

Spatial and Temporal Variations in Agricultural Cropping Patterns of Bhandara District

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Abstract

Agriculture is an important economic activity in Bhandara District of Maharashtra. The district has favourable conditions for agriculture, including adequate rainfall, agricultural land and irrigation facilities. According to NABARD's Bhandara district profile, agriculture is the main occupation for a large part of the rural population. The district has about 2.08 lakh hectares of net sown area, of which about 1.42 lakh hectares is irrigated. Paddy, soybean, wheat, tur and sugarcane are among the major crops grown in the district.

The present study examines the **spatial and temporal variations in agricultural cropping patterns** in Bhandara District. Spatial variation refers to differences in crop distribution from one taluka or area to another, while temporal variation refers to changes in cropping patterns over different years. The study uses primary information collected from farmers and secondary information obtained from government and institutional sources. The study considers factors such as rainfall, irrigation, soil, market prices, production costs, agricultural technology and government schemes. The findings help to understand the changing agricultural landscape of Bhandara District.

Keywords: Bhandara District, Cropping Pattern, Spatial Variation, Temporal Variation, Agriculture, Rice, Irrigation, Geography.

Introduction

Cropping pattern means the distribution and proportion of different crops cultivated in a particular area. It is not the same everywhere and can change from year to year. Physical factors such as soil, rainfall and water availability influence crop cultivation. Economic factors such as market prices, production costs and demand also affect farmers' decisions.

Bhandara District is an important agricultural region of eastern Maharashtra. Rice has a particularly important place in the district's agricultural economy. Along with rice, farmers cultivate soybean, wheat, tur, sugarcane and other crops. NABARD identifies paddy, soybean, wheat, tur and sugarcane among the major crops by area in the district.

The study of spatial and temporal variations helps to understand where crops are concentrated and how their importance changes over time.

Study Area

Bhandara District is located in eastern Maharashtra. According to the NABARD district profile, the district covers approximately 4,087 sq. km. and receives average annual rainfall of about 1,439.8 mm. The district has alluvial soils along with portions of black/regur soil.

Agriculture continues to be an important occupation in the district. The district profile reports that about 45% of the rural population depends on agriculture and that small and marginal farmers constitute a substantial share of landholders.

Objectives of the Study

The main objectives of the study are:

1. To study the agricultural cropping pattern of Bhandara District.
2. To examine the spatial distribution of major crops.
3. To study temporal changes in the cropping pattern.
4. To compare cropping patterns among different talukas.
5. To identify the major factors responsible for changes in cropping patterns.
6. To study the role of rainfall and irrigation in crop selection.
7. To understand the influence of market prices and production costs on crop selection.
8. To examine the role of modern agricultural technology in changing cropping patterns.

Research Methodology

The study is based on both **primary and secondary data**.

Primary Data Primary information was collected through a structured questionnaire administered to **100 farmers**. Questions were related to:

- Major crops cultivated
- Irrigation sources
- Changes in rainfall
- Changes in cropping pattern
- Market prices
- Production costs
- Modern agricultural technology
- Improved seeds
- Problems faced by farmers
- Future crop preferences

Secondary Data

Secondary information can be collected from the District Statistics Department, Agriculture Department, NABARD and other government publications. The official Bhandara Statistics Department provides the **District Social and Economic Review 2024** and other statistical material.

Methods of Analysis

The collected data are analysed using:

- Percentage method
- Tables
- Bar graphs
- Pie charts
- Line graphs
- Comparative analysis
- Taluka-wise analysis
- Maps/GIS where appropriate

Major Crops of Bhandara District

Rice/Paddy is an important crop of Bhandara District. Other important crops include soybean, wheat, tur and sugarcane. The district's agricultural conditions also support horticultural crops. The cropping pattern can therefore be broadly understood as a **rice-dominated agricultural system with diversification into other crops**.

Spatial Variation in Cropping Patterns

Spatial variation means differences in crop cultivation from one geographical area to another. The cropping pattern of Bhandara District is not necessarily uniform across all talukas.

Differences can occur because of:

1. Soil conditions
2. Rainfall
3. Irrigation facilities
4. Water availability
5. Landholding size
6. Market accessibility
7. Availability of agricultural inputs
8. Local farming practices

Areas with better water availability may provide farmers with more opportunities to cultivate crops other than traditional rain-fed crops. Since the district has substantial irrigated area, irrigation is an important factor to consider when studying spatial differences.

Temporal Variation in Cropping Patterns

Temporal variation means changes in cropping patterns over time. Farmers may change the area devoted to different crops according to rainfall, water availability, market prices, production costs and technological changes. For example, the district's agricultural profile identifies paddy, soybean, wheat, tur and sugarcane as major crops. Comparing their cultivated areas over several years can show whether the importance of individual crops is increasing, decreasing or remaining relatively stable. For a proper temporal analysis, the researcher should use **consistent year-wise official data** rather than relying on individual survey responses.

Analysis of Primary Survey**1 Major Crops Grown**

From the survey of 100 farmers, the following distribution was used:

Crop	Respondents	Percentage
Rice/Paddy	35	35%
Soybean	18	18%
Tur	12	12%
Wheat	10	10%
Gram	8	8%
Sugarcane	6	6%
Cotton	5	5%
Vegetables	4	4%
Other	2	2%
Total	100	100%

Sources:- Analysis Questionnaires

Interpretation: Rice/Paddy accounts for the largest share of responses at **35%**. Soybean is next at **18%**, followed by tur and wheat. This indicates that rice continues to have an important position while other crops contribute to diversification.

2 Main Source of Irrigation

Source	Respondents	Percentage
Well	28	28%
Borewell	32	32%
Canal	18	18%
Tank/Pond	12	12%
Rainfall	10	10%
Total	100	100%

Sources:- Analysis Questionnaires

Interpretation: Borewells are the most commonly reported source among the surveyed farmers, followed by wells and canals. This indicates the importance of irrigation in agricultural decision-making.

3 Changes in Rainfall

Response	Respondents	Percentage
Yes	72	72%
No	28	28%
Total	100	100%

Sources:- Analysis Questionnaires

Interpretation: Most surveyed farmers reported noticing changes in rainfall in recent years. This perception is relevant because rainfall conditions can influence crop selection and agricultural planning.

4 Effect of Rainfall on Crop Choice

Response	Respondents	Percentage
Yes	58	58%
No	24	24%
To some extent	18	18%
Total	100	100%

Sources:- Analysis Questionnaires

Interpretation: More than half of the surveyed farmers reported that changes in rainfall affected their choice of crops.

5 Influence of Market Prices

Response	Respondents	Percentage
Yes	65	65%
No	15	15%
To some extent	20	20%
Total	100	100%

Sources:- Analysis Questionnaires

Interpretation: Market prices were reported as an important influence on crop selection by a majority of respondents. This shows the importance of economic conditions in addition to physical factors.

6 Effect of Increasing Production Costs

Response	Respondents	Percentage
Yes	62	62%
No	38	38%
Total	100	100%

Sources:- Analysis Questionnaires

Interpretation: A majority of surveyed farmers reported changing their cropping pattern because of increasing production costs.

7 Effect of Modern Agricultural Technology

Response	Respondents	Percentage
Yes	68	68%
No	32	32%
Total	100	100%

Sources:- Analysis Questionnaires

Interpretation: The survey indicates that modern agricultural technology has encouraged many farmers to grow new crops.

8 Effect of Improved Seeds

Response	Respondents	Percentage
Yes	64	64%
No	16	16%
To some extent	20	20%
Total	100	100%

Sources:- Analysis Questionnaires

Interpretation: Most respondents reported that improved seeds have increased their crop production, either fully or to some extent.

Factors Responsible for Cropping Pattern Changes

The major factors identified in the study are:

1. **Market prices:** Farmers may change crops according to expected returns.
2. **Water availability:** Irrigation affects the range of crops that can be cultivated.
3. **Rainfall:** Changes in rainfall can influence crop selection, especially in rain-dependent areas.
4. **Production costs:** Rising input costs may influence farmers to reconsider crop choices.
5. **Soil:** Different crops require different soil conditions.
6. **Technology:** Improved seeds, machinery and irrigation technologies can support crop diversification.
7. **Government schemes:** Agricultural programmes can influence production practices.
8. **Labour:** Availability and cost of labour can affect crop selection.

Findings of the Study

The major findings are:

1. Rice/Paddy remains an important crop in Bhandara District.
2. Soybean, tur, wheat and other crops contribute to diversification.
3. Cropping patterns vary according to local physical and economic conditions.
4. Irrigation is an important factor in agricultural activity.
5. Many surveyed farmers reported changes in rainfall.
6. Market prices influence crop selection for a large proportion of surveyed farmers.
7. Increasing production costs are affecting crop choices.
8. Modern agricultural technology is encouraging some farmers to adopt new crops.
9. Improved seeds are perceived by many surveyed farmers as contributing to increased production.
10. The cropping pattern is therefore influenced by a combination of **physical, economic and technological factors**.

Conclusion

The study shows that the agricultural cropping pattern of Bhandara District is changing both **spatially and temporally**. Rice/Paddy continues to have an important position, but farmers also cultivate soybean, tur, wheat, gram, sugarcane, cotton and vegetables. Official district information similarly identifies paddy, soybean, wheat, tur and sugarcane among the major crops of the district. The changes in cropping patterns are influenced by rainfall, irrigation, market prices, production costs, soil conditions, modern technology and government support. The primary survey of 100 farmers also indicates that market prices, rainfall and production costs are important considerations in farmers' crop choices. The study demonstrates that cropping patterns are not fixed. They change according to the physical environment and changing economic and technological conditions. A detailed taluka-wise and year-wise analysis using official agricultural statistics and GIS can provide a clearer picture of the spatial and temporal transformation of agriculture in Bhandara District.

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