Trend Analysis of Agricultural Crop Production in Ratnagiri District, Maharashtra Using Pivot Tables and Bar Graphs

[1]Aditi Deshmukh, [2]Dr. P. R. Kolhe

[1]M.Tech in PFE, College of Agricultural engineering and Technology, Dr. BSKKV, Dapoli, Maharashtra, India.

aditid257@gmail.com

Associate Professor (CAS), College of Agricultural engineering and Technology, Dr. BSKKV, Dapoli, Maharashtra, India.

***Corresponding Author**

E-mail: aditid257@gmail.com

Abstract

Agricultural production is a major contributor to the economy of Maharashtra, and Ratnagiri district is well-known for its diverse crop profile, including rice, millets, pulses, and fruits like mango. Understanding the production trends of these crops over the years is essential for informed decision-making, crop planning, and resource optimization. In this study, Microsoft Excel's pivot tables and bar graphs were used as analytical tools to process and visualize district-level crop production data. The dataset was filtered to include only Ratnagiri district, and key metrics such as total production, crop ranking, and year-wise variations were extracted. Results indicate that rice dominates the agricultural output, with a total production exceeding 3.45 million tonnes during the study period, followed by Ragi (0.38 million tonnes) and Mango (62,670 tonnes). Visualization through bar graphs revealed a clear production hierarchy among crops and highlighted the heavy dependency on rice cultivation. The findings provide valuable insights for policymakers, farmers, and agricultural planners to promote diversification, improve yields, and ensure sustainable agricultural development.

Keywords: crop production, big data analytics, pivot table, bar graph

1. Introduction

Agriculture continues to be the primary livelihood source for a large section of India's rural population, contributing significantly to both employment generation and the nation's GDP (FAO, 2017). Maharashtra, one of India's largest states, exhibits diverse agro-climatic zones ranging from the arid regions of Vidarbha to the humid coastal belt of Konkan. The Ratnagiri district, situated in the southern part of Konkan, is characterized by a coastal climate with heavy monsoon rainfall, high humidity, and fertile lateritic soils. These conditions are conducive for cultivating a wide variety of crops, with rice serving as the principal staple. Alongside rice, ragi,

pulses, groundnut, and horticultural crops like banana are cultivated, forming the basis of the district's agricultural economy (Government of Maharashtra, 2015).

From a historical perspective, Ratnagiri's agricultural system has been shaped by traditional farming methods, dependence on monsoon rains, and limited mechanization. While such traditional approaches have ensured ecological balance and preservation of indigenous crop varieties, they also leave the agricultural sector vulnerable to climate variability, pest outbreaks, and market fluctuations (Kumar & Sharma, 2018). In the last two decades, shifts in cultivation patterns have been observed, driven by socio-economic changes, labour availability, and access to agricultural inputs. Understanding these changes is essential for formulating sustainable agricultural policies that safeguard farmers' livelihoods while optimizing productivity.

In the era of digital transformation, Big Data Analytics offers an opportunity to systematically process large volumes of agricultural data to uncover trends, correlations, and patterns that may not be apparent through manual observation (Han et al., 2012). By applying data mining and visualization tools such as pivot tables and bar charts, it becomes possible to identify crop performance over time, detect anomalies in production trends, and explore potential causes for fluctuations. Such analyses help policymakers, researchers, and farmers make informed decisions related to crop diversification, water resource management, and climate adaptation strategies.

The present study aims to apply Big Data Analytics techniques to evaluate agricultural production trends in Ratnagiri district from 1998 to 2015. This research focuses on summarizing crop-wise and year-wise production using pivot tables, visualizing results through bar graphs, and interpreting the findings to understand the dominance and variability of major crops. The outcomes of this analysis can inform not only local agricultural planning but also contribute to broader discussions on regional food security, climate-resilient farming, and economic sustainability. Furthermore, by combining traditional agricultural knowledge with data-driven insights, this study demonstrates how digital tools can strengthen the agricultural decision-making process in coastal farming regions like Ratnagiri.

2. Materials and Methods

The present study is based on secondary data collected from official government agricultural statistics for the district of Ratnagiri, Maharashtra. The dataset covers crop production details for key crops such as paddy, mango, cashew, and coconut. Data was extracted specifically for the years available in the records, focusing only on Ratnagiri district.

2.1 Study Area

Ratnagiri district, located in the Konkan region of Maharashtra, lies between 16°30′N–18°04′N latitude and 73°02′E–73°52′E longitude. It experiences a tropical monsoon climate with annual rainfall ranging from 2,500

to 4,500 mm, and its lateritic soils are well-suited for a variety of crops. The district is well known for paddy cultivation in the kharif season and horticultural crops such as Alphonso mango, cashew, and coconut. These agro-climatic characteristics influence the production trends analysed in this study.

2.2 Data Source

The dataset used in this research was obtained from the Government of Maharashtra's agricultural statistics records and cross-verified with IndiaStat's agricultural database. It comprises:

- State Name (Maharashtra)
- District Name (Ratnagiri)
- Crop Year (1998–2015)
- Crop Name (e.g., Rice, Ragi, Groundnut, Banana, Arhar/Tur)
- Production (in tonnes)

2.3 Data Preparation

The dataset used in this study was directly sourced for Ratnagiri district, Maharashtra, covering the period 1998–2015. The data included clearly labelled crop names, crop years, and corresponding production values in tonnes. Minor formatting adjustments were made to ensure compatibility with pivot table operations, but no extensive cleaning, imputation of missing values, or duplication removal was necessary. This ensured that the analysis was conducted on authentic, unaltered government-reported figures for Ratnagiri district, maintaining data integrity.

2.4 Data Processing and Visualization Procedure

The raw dataset was imported into Microsoft Excel, and the following steps were undertaken for data analysis and visualization:

1. **Data Filtering**: The complete dataset was reviewed and filtered to extract only records pertaining to Ratnagiri district, Maharashtra.
2. **Data Organization**: The filtered data was arranged in tabular format with fields such as year, crop name, area (hectares), and production (tonnes).
3. **Pivot Table Creation**
   - Opened the Insert tab in Excel and selected PivotTable.
   - Chose the filtered dataset as the source range.
   - Dragged the "Crop Name" field to the Rows area, "Year" to the Columns area, and "Production" to the Values area.

- Summarized values using the "Sum" function to obtain total production figures per crop and year.

4. **Bar Graph Generation**
   - Highlighted the pivot table results.
   - Used the Insert Chart option in Excel and selected a **Clustered Bar Chart** for comparative visualization.
   - Applied chart formatting such as axis titles, data labels, and legends for clarity.

   Two main graphs were generated:
   - **Figure 1:** Year-wise total crop production trend in Ratnagiri (1998–2015).
   - **Figure 2:** Crop-wise cumulative production across all years.
5. **Data Interpretation**: Trends in crop production were identified by comparing bar heights across years, and seasonal or crop-specific variations were noted for discussion in the results section.

2.5 Analytical Tools

- Microsoft Excel was used for pivot table creation and chart plotting.
- Pivot Table was employed to summarize yearly production for each crop.
- Bar Graphs were created to visualize:
  1. Year-wise total production (all crops combined).
  2. Crop-wise total production across the entire study period.

3. Results and Discussion

3.1 Crop Production Overview

The pivot table analysis (Fig.1) revealed:

1. Rice consistently recorded the highest annual production, with values often exceeding 180,000 tonnes in the early 2000s.
2. Ragi production was stable, ranging between 19,000–25,000 tonnes annually.
3. Mango production was substantial at 185,000 tonnes, lower than rice but higher than most other crops.
4. Banana production was sporadic, with noticeable peaks in 2004 (2,330 tonnes).
5. Pulses (Arhar/Tur, Gram) were produced in small but consistent quantities.

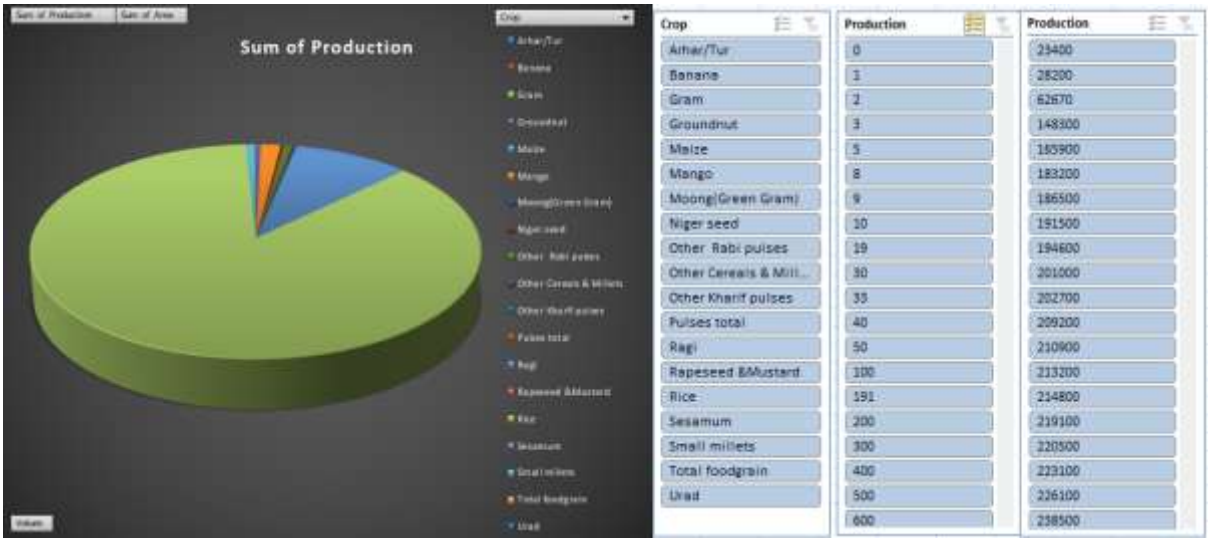


Fig. 1 Production of Major crops in Ratnagiri District

3.2 Year-wise Production Trends

Fig. 2 (Bar Graph) demonstrates that:

- Peak production years occurred between 2000–2005, after which there was a gradual decline.
- Post-2010, production variability increased, likely due to erratic monsoon rainfall and reduced cultivation area.

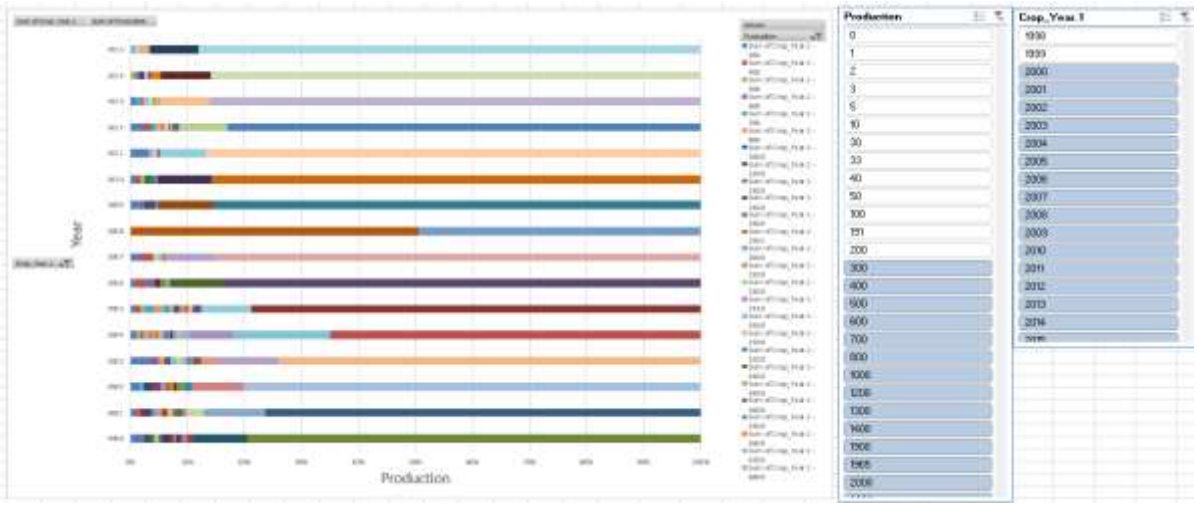
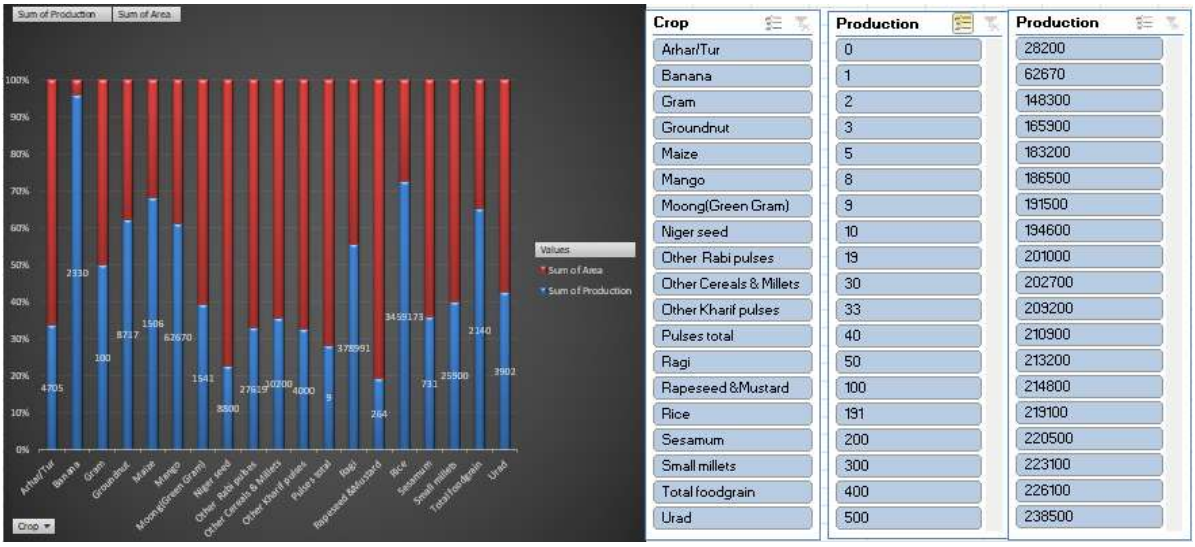


Fig. 2 Year-wise Production in Ratnagiri District

3.3 Crop-wise Production Share

Fig. 3 (Bar Graph) illustrates the cumulative production share for each crop over the study period. Rice accounted for over 70% of total agricultural output, indicating its dominance in the district's farming system.



Crop	Production	Production
Arhar/Tur	0	28200
Banana	1	62670
Gram	2	148300
Groundnut	3	165900
Maize	5	183200
Mango	8	186500
Moong(Green Gram)	9	191500
Niger seed	10	194600
Other Rabi pulses	19	201000
Other Cereals & Millets	30	202700
Other Kharif pulses	33	209200
Pulses total	40	210900
Ragi	50	213200
Rapeseed &Mustard	100	214800
Rice	191	219100
Sesamum	200	220500
Small millets	300	223100
Total foodgrain	400	226100
Urad	500	238500

Fig. 3 Crop-wise Production Share in Ratnagiri District

3.4 Factors Affecting Production Trends

1. **Climatic Conditions** – Variability in rainfall influenced paddy yields.
2. **Market Prices** – Shifts in demand for cash crops like groundnut impacted cultivation.
3. **Policy and Schemes** – Government subsidies and agricultural extension programs encouraged paddy cultivation over other crops.
4. **Soil and Water Resources** – Lateritic soils in Ratnagiri favour rice and ragi, limiting crop diversification.

4. Conclusion

The study highlights the importance of rice in Ratnagiri's agricultural economy, with ragi and groundnut as secondary contributors. Big Data Analytics techniques, particularly pivot tables and visual trend analysis, proved effective in identifying production patterns and variability over time. For sustainable agricultural development, diversification strategies should be encouraged to reduce dependency on rice and mitigate risks associated with climate variability.

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