

Use of Crop Diversification Technique for Quantitative Evaluation of Land use in Ahmednagar District in 1960-61 and 2010-11

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Abstract: *The area of Forest Cover (FC), Net Sown Area (NSA) Land Not Available for Cultivation (ANC), Fallow Land (FL) and Cultivable Waste (CW) have been converted into percentage to total geographical area are included in agricultural land use. Use of land is an important factor for planning process because of the finite nature of land resource. Ahmednagar district in Maharashtra covered an area of about 17 lakh hectare comprising nearly 73.52 percent area under net sown area in 1971-1972. Bhatia's method has been adopted in modified form. The crops having less than five percentages have been excluded from computation. In this research paper four crop-diversification regions have been identified as: 1) Area of high crop-diversification, 2) Area of moderate diversification, 3) Area of low diversification, and 4) Area of very low diversification. The spatial distributional pattern of crop diversification in the district in 1960-61 maximum crop diversifications appears in Rahuri (11.26) taluka and lowest at Shrigonda (24.48) taluka while in 2010-11 maximum crop diversification appears in Kopargaon (09.12) taluka and lowest at Newasa (41.76) taluka.*

Keywords: Crop Diversification, Land Utilization, Net Sown Area

1. Introduction

Agriculture is backbone of Indian economy. Agricultural scientists, economists, geographers and many others are engaged in the study of agriculture. Utilization of land requires proper planning for being limited resource. For agriculture, land is a very important resource. For its large area size, and physical and socio-cultural diversities, Ahmednagar has different types of land uses. After studying the land use pattern the spatial distribution of various crops, their growth and response to physio-socio-economic conditions prevalent in the district. The cultivation of crops and their growth are closely related to the decision making process on one hand and adaptation of innovation in agriculture, i.e. use of high yielding varieties, improved and efficient instrument, applications of chemical fertilizers and pesticides. The hectare under individual crop gives relative strength and realistic picture of crop landuse in the analysis of crop ranking of the region. The ranks of crops and their combination provide spatial variation in the distribution patterns. In this respect the study of crop combination and diversification manifests the present agricultural scenario.

2. Data Source

Secondary data has been used from Socio-Economic Reviews and District Statistical Abstracts of Ahmednagar District from 1961 to 2011. The data have been collected for various crops for the year 1960-61 and 2010-11 in both kharif and rabbi crops from taluka headquarter office, Ahmednagar District Gazetteer, Socio-Economic Abstract of Ahmednagar District and Census Handbook of Ahmednagar District are sources of data for this study. It is supplemented by numerous spot-inquiries. The areas of crop have converted into percentage (to net sown area) which is later on, used for ranking of crops to identify the relative strength of individual crop.

Objectives

- 1) Know the availability of land in Ahmednagar and its different uses.
- 2) To identify the crop diversification patterns of the Ahmednagar District by applying Bhatia's method of crop diversification and find out the variables responsible for such patterns in the area under study.

Study Area

Ahmednagar district in western Maharashtra region of Maharashtra state is an economically and agriculturally developed area. In 1961-62, there were thirteen tahsils in Ahmednagar district. The District 'Ahmednagar' is located middle part of the bank of Godavari and Mula river. This lays between 18°02'North 19°09'North to 73°09'East 75°05'East longitude with an area of 1701836 hectares of land and in Thirteen tahsils as per 1971-72 District gazetteer. It has an average elevation of 549 metres (1,801 ft) from mean sea level Physiography, rainfall, soil, temperature, and drainage influences on agricultural land use pattern in this district. Rainfall varies between 508 to 635 mms annually. The underline basalt on disintegration and decomposition brought various agents had yielded three kinds of soils viz. Deep black, deep & shallow Alluvial soils in Pravara, Mula and Seena river basins. These rivers are main irrigation source of middle district areas. The rainfall is mainly due to rain shadow area in term of amount of rainfall average receives 571.5 mms in western and middle part of district but southern part of district six tahsil are totally drought prawn area. Therefore these areas are mostly hilly and unirrigated. The variation in amount of rainfall & type of soil exerts influence on the Land use pattern of the study region in 1960-61 to 2010-11.

Crop Diversification

"The crop-combination technique is applied to compute crop-diversification pattern of the region. Its meaning is to raise variety of crops on arable land. It reflects the impact of physio socio- economic variables. Moreover, it shows the

contemporary competition among crops for an area, scope for rotation, the effect on double cropping”, (Husain, 1979). The maximum numbers of crops lead to maximum competition, the higher is the magnitude of diversification. Some Geographers and Economists so far have used the concept of diversification in variety of research. “This concept was applied in the field of manufacturing to identify the degree of diversifications and concentrations by Cleann (1930), later on, by Tree (1938), Florence (1942) and Rainwald (1949). Gibb Martin (1974) has used diversification concept in computing measurement of diversification of employment in industry”. Among Geographers, Bhatia (1965) adopted and introduced crop diversification technique in order to understand crop competition in the region followed by Jasbir Singh; Ayya modified Bhatia’s method of crop diversification with accounting for those crops which occupy at least one percent of the gross cropped area.

3. Methodology

Bhatia’s Crop Diversification Method

In order to identify spatial pattern of crop diversification in Present study, Bhatia’s method has been adopted in modified form. The crops having less than five percentages have been excluded from computation. This modified formula expresses as:

$$\text{Index of Crop Diversification} = \frac{\text{Percentage of Net Sown Area}}{\text{Number of 'n' Crops}}$$

where ‘n’ crops are those which individually occupy five or more than five percent of crop to net sown area in the talukas.

Crop Diversifications: Application and Results

The obtained results have been displayed in Map 1 & 2 and Table 1 and 2 shows crops, crops in competition, talukas and area in crop diversification in the Ahmednagar District.

Table 1: Patterns of Crop Diversification (1960-61 and 2010-11)

Diversification		No of Talukas		% of Total Talukas		Area (Hectares)		% of Area	
Class	Magnitude	1961	2011	1961	2011	1961	2011	1961	2011
0-10	High	--	02	--	14.29	--	116341	--	12.33
10-20	Moderate	10	05	76.92	35.71	915118	385079	76.17	40.82
20-30	Low	03	05	23.08	35.71	286359	291593	23.83	30.91
>30	Very Low	--	02	--	14.29	--	150251	--	15.93
Total		13	14	100	100	1201477	943264	100	100

(Source: By the Researcher)

In 2010-11 it observed largest area appears in the moderate crop diversification class covered 40.82 percent area in the district and two taluka characterized by high crop diversification (12.33 percent area in the study region) in Ahmednagar District. The two crops namely, Cotton and Sugarcane were in competition for diversification in Newasa taluka and Jawar and Wheat were in competition for diversification in Shrigonda taluka while Bajara and Jawar were in competition for diversification in Karjat taluka.

The three crops namely, Rice, Fodder crops and Condiments and spices were in competition for diversification in Akole taluka, Bajara, Jawar and Cotton were in competition for diversification in Shevgaon taluka and Bajara, Jawar and Wheat were in competition for diversification in Nagar

Map 1 & 2 show the spatial distributional pattern of crop diversification in the district. Four crop-diversification regions have been identified as: 1) Area of high crop-diversification, 2) Area of moderate diversification, 3) Area of low diversification, and 4) Area of very low diversification.

The four categories of crop diversifications, its class, magnitude, talukas and area are shown in Table 1. It observed from this table that in 1960-61 largest area appears in the moderate crop diversification class covered 76.17 percent area in the district and low crop diversification class covered 23.83 percent area in Ahmednagar District. The three crops namely, Jawar, oilseeds and pulses were in competition for diversification in Shrigonda and Karjat talukas. The four crops namely, Jawar, Bajara, Oilseeds and Pulses were in competition for diversification in Sangamner, Nagar and Parner talukas. Jawar, Bajara, Pulses and Cotton were in competition for diversification in Pathardi taluka while Jawar, oilseeds, Pulses and Fodder crops were in competition for diversification in Jamkhed taluka. The five crops, namely, Bajara, Oilseeds, Pulses, Rice and Fodder crops were in competition for diversification in Akole taluka, Jawar, Bajara, Wheat, Oilseeds and Sugarcane crops were in competition for diversification in Shrirampur taluka and Jawar, Bajara, Wheat, Oilseeds and Pulses crops were in competition for diversification in Newasa taluka in Ahmednagar District. Six crops namely, Jawar, Bajara, Wheat, Oilseeds, Pulses and Sugarcane were in competition for diversification in Kopargaon and Rahuri talukas, while Jawar, Bajara, Wheat, Oilseeds, Pulses and Cotton were in competition for diversification in Shevgaon taluka in Ahmednagar District (Table 2).

taluka. The four crops, namely, Bajara, Jawar, Oilseeds and Pulses were in competition for diversification in Parner and Jamkhed talukas, Bajara, Jawar, Cotton and Fruits were in competition for diversification in Pathardi taluka and Bajara, Wheat, Fodder crops and Sugarcane were in competition for diversification in Rahuri taluka while Bajara, Wheat, Oilseeds and Sugarcane were in competition for diversification in Jamkhed taluka in Ahmednagar District. Five crops namely, Bajara, Wheat, Oilseeds, Vegetables and Sugarcane were in competition for diversification in Sangamner taluka. Eight crops, namely, Bajara, Wheat, Oilseeds, Pulses, Cotton, Vegetable, Sugarcane and Maize were in competition for diversification in Kopargaon taluka. Bajara, Jawar, Wheat, Oilseed, Pulses, Cotton, Fodder crop and Sugarcane were in competition for diversification in

Shrirampur taluka in Ahmednagar district (Table 2 and Map 2).

Table 2: Pattern of Crop Diversification in 1960-61 and 2010-11

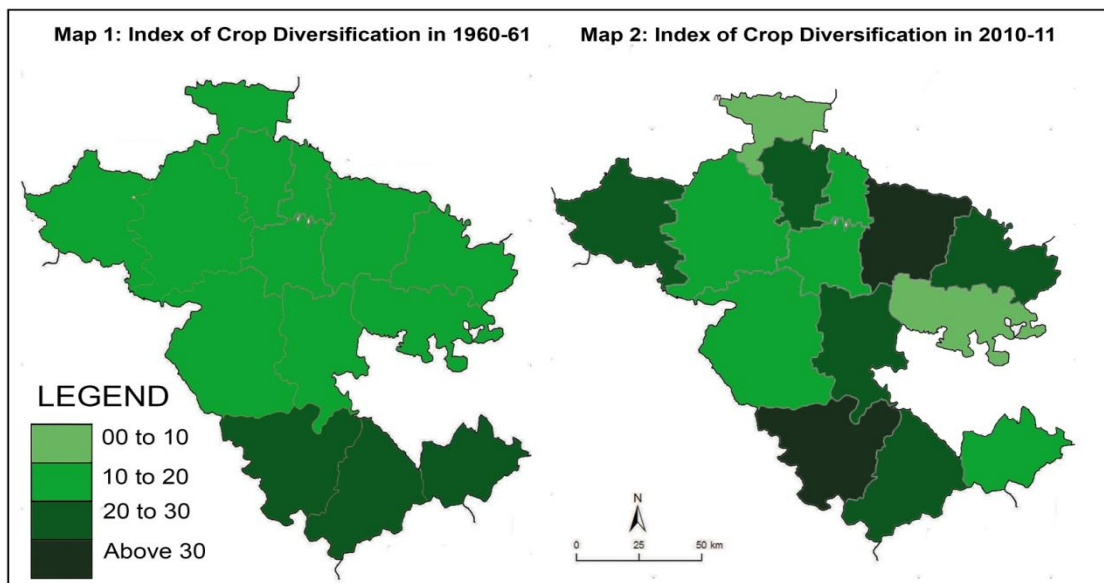
Taluka	Index of Crop Diversification		Crops in Competition for Diversification		Area in Hectares		% Area	
	1960-61	2010-11	1960-61	2010-11	1960-61	2010-11	1960-61	2010-11
Akole	11.58	20.26	B+Os+P+R+Fo	R+Fo+Cs	74784	58518	6.22	6.20
Sangamner	15.27	12.26	J+B+Os+P	B+W+Os+V+S	100826	82747	8.39	8.77
Kopargaon	13.92	09.12	J+B+W+Os+P+S	B+W+Os+P+C+V+S+M	87180	59036	7.26	6.26
Rahata	NA	21.25	NA	B+W+Os+S	NA	34656	NA	3.67
Shrirampur	16.45	10.18	J+B+W+Os+S	B+J+W+Os+P+C+Fo+S	61731	36231	5.14	3.84
Newasa	17.68	41.76	J+B+W+Os+P	C+S	107466	75146	8.94	7.97
Shevgaon	14.55	29.74	J+B+W+Os+P+C	B+J+C	96970	26500	8.07	2.81
Pathardi	19.64	09.71	J+B+P+C	B+J+C+Fr	88538	57305	7.37	6.08
Nagar	18.26	25.29	J+B+Os+P	B+J+W	102617	113272	8.54	12.01
Rahuri	11.26	14.78	J+B+W+Os+P+S	B+W+Fo+S	66070	45385	5.50	4.81
Parner	17.89	19.57	J+B+Os+P	B+J+Os+P	128936	143388	10.73	15.20
Shrigonda	24.48	34.52	J+Os+P	J+W	112359	75105	9.35	7.96
Karjat	23.27	25.36	J+Os+P	B+J	102297	58647	8.51	6.22
Jamkhed	21.12	15.01	J+Os+P+Fo	B+J+Os+P	71703	77328	5.97	8.20

(Source: By the Researcher)

1) Area of High Crop Diversification

There was no area under high crop diversification in 1960-61. This category covered 12.33 percent area under high crop diversification in 2010-11. In 2010-11 the area of high crop diversification appeared in Kopargaon and Pathardi talukas of the district. Two talukas come under high crop

diversification and covered 116341 hectares area. The crops in diversification were Bajara, Wheat, Oilseeds, Pulses, Cotton, Vegetables, Sugarcane, Maize, Jawar and Fruits. (Map 2 and Table 2).



2) Area of Moderate Crop Diversification

In 1960-61 the area of moderate crop diversification appeared in all over parts (ten talukas) of the district. Ten talukas come under moderate crop diversification and covered 915118 hectares area. The crops in diversification were Jawar, Bajara, Wheat, Oilseed, Pulses, Fruits, Sugarcane, Rice and Cotton. Ten talukas have occurred, respectively Akole, Sangamner, Kopargaon, Shrirampur, Newasa, Shevgaon, Pathardi, Nagar, Rahuri and Parner talukas (Map 1 and Table 2). While in 2010-11 the area of moderate crop diversification appears in middle part (three talukas) and two taluka to the south side of the district (Map 2). Five talukas come under moderate crop diversification and covered 385079 hectares area. The crops in diversification were Bajara, Wheat, Oilseed, Vegetable,

Sugarcane, Jawar, Pulses, Cotton and Fodder crops. Three talukas had occurred in middle part, respectively Sangamner, Shrirampur and Rahuri and two taluka to the south part, viz. Parner and Karjat (Map 2 and Table 2).

The western part in the district identified 10 to 20 index of crop diversification on Laterite, Radish brown soil tract where rainfall ranging between 455-636 mms (average annual rainfall) in the talukas, viz. Sangamner, Shrirampur and Rahuri. A small patch of moderate crop diversification appears in south part in the low rainfall (less than 368 to 413 mms rainfall) in the district that parts limit on the growth of crops. In this category the Parner and Karjat talukas includes. (Map 2 and Table 2).

3) Area of Low Crop Diversification

In 1960-61 the low crop diversification regions appeared in the southern part of the district. Jawar, oilseeds, pulses and fodder crops come under this diversification. It appeared in Shrigonda, Karjat and Jamkhed talukas in the south part of district (Map 1). While In 2010-11 the low crop diversification regions appears in the all over part of the district. Rice, Fodder crops, Bajara, Jawar, Cotton, Wheat and Condiments and Spices come under this diversification. It appeared in the talukas namely, Akole, Shevgaon, Nagar, Karjat and Rahata in the district (Map 2). This part confines with average annual rainfall between 300 to 600 mms and deep black to medium black soils has resulted low crop diversification in this part. It appeared in the talukas namely, Rahata, Nagar and Shevgaon in the northern strip. The west part of the district was found low diversification of crops in the Akole taluka. These talukas have 20 to 30 index of crop diversification. Thirty five percent talukas come under this category which covered 291593 hectares area (30.91 percent) to the net sown area in the district (Map 2 and Table 2).

4) Area of Very Low Crop Diversification

There was no area under very low crop diversification in 1960-61. But in 2010-11 the north eastern part in the district comprising one taluka, namely, Newasa and south part of district one taluka namely, Shrigonda had found very low crop diversification covered 15.93 percent (150251 hectares) area of the district. Cotton, Sugarcane, Jawar and Wheat were in competition in this taluka. These crops were grown on coarse black, Radish brown soil hence were unprofitable and between 380-450 mms average annual rainfall (Map 2 and Table 2).

4. Conclusion

- In 1960-61 maximum crop diversification appears in Rahuri (11.26) taluka and lowest at Shrigonda (24.48) taluka while in 2010-11 maximum crop diversification appears in Kopargaon (09.12) taluka and lowest at Newasa (41.76) taluka.
- There was no area under high crop diversification in 1960-61. This category covered 12.33 percent area under high crop diversification in 2010-11.
- Bajra, Wheat, Oilseeds, Pulses, Cotton, Vegetables, Sugarcane and Maize in Kopargaon and Bajara, Jawar, Cotton and Fodder Crops in Pathardi tahsils comprise in high crop diversification class.
- The area under moderate crop diversification covered 76.17 and 40.82 percent in 1960-61 and 2010-11.
- Bajara, Wheat, Oilseeds, Vegetable and Sugarcane in Sangamner tahsil Bajara, Jawar, Wheat, Oilseed, Pulses, Cotton, Fodder Crop and Sugarcane in Shrirampur tahsil Bajara, Wheat, Fodder Crop and Sugarcane in Rahuri tahsil Bajara, Jawar, Oilseeds and Pulses in Parner and Jamkhed tahsils comprise in moderate crop diversification class.
- The area of low crop diversification covered 286359 and 291593 hectares (23.83 and 30.91 percent to total area) in 1960-61 and 2010-11.
- Low crop diversification is noticed at Akole, Rahata, Shevgaon, Nagar and Karjat tahsils whereas very low

crop diversification is noticed at Newasa and Shrigonda tahsils.

- No any crop goes out in the competition for diversification, while jawar, bajara, wheat, cotton, rice, oil seeds, pulses, vegetation, fodder, sugarcane, fruits and condiments and spices enters in the competition for diversification.

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