



(RESEARCH ARTICLE)



Agricultural productivity in 1990 to 2015 of Ahmednagar District of Maharashtra State

MR Erande *

Department of Geography, Shri Mulikadevi Mahavidyalaya, Nighoj, Tal. Parner, Dist. Ahmednagar, Maharashtra, India.

International Journal of Science and Research Archive, 2023, 08(01), 662–670

Publication history: Received on 16 November 2022; revised on 05 February 2023; accepted on 07 February 2023

Article DOI: <https://doi.org/10.30574/ijrsra.2023.8.1.0042>

Abstract

The present research paper studies and analyze the agricultural productivity at the macro level in the Ahmednagar district. This study is based on secondary data collected from revenue records and district gazetteer offices. Agricultural production was depending on market, demand, physical, and climate, socio-cultural, economic, technological and organizational factors. Endeavour is made to study landuse patterns in Ahmednagar district of Maharashtra State for the year 1990-91, this is the normal year for an agricultural phenomenon. The study region covers 1704800 hectares of land the percentage of the state is 5.6% area and has a population of 4543159 in 14 tahsils as per the 2011 Census. Ahmednagar District is located in the western part of Maharashtra State. Physiography, rainfall, soil, temperature, and drainage influence agricultural productivity and land use pattern in this district. Rainfall varies between 200 to 382 mms. The present study represents a real situation of cropping pattern in Ahmednagar district and helps planners and agricultural scientists for agricultural planning at the tahsil level.

Keywords: Agriculture land use; Agricultural productivity; Yield of Crop; Ahmednagar

1. Introduction

"Agricultural Productivity is the measurement of output and the inputs required to produce that output." In other terms, it is a ratio of input to output. In traditional agricultural productivity measurement, geographers and economists considered inputs such as labour and capital to be costs incurred in the production of agricultural produce. The traditional technique to measuring agricultural productivity, on the other hand, ignores the social and environmental costs associated with food production and livestock keeping.

In today's agricultural productivity measurement, the issue of soil sustainability, ecosystem health, and social acceptability is becoming increasingly significant. Agricultural productivity is determined by the interaction of physical and cultural elements, and it presents itself in terms of per hectare productivity and total production. Where agricultural productivity measurement can assist in determining which areas are working less efficiently than others.

Agricultural plans can be developed to eliminate and minimise regional inequities by delineating zones of low, medium, and high productivity. It also provides an opportunity to establish the ground reality, the true cause of an area's or region's agricultural backwardness. Agriculture productivity is the most essential indicator for demonstrating the geographical pattern of agricultural development in the research region.

Researchers, geographers, and economists have created tools and techniques to determine agricultural production in the last decade. The following are some approaches developed and used for measuring agricultural production and agricultural efficiency per unit area. such as output per unit area, production per unit of farm labour, to assess

* Corresponding author: MR Erande

agricultural production as grain equivalents, input-output ratio and ranking coefficient method (Kendall, 1939; Stamp, 1960 and Shafi, 1990).

1.1. Study area

Ahmednagar district is situated partly in the upper Godavari Basin. It lies between 18°2' North latitude to 19° 9' North latitude and 73°9' East longitudes to 75° 5' East longitudes. It is surrounded by Nashik district in the North, Beed and Aurangabad districts in the East, Pune district in the South, Thane and Raigad districts in the North-West. Ahmednagar district has an area of 17410 square km and a population is 4543159 (2011 Census). It ranks first in terms of area and sixth in terms of population among the district of the state. The mainstream of the Sahyadri runs north-south in the western proportion of the district. From the main Sahyadrian range, two prominent spurs stretch out of the east. Baleshwar and Harishchandra range which runs right across the district. It acts as a watershed between the Pravara and its tributaries which drain towards the Godavari. Some of the ranges are flat-topped and regular in height and slope, while others are conical and irregular. The district is broadly divided into three major geographical regions: I) Pravara Basin, II) Dhora Basin and III) The Kukadi Basin. The district is drained by two main rivers, viz. Pravara and the Kukadi and their tributaries. The climate of the district is generally dry except during the South-West monsoon season. The average annual rainfall for the district as a whole is 488.4 mm. Within the district, there are considerable variations in rainfall. The rainfall generally decreases as one proceeds from West to East. The temperature begins to increase rapidly from the latter half of February. May is the hottest month and December is the coldest month with the Maximum temperature at 36.38°C and minimum temperature at 19.92 °C at Ahmednagar. The soil of the district is essentially derived from the Deccan Trap which is the predominant rock formation of the district. The soil formation is mainly affected by the climatic condition and topography of the district. The soil in the Pravara and Mula valleys is quite deep and fertile. The relief in the rest of the district is undulating and susceptible to erosion. The light shallow soil is found on hillslopes and very coarse soils at a higher elevation.

Objectives

- Know the availability of land in Ahmednagar District and its different uses.
- To study the agricultural productivity in Ahmednagar District from 1990-91 to 2015-16.

1.2. Database and methodology

The area and agricultural productivity of covered each crop had converted into a percentage of the total geographical area. Secondary data has been used from Socio-Economic Reviews and District Statistical Abstracts of Ahmednagar District in 1990-91 and 2015-16. The description of each land classification has been supplemented by numerous spot inquiries, besides information embodied by using the Ahmednagar District Census Handbook, District Gazetteer and District Socio-Economic Review of Ahmednagar District.

1.2.1. Productivity of agricultural crops

Agriculture productivity fluctuations in the percentage share of total crop output allocated to tehsils and districts in the Ahmednagar district. To study the changes in the output of productivity of certain crops in the Ahmednagar district between 1990-1991 and 2015-16. In these two terms years of data, average changes in the production of selected crops are discovered throughout the entire study area. The overall production of chosen crops is shown, with the value increasing and decreasing over the research period. Table No. 1 illustrates the production of wheat, jawar, bajra, pulses, cotton, oilseeds, rice, vegetables, fodder crops, sugarcane, fruits, maize and other crops as well as the variations in the production of wheat, jawar, bajra, pulses, cotton, oilseeds, fodder crops, sugarcane, fruits, maize and other crops. Other products, such as rice, vegetables, sugarcane and maize, are dropping in value by less than 5.0% due to production changes in the Ahmednagar district area.

Table No. 1 indicates the increased value of selected crops, which is extremely high in wheat, jawar, bajra, cotton, oilseeds, fodder crops, fruits, maize and other crops but very low in rice, pulses, sugarcane, vegetables, and total food crops accordingly. All of the information in the preceding table no. 1 and trends of production of the average yield of selected crops are the same.

These crops were chosen in the Ahmednagar district, where crop yield has changed in response to significant technological advances in agriculture and irrigation facilities over the last few decades. The use of seeds, fertilizers, market facilities and irrigation sources has increased crop yield and production patterns.

Because all of these crops are soil-adapted, black soil plays a vital role in enhancing yield. As a result, all of these factors interact and influence agricultural production in the Ahmednagar district during the investigation period.

1.2.2. Levels of Bajra Productivity

The average amount of Bajra productivity in the Ahmednagar district varies greatly. During the investigation period of 1990-91, the average productivity of Bajra in the region was 825 kg per hectare. High Bajra productivity of more than 1000 kg per hectare was seen in Kopargaon, Rahata, Shrirampur, Shevgaon, Pathardi, Nagar, Rahuri, Parner, Karjat and Jamkhed tehsils in this region. While Bajra productivity ranges from 100 to 1000 kg per hectare in Sangamner tehsils. In the tehsils of Akole, Newasa and Shrigonda change in productivity were noted between 1990-91 and 2015-16. The maximum yields of 700 kg per hectare were obtained in 2015-16, with a total production of 38551 metric tons. (Map 1A)

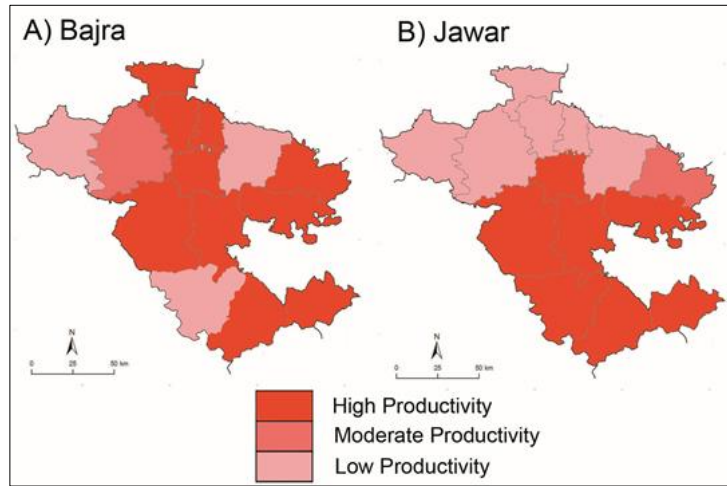


Figure 1 Agricultural productivity of Ahmednagar district (1990-91 to 2015-16)

1.2.3. Levels of Jawar Productivity

During the investigation era, jawar was the predominant crop in the Ahmednagar district. The yield of Jawar in the study region has varied greatly during the last few decades. In 2015-16, the region's average productivity was 670 kg per hectare. Pathardi, Nagar, Rahuri, Parner, Shrigonda, Karjat and Jamkhed tehsils reported jawar productivity of more than 6000 kg per hectare while the productivity was between 3000 to 6000 kg. Per hectare recorded in Shevgaon tahsil. Very less productivity was recorded in Akole, Sangamner, Kopargaon, Rahata, Shrirampur and Newasa tehsils in 2015-16 (Map 1B).

1.2.4. Levels of Wheat Productivity

Table no. 1 shows the distribution pattern of wheat productivity. During the study period, the average wheat productivity in the region was 1520 Kg per hectare. Kopargaon, Rahata, Rahuri, Nagar and Shrigonda tehsils have yielded wheat production above 2000 Kg. per hectare, however, Akole, Sangamner, Shrirampur, Newasa and Parner tehsils have a moderate output of wheat 1000 to 2000 kg. In Shevgaon, Pathardi, Karjat and Jamkhed tehsils, production was less than 1000 kg. During 2015-16 in wheat production. The yield and wheat products are the greatest in the region but have been gradually declining since the 1990-91 decade (Map 2A).

Table 1 Average Yield Per Hectare of Selected Crops in Ahmednagar District 1990-95 to 2005-10

Sr.No.	Crops	Yield per Hectare inKg.		Production in '000'tones		Volume of Change in %
		1990-91	2015-16	1990-91	2015-16	1990-91 to 2015-16
1	Bajara	700	950	443240	507091	22.32
2	Jawar	560	780	43260	85566	14.79
3	Wheat	800	1520	25848	72260.8	16.23
4	Oil Seeds	160	350	2883.2	17412.5	5.08
5	Pulses	180	260	10346.4	8317.4	-0.71
6	Vegetables	850	1230	12648	1783.5	-3.80
7	Fodder Crops	560	750	54812.8	77685	8.00
8	Sugarcane	26	42	1623.44	1617.42	0.00
9	Fruits	630	860	2866.5	79825.2	26.90
10	Maize	350	560	1417.5	17908.8	5.77

Source: Socio-Economic Abstract of Ahmednagar District (1990-91 to 2015-16)

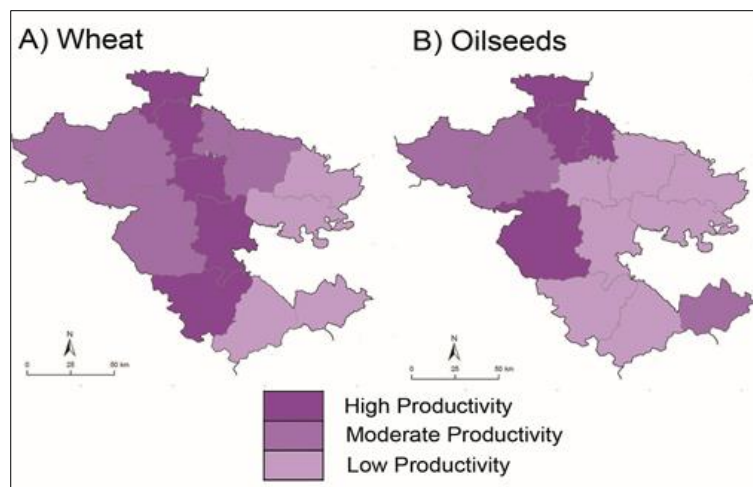


Figure 2 Agricultural productivity of Ahmednagar district (1990-91 to 2015-16)

1.2.5. Levels of Oilseeds Productivity

Oilseeds, which include groundnuts and sesames, are major crops in the region, with a concentration in the district's south and central. During the study period, the average productivity of oilseeds was 255 kg per hectare. Oilseed productivity in Kopargaoon, Rahata, Shrirampur and Parner tehsils was more than 1500 kg. Oilseed productivity of 1000 to 1500 kg per hectare was observed in Sangamner, Akole and Jamkhed tehsils. During the period 2015-16, Shevgaon, Pathardi, Nagar, Rahuri, Shrigonda and Karjat tehsils had low productivity of 500 to 1000 kg per hectare. Production levels are limited due to agronomic constraints and competition with other grain crops. During the study periods, the total oilseed production for the region was 60942 metric tons, with a yield of 160 kg per hectare. After increasing production and yield in recent decades, the yield was 350 kg per hectare (Map 2B).

1.2.6. Levels of Pulses Productivity

Pulses are a vital food grain in the Ahmednagar region. Pulses production in this region is 220 kg per hectare on average. Kopargaoon, Newasa, Parner and Jamkhed tehsils were found to have a high yield of more than 3000 kg per hectare of Pulses. While Akole, Sangamner, Rahata, Shrirampur, Rahuri and Karjat tehsils had intermediate productivity of 1000 to 3000 kg per hectare. During the period 2015-16, Shevgaon, Pathardi, Nagar and Shrigonda tehsils had low productivity of less than 1000 kg per hectare. Pulses productivity is quite high in the Jamkhed tehsils where the concentration of Pulses plays a big impact (Map 3A).

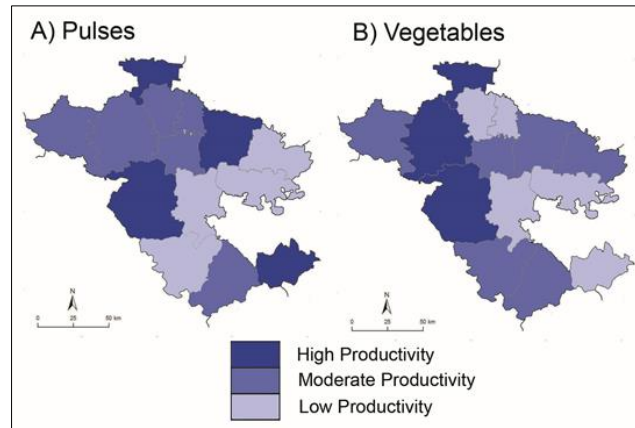


Figure 3 Agricultural productivity of Ahmednagar district (1990-91 to 2015-16)

1.2.7. Levels of Vegetables Productivity

Vegetables are very significant in the Ahmednagar district. In 2015-16, the average productivity of vegetables was 1230 kg per hectare. Sangamner, Kopergaon and Parner tehsils had the highest yield of fruits and vegetables, exceeding 5000 kg per hectare. In Akole, Newasa, Shevgaon, Rahuri, Shrigonda and Karjat tehsils, productivity ranged from 2000 to 5000 kg per hectare. Low productivity of less than 2000 kg per hectare was recorded in Rahata, Shrirampur, Pathardi, Nagar and Jamkhed tehsils with a high concentration throughout the district from 2015-16. To restrict, the development and productivity of vegetables recorded during the study periods were decreased to 10864 metric tons (Map 3B).

1.2.8. Levels of Fodder Crops Productivity

Fodder crops are very important crops of animal husbandry and dairy farming in the Ahmednagar district. In 2015-16, the average productivity of fodder crops was 750 kg per hectare. Akole, Sangamner, Shrirampur and Rahuri tehsils had the highest yield of fruits and vegetables, exceeding 3000 kg per hectare. In Kopergaon, Rahata and Newasa tehsils, productivity ranged from 1000 to 3000 kg per hectare. Low productivity of less than 1000 kg per hectare was recorded in Shevgaon, Pathardi, Nagar, Parner, Shrigonda, Karjat and Jamkhed tehsils with a high concentration throughout the district from 2015-16. To restrict, the development and productivity of vegetables recorded during the study periods decreased to 22872 metric tons (Map 4A).

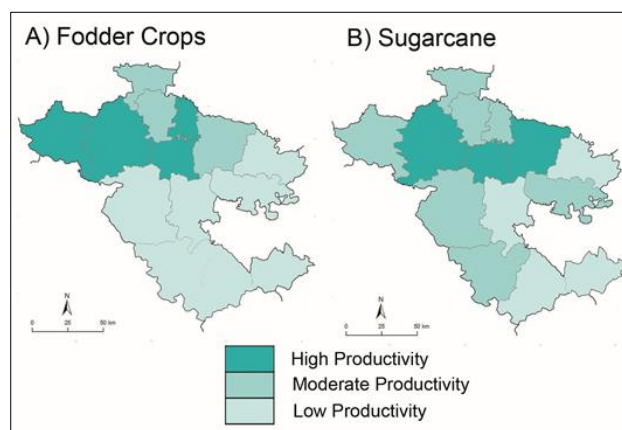


Figure 4 Agricultural productivity of Ahmednagar district (1990-91 to 2015-16)

1.2.9. Levels of Sugarcane Productivity

During the period 2015-16, the average productivity of sugarcane in the Ahmednagar district was 42 tons per hectare. Sugarcane is another cash crop grown by farmers in the Ahmednagar district. Sugarcane productivity of over 40 tons per hectare was seen in the tehsils of Sangamner, Newasa and Rahuri. While modest sugarcane productivity of 15 to 40 tons per hectare was noted in Akole, Kopergaon, Rahata, Shrirampur, Pathardi, Parner and Shriganda tehsils. During the period 2015-16, Shevgaon, Nagar, Karjat and Jamkhed tehsils recorded low productivity of less than 15 tons per hectare. The highest sugarcane was recorded in Sangamner tehsil during study periods (Map 4B).

1.2.10. Levels of Fruits Productivity

Fruits are very significant in the Ahmednagar district. Fruits such as mango, pomegranate, bananas, grapes, custard apple, lemon, orange, papaya and watermelon have high production rates in the region. Pomegranate is a major crop in the Ahmednagar area, with 20% of the region's production focused on this fruit crop. In 2015-16, the average productivity of fruits was 860 kg per hectare. Sangamner and Newasa tehsils had the highest yield of fruits, exceeding 3000 kg per hectare. In Rahata, Shrigonda and Pathardi tehsils, productivity ranged from 1000 to 3000 kg per hectare. Low productivity of less than 1000 kg per hectare was recorded in Akole, Kopargaon, Shrirampur, Shevgaon, Nagar, Rahuri, Parner, Karjat and Jamkhed tehsils with a high concentration throughout the district from 2015 to 2016. To restrict, the largest production was discovered in 2015-16 rather than 1990-91 it is observed at 76959 metric tons (Map 5A).

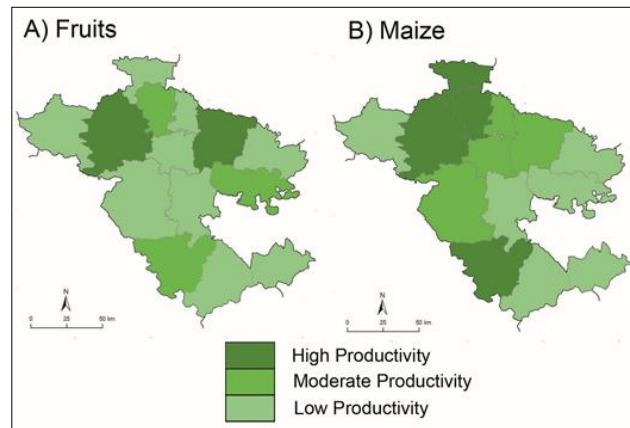


Figure 5 Agricultural productivity of Ahmednagar district (1990-91 to 2015-16)

1.2.11. Levels of Maize Productivity

Maize was also a significant crop in the Ahmednagar district between 2015 and 2016. The region's average maize productivity is 5600 kg per hectare. Maize productivity exceeding 1000 was highest in the tehsils of Sangamner, Kopargaon, Rahata and Shrigonda. Moderate maize productivity of 500 to 1000 kg per hectare was observed in Shrirampur, Newasa, Rahuri and Parner tehsils. During the investigation period, low maize productivity of less than 500 kg per hectare was observed in Akole, Shevgaon, Pathardi, Nagar, Karjat and Jamkhed tehsils. Important cash crops generally the district and cultivators were pleased with this performance in this region since ideal climatic conditions, soil texture temperature, and water availability was responsible for maximum yield (Map 5B).

2. Overall productivity of Ahmednagar district: the measurement of yield index method

During the study period of Ahmednagar district from 1990-91 to 2015-16, the regional imbalance in agriculture productivity was examined using a statistical Yield Index Method. While using this procedure, the following crops were cultivated in the district and were chosen. Jawar, Bajra, Wheat, oilseeds, Pulses, vegetables, Fodder crops, Sugarcane, Fruits and Maize are examples of crops.

The yield index of selected crops is calculated by the following formula according to the S.S. Bhatiya (1967) method:

$$\text{Yield of Crop 'a'} = \frac{\text{Yield of Crop 'a' in the areal unit}}{\text{Yield of Crop 'a' in the region}} \times 100$$

$$\text{Agricultural Efficiency Index} = \frac{I_{ya} \times C_a + I_{yb} \times C_b + I_{yn} \times C_n}{C_a + C_b + C_n} \times 100$$

A composite yield index was obtained for each tehsil and the same is represented and shown in Map No.6

Table 2 Overall Agricultural Productivity of Ahmednagar District (1990-91 to 2015-16), By S. S. Bhataia Method(1967)

Sr. No	Agriculture Productivity	Category of Ei	No. of Tehsils	Name of Tehsils
1	High Productivity	Above 500	4	Sangamner, Kopargaon, Newasa, Shrirampur
2	Moderate Productivity	200 to 500	6	Akole, Rahata, Pathardi, Nagar, Rahuri, Jamkhed
3	Low Productivity	Less 200	4	Parner, Shrigonda, Shevgaon, Karjat

Source: Computed by the Researcher

According to the table no. 3 the yield index is calculated and divided into three categories such as;

- Areas of High Productivity
- Areas of Moderate Productivity
- Areas of Low Productivity

2.1. Areas of High Productivity (above 500)

During the investigation periods of 1990-1991 and 2015-16, the selected major crop productivity was observed in this category, which includes the tehsils of Sangamner, Kopargaon, Newasa and Shrirampur which are located in the north Ahmednagar district of the study region. Because of the favorable climatic conditions, heavy rainfall, ideal soil for crop production, and well-built irrigation facilities (wells, tube wells, and canals), and sources to maximize crop production in this region. During the examination period of 1990-91 to 2015-16, a high productivity area displayed above the agricultural efficiency index is 500 in the region of the Ahmednagar district (Map 6).

2.2. Areas of Moderate Productivity (200 to 500)

During the investigation period, this category of moderate productivity was mostly recorded in the center and southern parts of the Ahmednagar district. Akole, Rahata, Pathardi, Nagar, Rahuri and Jamkhed tehsils had moderate productivity levels of 200 to 500. Because rainfall is minimal in this region, crop yield in this region is determined by soil factors and farmer economic conditions (Map 6).

2.3. Areas of Low Productivity (below 200)

During the study period, Parner, Shrigonda, Shevgaon and Karjat tehsils of Ahmednagar district were included in this group. The irrigation facility in Parner and Karjat tehsil was not developed and was not in excellent working order (Map 6).

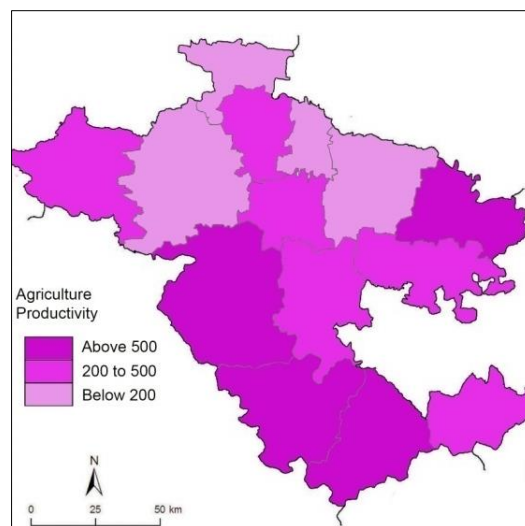


Figure 6 Agricultural productivity of Ahmednagar district (1990-91 to 2015-16)

Agricultural implements, on the other hand, are ancient and in bad condition due to traditional practices. Rainfall and climatic conditions are also to blame for the combined effect of all these factors, which resulted in low agricultural production (less than 200) in this region from 1990-91 to 2015-16.

3. Conclusion

- The major food crop production is Bajra, Jawar and Wheat. The average productivity of Bajra was recorded at 79.17% during the study periods.
- The highest productivity of food crops recorded is Wheat (126.67%) in 2015-16. The change in production is positive it is observed at 60.00% during study periods while the lowest productivity recorded in the crops was Sugarcane.
- In 1990-91 the largest area and productivity was recorded Vegetables and the lowest was Sugarcane as well as in 2015-16.
- The Percentage of area and productivity is high of Wheat crops and the lowest is Sugarcane observed during the study periods.
- In 1990-91, the average productivity is highest recorded for vegetables (850 Kg. per hectare s) as well as the food crops is Wheat crop while the lowest productivity is recorded for Sugarcane (26 metric tons per hectare).
- In 2015-16, the average productivity is highest recorded for Wheat (1520 Kg. per hectare s), as well as cash crops, a Vegetable crop while the lowest productivity is recorded for Sugarcane (42 metric ton hectares).
- The highest positive changes observed in Bajra crops as food crops and fruits are cash crops during the study period.
- The areas of high productivity are recorded in Sangamner, Kopargaon, Newasa and Shrirampur tehsil during study periods.
- The areas of moderate productivity are recorded in Akole, Rahata, Pathardi, Nagar, Rahuri and Jamkhed tehsil during study periods.
- The areas of low productivity are recorded in Parner, Shrigonda, Shevgaon and Karjat tehsil during study periods.
- In the Ahmednagar district northern side of the district are very much developed in irrigation facilities, market, transportation and fertilizers while the southern part of the tehsil observed less irrigation facilities, drought-prone area, and less favorable environmental condition for agricultural development.

References

- [1] Bhatia, S.S. (1967), Spatial Variation, Changes and Trends in Agriculture Efficiency in U.P. 1953-1964. India Journal of Agricultural Economics.
- [2] Bhatia, S.S. (1965), Patterns of Crops Concentration and Diversification in India, Economic Geography.
- [3] Bhatia, S.S. (1965), Patterns of Crops Concentration and Diversification in India, Economic Geography.
- [4] Coppock, J.T. (1968), Changes in Land use in Great Britain, Land use and Resources Studies in Applied Geography, London. Institute of British Geographers of Special Publication, Vol. 1.
- [5] Chauhan, T.S. (1987), Agricultural Geography, A Case Study of Rajasthan State, Academic Publication, Jaipur.
- [6] Chisholm, (1962), Rural Settlement and Land use, An Essay on Location: (United Forum Agricultural Geography by W. M. Morgan and Mutton, London Methuen and Co. 1962.
- [7] Deshpande, V.D. (1964), Inter District Variations in Agricultural Efficiency in Maharashtra State, Indian Journal of Agriculture Economics, Vol. 19, No. 1.
- [8] Husain, M. (1976), A New Approach to the Agricultural Productivity Regions of the Sutlej -Ganga Plains of India, Geographical Review of India, Vol. 36.
- [9] Husain, M. (1996), Systematic Agricultural Geography, Reprinted in 2004, Rawat Publication, Jaipur, Rajasthan State.
- [10] Jasbir, Singh. And Dhillon, S.S. (1984), Agricultural Geography, Tata Mc. Grow Hill Publishing Co. Ltd. New Delhi.
- [11] Kendall, M.G. (1939), The Geographical Distribution of Crop Productivity in England, Spatial Geography. Ed. Barry and Marbel.

- [12] Mali, N.G. (2004), A Critical Study of Agricultural Productivity in Parbhani District, Maharashtra State, and Thesis Submitted to S.R.T.M.U. Nanded.
- [13] Mohammad, Ali. (1978), Studies in Agricultural Geography, Rajesh Publication, New Delhi.
- [14] Noor, M. and Singh, R. (1981), Measurement of Crop Productivity, Perspectives in Agriculture Geography, Vol. 4, Concept Publishing Company, PP. 159-180
- [15] Patil, A.A. (2002), Changes in Agricultural Productivity in Upper Bhima an Upper Krishna Basin in Maharashtra State, A Geographical Analysis, And Unpublished Thesis Submitted to Shivaji University, Kolhapur, Maharashtra, PP. 94-102
- [16] Shafi, M. (1960), Measurement of Agricultural Efficiency in U.P., Economics Geography, Vol. 36, PP. 296-305
- [17] Singh, J. (1975), An Agricultural Atlas of India: A Geographical Analysis, Kurukshetra, Vishal Publication India, PP. 263-298