d^2/ n$ with $\sum d^2$ i.e. the sum of squared differences. In this method, the minimum value of deviation decides the number of crops to be included in crop combination. The modified formula of Rafiullah is as below:

$$d = \sqrt{\frac{\sum D^{2} p - D^{2} n}{N^{2}}}$$

Where d is the deviation,

Dp is the positive difference

Dn is negative difference from the medial value and

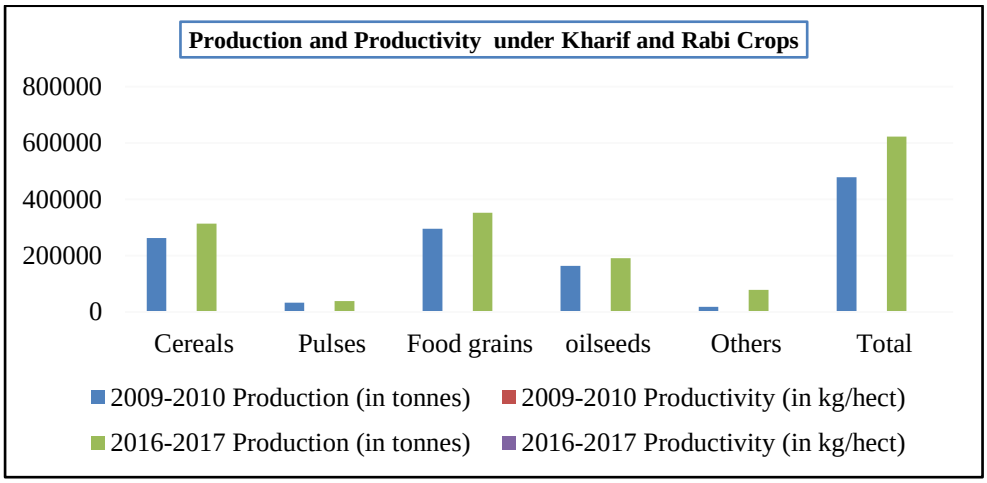
N is the number of crops.

In crop combination according to the crops production seasons, combination divides according to number of the corps. Monoculture, two crop combination, three crop combination etc.

Table no. 3 : Total Production and Productivity under Kharif and Rabi crops, 2018

Crops	2009-2010		2016-2017	
	Production (in tonnes)	Productivity (in kg/hect)	Production (in tonnes)	Productivity (in kg/hect)
Cereals	262489	2431	313967	2871
Pulses	33103	1001	38530	1340
Food Grains	295592	2096	352497	2552
oilseeds	163824	1532	191201	1330
Others	18767	894	78992	4028
Total	**478183**	**1778**	**622690**	**2065**

Source: *Rajasthan Agricultural Statistics at a glance 2010-2011 and 2016-17, Commissionerate of Agriculture, Rajasthan, Jaipur*



Agriculture Development

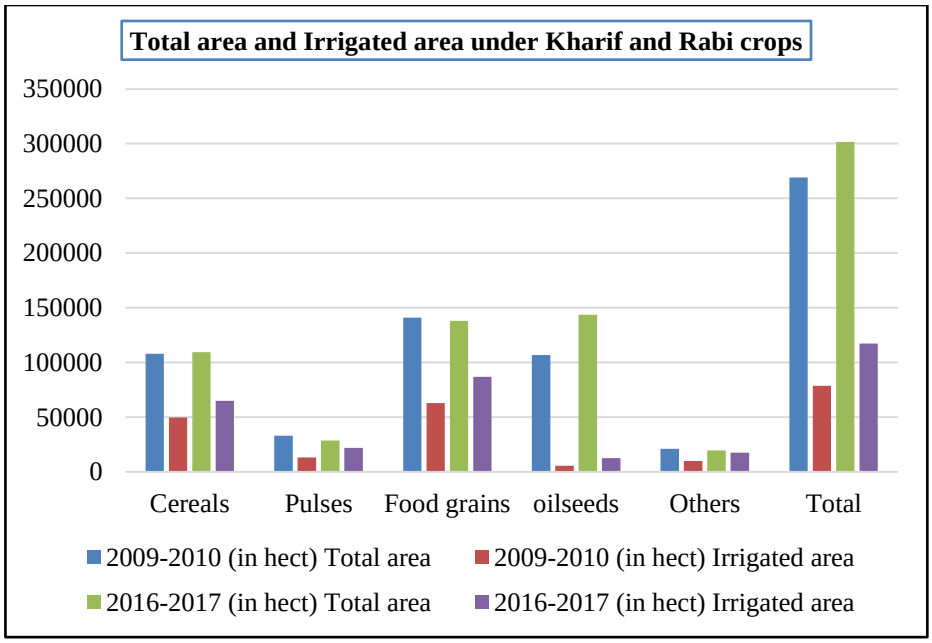
Agriculture development means providing assistance to the crop producers with the help of various agriculture resources. Providing protection, assisting in the research sphere, employing latest techniques, controlling pests and facilitating diversity all fall within the purview of agriculture development. Indian planning model has linked inclusive growth and agriculture development as the two angels of development. The first attention is for achieving higher production and productivity in food and non-food crops and also emphasized on area and production of the allied activities including horticulture and plantation, livestock, fisheries etc. The second attention was linked to employment opportunities and reduces rural poverty. This is possible by increasing farm wages and increasing employment opportunities in the non-farm sector. Agriculture is a state subject and its development and achievement is based on the policies and approaches taken by respective state Governments. In Rajasthan, the agriculture growth has been rapidly increasing as a whole since 2000's. The sources of agriculture growth performance may be explained in terms of exogenous and endogenous variables. The production and productivity of food crops, non-food crops and non-crops are endogenous and exogenous variables like land utilization, land irrigation, other inputs and Government's innovative agricultural policies.

The tables show the agricultural performance of Rajasthan are determined by the growth rate of production, productivity and area coverage of various crops and non-crops of two time periods from 2009-2010 and 2016-2017.

Table No. 4: Total area and Irrigated area under Kharif and Rabi crops, 2018

Crops	2009-2010 (in hect)		2016-2017 (in hect)	
	Total Area	**Irrigated Area**	**Total Area**	**Irrigated Area**
Cereals	107975	49893	109352	64945
Pulses	33078	13182	28751	22076
Food Grains	141053	63075	138103	87021
oilseeds	106958	5707	143782	12568
Others	20981	9943	19610	17660
Total	**268992**	**78725**	**301495**	**117249**

Source: *Rajasthan Agricultural Statistics at a glance 2010-2011 and 2016-17, Commissionerate of Agriculture, Rajasthan, Jaipur*



Discussion

In year 2009-2010 total area under kharif and rabi crops was 268992 hect. that became 301495 hect. in 2016-2017. Total irrigated area under kharif and rabi crops was 78725 hect. in 2009-2010 that became 117249 hect. in 2016-2017. It shows both areas increased in respective years. Total production under kharif and rabi crops was 478183 tonnes in 2009-2010 that became 622690 tonnes in 2016-2017 and total productivity under kharif and rabi crops was 1778 kg/hect. in 2009-2010 that became 2065 kg/hect. in 2016-2017. these datas also show agriculture development because production and productivity both increased in respective years.

Conclusion

Cropping pattern, crop combination indicate the complexities of crop distribution in quantitative manner. About 71 percent of total area of Pratapgarh district is under cultivation with a wide variety of Kharif and Rubi crops like Maize, Soyabean, Paddy, Sugarcane, Sunflower, Pulse (Kharif crops) and Wheat, Gram, Cotton, Groundnut, Sirson (Rabi crops) and more than 99 percent of the total agriculture land is double cropped area. The crop Wheat is the first ranking crop, Soyabean and Maize comes at second and third place respectively. The pattern of crops and crop combination are mostly controlled by topography, soil and irrigation facilities. Crops production and productivity are increasing in given years. The spatial variations of cropping pattern identified in the area are highly useful not only for watershed development planning but also for agriculture development and economic development of the farmers lives in the area.

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