

A Geographical Analysis of crop combination region in Pune district, Maharashtra.

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Abstract

The study of crop combination regions constitutes an important aspect of agricultural geography as it provides good basis for agricultural regionalization. This type of study is useful for regional agricultural planning for sustainable development. Weaver's crop combination study in geography is fruitful in many ways. Firstly, this technique provides an adequate understanding of individual crops. Secondly, combination is itself an integrative reality and lastly, crop combination regions are essential for the construction of more complex structure of vivid agricultural region. This crop combination technique has great importance in regional agricultural planning. In order to demarcate crop combination regions Weaver in 1954 devised the least standard deviation. In this technique actual percentage of the cropped area occupied by the different field compared with the theoretical distributions in which cropped area is equally divided among the component crops in an enumeration unit. With this procedure it is possible to establish and designate crop combinations which are come into existence because of closest resemblance in theoretical distribution of crops and actual percentage of crops. The present paper result of crop combination identified that the number of crops in combination has increased northern part and eastern part of the study region, means that increase facilities and sources of irrigation; other hand increases the number of crops in combination.

Keywords: Agriculture, Agricultural region, Crop Combination, Sustainable development.

Objectives:

The main Objective of present study is to analyze crop combination region in Pune district.

The Study Area:

Pune District is situated in Maharashtra state of India. Pune city is the district headquarters, total geographical area of district is 15,642 square kilometers. Pune district comes under the plain zone and situated at an average elevation of ranging from 600 to 1300 meter above the mean sea level. The district is lies between 17°54', 19°24' N Latitude, 73°19', and 75°10' E longitude. Pune district is bordered by Ahmadnagar district in the north, Solapur and Satara districts in the south, Ahmadnagar and Solapur districts of the east, Raigad and Thane district of the west. The Sahyadris run in the north-south direction of the district about 115 km. Pune District is the part of western Maharashtra in India.

Data Collection and Methodology:

The Present study was based on primary and secondary data sources. The published sources namely Tahsil Revenue Record, Socio-economic abstract of Pune District, District Census Handbook, Department of Irrigation, Groundwater Survey and Development Agency, Land Record office to obtain crop data in pune district. Land used data collected from socio -economic abstract. Pune district, strategic, research and extension plan of Pune district. And District census handbook in Pune district referred to collect related information. Semi-statistical and statistical techniques are applied to compute crop combination.

In the present study Doi's (1959) crop combination technique has been used. In present study, Doi's technique solves the problems of Weaver's technique simultaneously by substituting the variance ($\sum d^2/n$) or least standard deviation ($\sqrt{\sum d^2/n}$) of Weaver with the sum of squared deviation ($\sum d^2$). The combination having smallest $\sum d^2$ is the crop combination. The smallest $\sum d^2$ is actually found by using one sheet table. This table presents critical values for various elements at different ranks

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against cumulative percentage of elements at higher rank. To use this table it needs to sum up its actual percentages under different crops.

Discussion:

Crop combination analysis observed to be useful to understand relationship between soil climate complex and agricultural activity in several studies in geography (Pandey, 1992, Saptarshi, 1993, Bagat Vijay, 2004, More J. C, 2008) It may be defined as the geographical investigation of agriculture, which has the purpose to select various crops to be studied collectively in an area on the basis of long term land-man relationship. The study of crop combination regions constitutes an important aspect of agricultural geography as it provides good basis for agricultural regionalization. In present study, crop combination has obtained from by following statistical procedure. In case of Junnar taluka individual crop percentage are given as follows.

In Junnar taluka, first crop, bajara occupies 27.03 percent area, so that the next crop is included. It makes the sum of the two crops (27.03 + 21.06) is 48.09 percent. Cumulative percentage of 48.09 less than 50, so next crop is included, It makes three crops (27.03+ 21.06 + 11.70) is 59.79 percent. Cumulative percentage of 59.79 , it is higher than 50 and it is close to 60, so selected 60 as sum of the percentage of higher ranking elements i.e. bajara, jowar and fodder crops contributing over 55 percent of the total cropped area. Now under the heading 60, the critical value for the fourth rank of element is lower than fourth crop, The actual percentage of fourth crop is higher than critical value i.e. 3.5. So it is too included in crop combination. The cumulative percentage of four crops comes to 70 percent. The cumulative percentage of 70 lies between 65 and 70, but close to 70, where the corresponding critical value of element at fifth rank is 5.9, is again less than next crop, Gram, 7.89 percent. So fifth crop, gram, is also added to this combination. The cumulative percentage of five crops is 77.89, lies between 75 and 80, and close to 75. Now under the heading 75, the critical value of element at sixth rank is 6.1, is again less than next crop, oilseeds 7.69 percent. Oilseeds also added to this combination. The critical value for the seventh rank is 8.1, which is more than the seventh rank crop 6.70 percent. So, the seventh crop is excluded for the crop combination in Junnar taluka. Therefore, bajara, jowar, fodder crops, vegetables and fruits, gram, and oilseeds are allotted to Junnar taluka by Doi's technique. In the year 2013-14, Monoculture, two, three, five, and six crop combinations have been found in Pune district by applying Doi's method.

Findings:

Monoculture

During the year 1990-91 monoculture is found in Baramati, Daund, and Indapur talukas. It is the result of low intensity of irrigation, low amount of rainfall and black fertile soils. where jowar is cultivated as monoculture and is identified in three talukas on Indapur (78.33 percent), Daund (68.62 percent), and Baramati (63.22 percent). These region Jowar is sown twice in kharif and rabi seasons. In rabi season jowar is a main crop in east part of study region.

During the year 2013-14 monoculture is found in Indapur taluka and Pune city. In Indapur taluka jowar is the major crop and occupied in 67.68 percent area. It is the result of low intensity of rainfall. In Pune city on total net sown area all cultivation found in fruit and vegetables because some villages included in municipal corporation and irrigation is available in this area.

Table1A: Crop Combination in 1990-91

Sr. No.	Tahsil	No. of Crops in Combination	Name of Crops in Combination
1	Ambegaon	3	Jowar, Bajara, Wheat.
2	Baramati	1	Jowar
3	Bhor	3	Jowar, Rice, Oilseeds
4	Daund	1	Jowar
5	Haveli	3	Fodder +, Bajara, Jowar
6	Indapur	1	Jowar
7	Junnar	5	Bajara, Jowar, Gram, Vegetables Fruits, Wheat
8	Khed	3	Jowar, Bajara, Oilseeds
9	Maval	2	Fodder +, Rice
10	Mulshi	2	Fodder +, Jowar
11	Pune City	5	Vegetables Fruits, Jowar, Sugar cane, Wheat, Fodder +
12	Purandar	3	Jowar, Bajara, Oilseeds
13	Shirur	2	Bajara, Jowar
14	Velhe	2	Fodder +, Rice

Source : Computed by Researcher

Table1B: Crop Combination in 2013-14

Sr. No.	Tahsil	No. of Crops in Combination	Name of Crops in Combination
1	Ambegaon	5	Jowar, Bajara, Oilseeds, Vegetables Fruits +, Rice
2	Baramati	2	Jowar, Fodder Crops
3	Bhor	3	Jowar, Rice, Fodder Crops
4	Daund	3	Jowar, Sugar cane, Fodder Crops
5	Haveli	5	Fodder Crops, Bajara, Jowar, Sugar cane, Vegetables Fruits +
6	Indapur	1	Jowar
7	Junnar	6	Bajara, Jowar, Fodder Crops, Vegetables Fruits +, Gram, Oilseeds
8	Khed	5	Jowar, Bajara, Oilseeds, Gram, Vegetables Fruits +
9	Maval	3	Jowar, Rice, Gram
10	Mulshi	2	Jowar, Rice
11	Pune City	1	Vegetables Fruits +
12	Purandar	2	Jowar, Bajara
13	Shirur	2	Jowar, Bajara
14	Velhe	3	Jowar, Rice, Fodder Crops

Source : Computed by Researcher

Two Crop Combination

During the year 1990-91 two crop combination is found in four talukas, namely, Maval, Mulshi, Shirur and Velhe, where the most of part found in eastern part in study region. In this combination four crops have entered in four talukas, namely, jowar, bajra, fodder crops and rice. Maval and Velhe talukas have fodder crops and Rice combination, while Mulshi talukas found fodder crops and jowar combination. Maval and Velhe lies high rainfall and it is suitable for rice cultivation. In these tahsils some hilly area reserved for fodder crops. jowar and bajara combination found in Shirur talukas.

In 2013-14 two crop combination also found in Baramati, Mulshi, Purandhar and Shirur talukas. In this combination found jowar, fodder crops, rice and bajara. Purandhar and Shirur tahsils have found jowar and bajara combination. In this tahsils moderate rainfall and low intensity irrigation, hence most of cultivation jowar and bajara crops. Baramati tahsil have found jowar and fodder crops combination, while Mulshi tahsil have rice combined with jowar.

Three Crop Combination

During the year 1990-91, five tahsils have found of three crop combination. Ambegaon, Bhor, Haveli, Khed and Purandhar have entered three crop combinations. In this combination six crop have found namely, jowar, bajara, oilseeds, wheat, rice and fodder crops. Khed and Purandhar tahsils entered jowar, bajara, and oilseeds combination. The soil in khed and purandhar tahsils is suitable for oilseeds cultivation. jowar and bajara cultivation in khed and purandhar, because found moderate rainfall and less irrigation. Ambegaon tahsil have found jowar, bajara and wheat crop combination. Bhor tahsil found jowar, rice and oilseeds crop combination, while Haveli tahsil entered fodder crops, bajara and jowar crop combination.

During the year 2013-14, four tahsils have found of three crop combination. In this combination Bhor and Velhe tahsils have found jowar, rice and fodder crops combination. Daund tahsil observed the jowar, sugarcane and fodder crops crop combination. Sugarcane is major crops in this tahsils, where irrigation have found, combined with jowar and fodder crops. Maval taluka observed rice combined with jowar and gram. Maval taluka lies in west part in study regions. Rice is a dominant crop, followed by jowar and gram.

Five Crop Combination

During the year 1990-91, observed five crop combinations in Pune district. Jowar, bajra, wheat, gram, vegetables and fruit, fodder crops and sugarcane have observed in this combination. Five crop combinations are found in Junnar and Pune city. Junnar tahsi have found Bajara, Jowar, Gram, Fruit and Vegetables and Wheat crop combination.

During the year 2013-14 Ambegaon, Haveli and Khed have found five crop combination. In this combination entered the Jowar, Bajara, Oilseeds, Vegetables Fruits, Rice, fodder crops, sugarcane, and gram. Ambegaon tahsil observed jowar, bajara, oilseeds, vegetables and fruit and rice crop combination. Haveli tahsil observed the Fodder Crops, Bajara, Jowar, Sugarcane and Vegetables and Fruits crop combination. Where Khed tahsil observed the jowar, bajara, oilseeds, gram and vegetables and fruit crop combination.

Six Crop Combination

During the year 1990-91 six crop combination has not found. But in 2013-14 six crop combination have found in Junnar tahsil. Junnar tahsil in north part of the study region observed the jowar, bajara, fodder crop, fruit and vegetables, gram and oilseeds crop combination. Jowar covered largest area followed by bajara.

Conclusion:

The purpose of this paper is to highlight the changes in agricultural crop pattern and crop combination and crop region and its impact on the agricultural development during 1990-91 to 2013-

14. Jowar is a monoculture crop found in three talukas namely, Baramati, Daund, and Indapur in the year 1990-91 but in the year 2013-14 jowar is a monoculture crop found in only Indapur taluka and fruit and vegetables found in pune city. Two crop combinations are found in Maval, Mulshi, Shirur and Velhe talukas in the year 1990-91 and in year 2013-14 two crop combinations are found in Baramati, Mulshi, Purandhar and Shirur talukas. The three crop combinations found in Ambegaon, Khed, Bhore, Purandhar and Haveli talukas in the year 1990-91 and in the year 2013-14, three crop combination found Bhore, Daund, Maval and Velhe. Five crop combinations are found in Junnar and pune city in 1990-91 and Ambegaon, Haveli and Khed in the year 2013-14. Six crop combination are found in Junnar taluka only the year 2013-14. The result of crop combination identified that the number of crops in combination has increased northern part and eastern part of the study region, means that increase facilities and sources of irrigation; other hand increases the number of crops in combination. The present study, scholar may suggest that area under a crop may be multiplied by average yield in quantity, growing different type crops in the district to consummate the demand of increasing population by intensity of irrigation facility. This type of changes may also be useful to understand emphasize on water resources and thereby sustainability in agriculture. Such exercise has been kept for assist the further study.

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