International Journal of Engineering in Computer Science

E-ISSN: 2663-3590
P-ISSN: 2663-3582
IJECS 2024; 6(1): 56-60
www.computersciencejournals.com/ijecs
Received: 15-01-2024
Accepted: 19-02-2024

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The production, yield, and area of the jowar (great millet) in the states of India using the pivot table

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DOI: https://doi.org/10.33545/26633582.2024.v6.i1a.112

Abstract
This study utilizes big data analytics tools like pivot tables and dashboards to examine the production, yield, and output of *Sorghum Bicolor*, commonly known as jowar great millet, in Maharashtra, India. By analyzing a sizable dataset encompassing district-level data on area, yield, and production of jowar great millets across multiple years, researchers aim to provide valuable insights for decision-makers and farmers. The pivot table facilitates a comprehensive overview of jowar great millet data across districts, aiding in the identification of trends over time and across different states. Furthermore, an interactive dashboard, comprising various graphs and charts, offers a visual representation of production, yield, and area trends. Notably, Maharashtra emerges as the leading state in jowar great millet production, both in terms of area cultivated and production quantity. Conversely, states like Karnataka and Andhra Pradesh also contribute significantly to production and yield, whereas Bihar consistently records lower production figures. This analysis underscores the importance of employing data-driven approaches to understand and enhance agricultural practices, thereby benefiting stakeholders across the industry.

Keywords: Data analysis, India, states, jowar (great millet), dashboard, interactive visualization, pivot tables

Introduction
Big data is an assortment of intricate and sizable data collections that are challenging to handle using conventional database management techniques or conventional methods of data processing. Big Data consists of four main components: volume (the size of the data), velocity (the speed at which the data is being collected), variety (the variety of the data being collected), and veracity (the accuracy of the massive volume of rapidly incoming data must be validated by big data solutions) [11].

Big data is the huge amount of information generated online, which is uploaded to servers via web interfaces and includes information about all kinds of real-time activity. Numerous research organizations are important to agriculture in the areas of breeding programs, pest control, quality enhancement, and nutritional development of target crop varieties [13].

The term "big data" describes an extensive and complex set of data. Processing large amounts of data with traditional database management systems or data processing techniques becomes difficult. Four factors define big data: (a) volume, or how much data there is; (b) velocity, or how the data is being acquired; (c) variety, or how different the data is being collected; and (d) veracity, or the need for big data solutions to verify the accuracy of the large amount of data. For consumers to handle big data economically, a shift in computing architecture is necessary to manage the storage and processing of massive amounts of data [11].

Millets have enormous significance, especially jowar big millet. Because of their superior nutritional value, ability to withstand a wide range of environmental conditions, and role in promoting food security, these grains are highly prized. Particularly in areas where food security is an issue, jowar great millet is an essential part of balanced diets due to its high nutrient content, particularly in the areas of fiber, protein, and minerals. The knowledge on the physical properties of a crop is essential for proper design of processing equipment [19]. Because jowar great millet requires little water and can grow in semi-arid environments, its

cultivation also supports biodiversity and sustainability in agriculture. Because of this, it is an essential crop in many regions of the world for promoting agricultural resilience, enhancing livelihoods, and guaranteeing food security.
In agriculture, pivot tables provide succinct data summaries, making it easier to analyze crop yields, production patterns, and land use. They support farmers' and policymakers' decision-making by assisting in the identification of trends and the efficient use of resources.(The effect on fruit ripening was indicated by retarded respiratory climacteric, delayed peel colour development [15]) Furthermore, pivot tables make it possible to compare factors like crop types, locations, and seasons quickly, which helps with strategic planning and boosts agricultural productivity.

Review of literature

According to J. L. Hatfield *et al*. (2015) "Precision agriculture aims to increase field crop output while safeguarding the environment and achieving higher economic yields by using seed, pesticides, and irrigation water more precisely timed and applied. The analyses conducted in this manuscript show the feasibility of utilizing crop simulation models, geographic information systems technology, and precision agriculture in the cotton production system of the Mid South to maximize yields while reducing inputs of nitrogen and water. The Hood Farm Levingston Field, which spans 201 hectares and is situated adjacent to the Mississippi River in Bolivar County, Mississippi, was selected as the test site to create a one hectare soil physical property grid.

Big Data in agriculture and food by Irena Knezevic and Kelly Bronson1 (2016): Farming is currently experiencing a significant digital transformation. Our review of current Big Data applications in the agri-food sector has highlighted several data collection and analytics tools that could impact the balance of power among stakeholders in the food system, such as between farmers and large corporations. Questions arise regarding who retains ownership of data generated by tools like Monsanto Corporation's Weed I.D. app and whether there are privacy concerns associated with data collected by John Deere's precision agricultural equipment. A comprehensive research objective for Big Data scholarship should involve systematically tracking the digital revolution in agriculture and mapping both the advantages and limitations of Big Data applications in the food and agriculture sectors. This objective connects data scholarship with food studies and emphasizes the tangible effects of Big Data on society. "Application of Pivot Tables in Agricultural Research" by S. K. Mishra *et al*. (2017) [7] This article explores the application of pivot tables in agricultural research, illustrating their use in summarizing and analyzing data such as crop yields, soil nutrient levels, and weather patterns. The authors highlight the simplicity and versatility of pivot tables for managing large datasets.

"Data Analysis Using Pivot Tables in Agriculture" by M. H. Ali *et al*. (2018) [1]: The use of pivot tables in the analysis of agricultural data is the main topic of this paper. It offers a step-by-step tutorial on how to condense and analyze big statistics in agriculture using pivot tables. The advantages of pivot tables are emphasized by the writers, including their speedy report generation and capacity to spot patterns or trends in data.

Data analytics for crop management by Nabila Chergui and Mohand Tahar Kechadi, 2022: The global economy is significantly impacted by recent developments in information and communication technologies across all economic sectors. The emergence of digital agriculture as a result of the democratization of digital devices and developments in data science and artificial intelligence. New methods for increasing farming's output and efficiency while protecting the environment were made possible by digital agriculture. Agronomists, farmers, and other professionals can now better comprehend farming chores and make better judgments thanks to the collecting and analysis of large agricultural statistics made possible by recent and sophisticated digital equipment and data science. We provide a thorough analysis of data mining approaches applied to digital agriculture in this research. We present the components of the crop yield management procedure.

'Analyses of the rice and ragi production, yield and area data of Maharashtra using pivot Table' by Khatal *et al*. (2023) [13]

This study examines the area, yield, and output of the rice and ragi crops farmed in Maharashtra using big data analytic technologies including pivot tables and dashboards. Researchers, farmers, and decision-makers in Maharashtra can all gain from knowing the production patterns of two significant cereal crops grown there: ragi and rice. A substantial dataset including data on the acreage, yield, and production of rice and ragi over a number of years was acquired in order to conduct this study. The dataset includes data on the area under cultivation for both crops, yield per hectare, and production at the district level. To start, a pivot table is made to collect information and give a general idea of the amount of land, yield, and production of rice and ragi in each.

Materials and Methodology

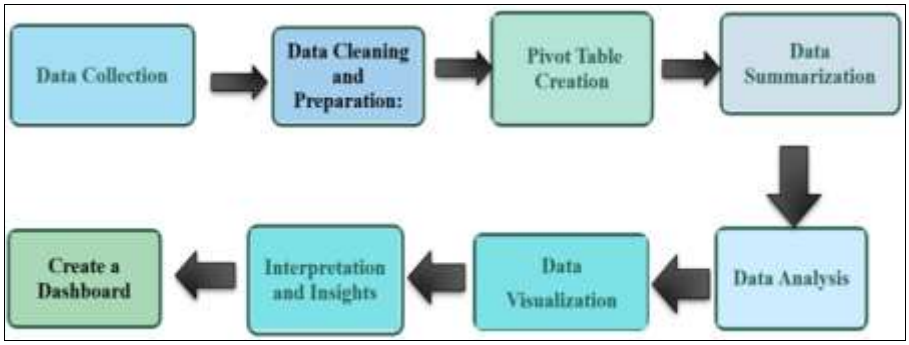

Fig 1: The process for creating pivot tables

1. **Data Collection:** Gathered necessary information on jowar great millet (great millet) from different sources, such as the Directorate of Economics and Statistics, Department of Agriculture and Farmers Welfare, Ministry of Agriculture and Farmers Welfare, Government of India. The data included details about the area, production, and yield of jowar great millet in States of India from 2019 to 2023, with a specific focus on the Maharatra region.
2. **Data Cleaning and Preparation:** Cleaned the collected data by removing any duplicates, errors, or outliers. Transformed the data into a format suitable for pivot table analysis, such as organizing it in a tabular form with rows of repressed observations and columns of repressed variables.
3. **Pivot Table Creation:** Imported the cleaned and prepared data into spreadsheet software that supports pivot table functionality, such as Microsoft Excel. Created a pivot table by selecting the relevant data range and choosing the appropriate variables for rows, columns, and values.
4. **Data Summarization:** Used the pivot table to summarize the agricultural data of jowar (great millet) by calculating various summary statistics, such as means, sums, counts, or percentages. This step helped to gain a quick overview of the data and identify any patterns or trends.
5. **Data Analysis:** Utilized pivot table featured to examine the compiled data, enabling the exploration and comparison of various subsets of the information. This analysis was involving filtering, sorting, or grouping to gain further insights.
6. **Data Visualization:** Created visual representations of the analyzed data using pivot table tools, such as charts or graphs. This step helped to communicate the findings effectively and facilitated decision-making in agriculture.
7. **Interpretation and Insights:** Interpretation and Insights: From the pivot table findings, significant insights were evaluated and deduced. Agricultural methods like crop management plans, resource distribution, and risk assessment were influenced by these discoveries.
8. **Create a Dashboard:** at the last created a dashboard for easy to understand when, where and in how much quantity yield, area and production is increased or decreased with a respective year in respective crops.

Results and Discussion

Data Collection

Gathered necessary information on jowar great millet (great millet) from different sources, such as the Directorate of Economics and Statistics, Department of Agriculture and Farmers Welfare, Ministry of Agriculture and Farmers Welfare, Government of India. The data included details about the area, production, and yield of jowar great millet in Maharashtra from 2019 to 2023, with a specific focus on the maharatra region.

1. **Yield Analysis:** The pivot tables and dashboards was used to analyze the yield data collected from the Directorate of Economics and Statistics, Department of Agriculture and Farmers Welfare, Ministry of Agriculture and Farmers Welfare, Govt. of India. The analyzed was provided insights into the factors that affect yield, production and area of jowar great millet. The discussion focused on identifying the yield variability and suggested strategies to optimize yield and crop sectioned.
2. **Resource Allocation:** After analyzing data on resource inputs, the pivot tables and dashboards were helped optimized resourced allocation in agriculture. The results highlighted areas of Production are high and low in Maharashtra.
3. **Risk Assessment:** The analysis identified high-risk areas where production is very less due to high rainfall.
4. **Crop Management:** After analyzing data on crop Production, Yield and Area of jowar great millet. The pivot tables and dashboards provided insights into optimal crop management practices. The results were guide decisions on planting dates, pest control measures, or nutrient application rates.
5. It is very interesting to note that though the maximum state wise jowar great millet area during 2019-20, 2020-21, 2021-22 and 2023-24 is found to be in Maharashtra state (18.19 lakh/ha) followed by second state are karnatka state (6.67 lakh/ha).As shown in figure 1, The minimum state wise jowar great millet area during 2019-20, 2020-21, 2021-22 and 2023-24 was observed in Bihar state are (0.01 lakh/ha).
6. It is very interesting to note that though the maximum state wise jowar great millet production during 2019-20, 2020-21, 2021-22 and 2023-24 is found to be in Maharashtra state (15.66 lakh/tonnes) followed by second state are Karnataka state (8.02 lakh/tonnes). As shown in figure 2, The minimum state wise jowar great millet area during 2019-20, 2020-21, 2021-22 and 2023-24 was observed in Bihar and Jharkhand state are (0.01 lakh/tonnes).
7. It is very interesting to note that though the maximum state wise jowar great millet yield during 2019-20, 2020-21, 2021-22 and 2023-24 is found to be in Andhra pradesh state (3371.40 kg/ha) followed by second state are Madhya pradesh state (1801.60 kg/ha). As shown in figure 3, the minimum state wise jowar great millet area during 2019-20, 2020-21, 2021-22 and 2023-24 was observed in Bihar state are (224.40 kg/ha).

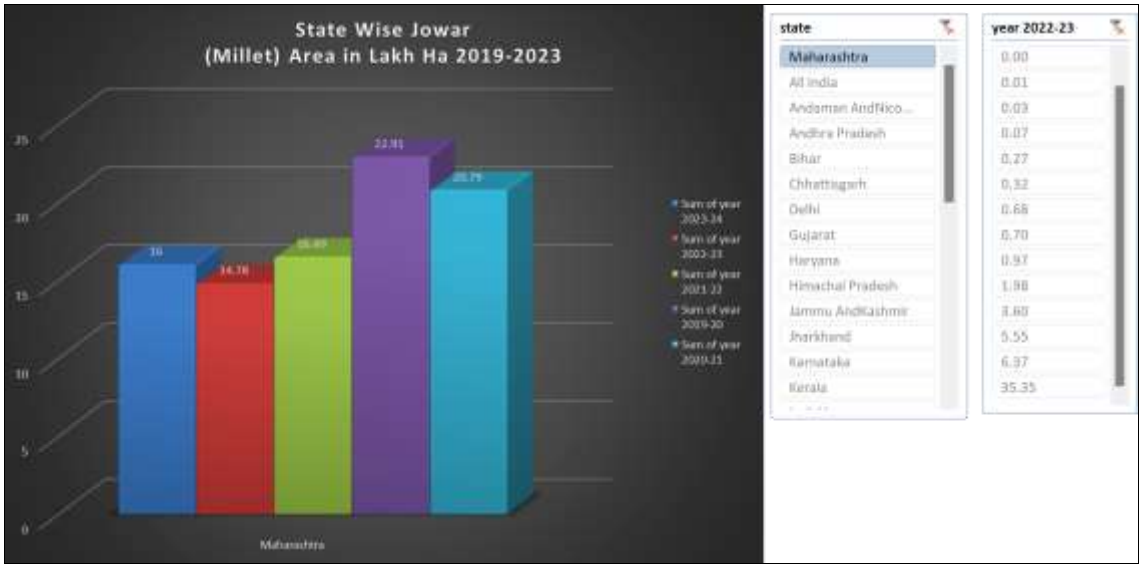

Fig 2: Dashboard of State Wise Great millet Production (Area): jowar great millet [6]

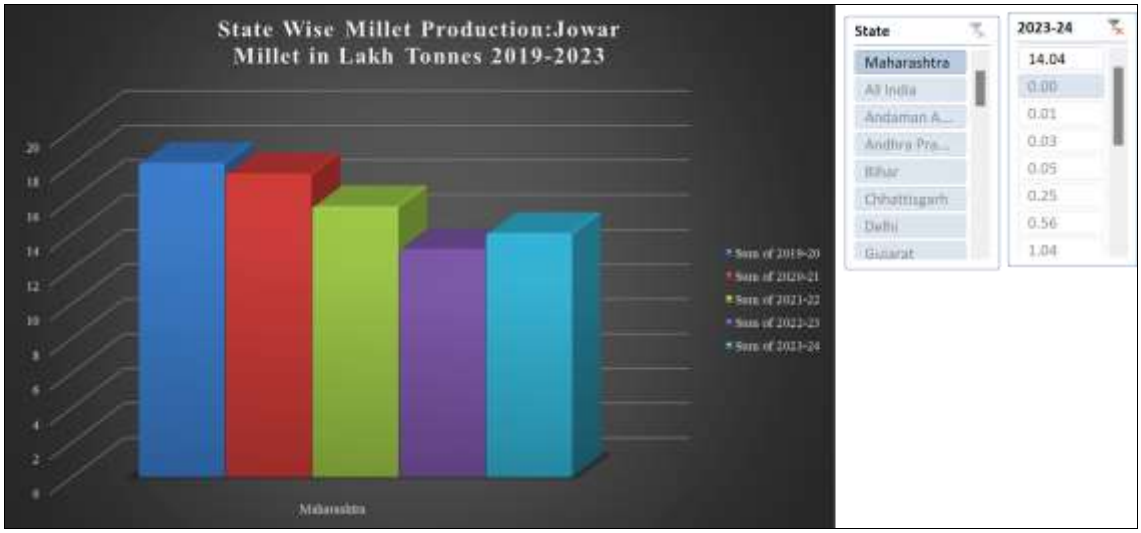

Fig 3: Dashboard of State Wise Great millet (Production): Jowar great millet great millet in Lakh tonnes 2019-2023 [6]

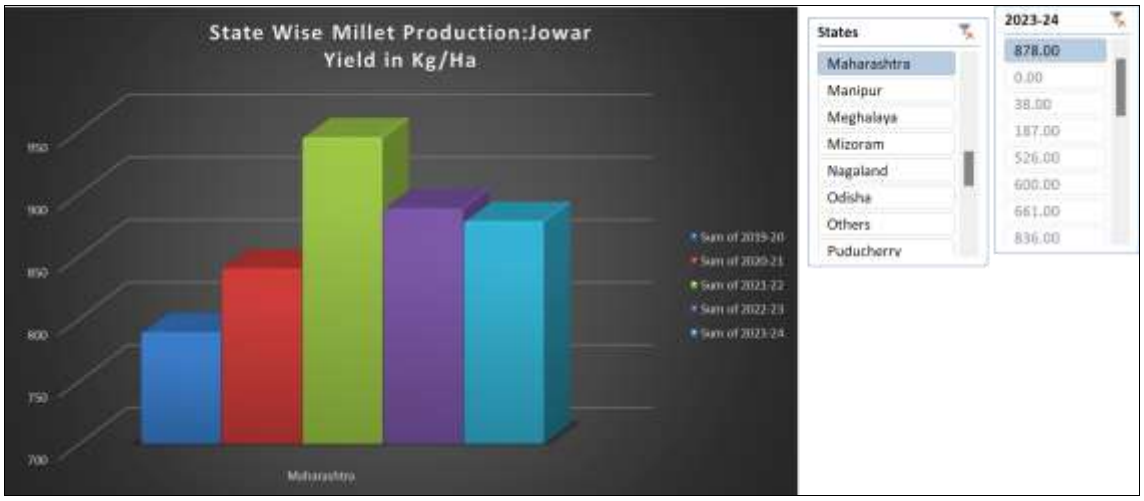

Fig 4: Dashboard of State Wise Great millet Production (Yield): jowar great millet Yield in Kg/Ha [6]

Conclusion

The study came to the conclusion that pivot tables and dashboards, which are tools for analyzing large data, can be used in agriculture to make insightful suggestions for different crop selection factors in different Indian states. The dashboard and pivot table are crucial for assisting farmers in making decisions that would increase agricultural yield, sustainability, and profitability in various Indian states after evaluating all jowar great millet data going back five years. In conclusion, the dashboard analysis and pivot table

provide important information about the jowar great millet production in Maharashtra. Even though Maharashtra has the highest jowar great millet area, Karnataka comes in second place in terms of production. Additionally, Bihar and Jharkhand have the lowest jowar great millet production. It is interesting to note the jowar great millet yield in Andhra Pradesh.It is very interesting to note that though the maximum state wise jowar great millet yield during 2019-20, 2020-21, 2021-22 and 2023-24 is found to be in Andhra pradesh state (3371.40 kg/ha) followed by second state are Madhya pradesh state (1801.60 kg/ha). The minimum state wise jowar great millet area during 2019-20, 2020-21, 2021-22 and 2023-24 was observed in Bihar state are (224.40 kg/ha)

References

1. Ali MH. Data Analysis Using Pivot Tables in Agriculture; c2018.
2. Chen M, Zhang Y, Leung CV. In Text Book Big Data: Related Technologies, Challenges and Future Prospects; c2014.
3. Ch CS, Uday Kumar J, Kishor Kumar B, Ch S. Big Data Analytics on Indian Crop Planning to Increase Agricultural Production. Advanced Science and Technology Letters. 2017;147:7.
4. Government of India Ministry of Agriculture & Farmers Welfare. Crops report major contributing district. Available from: https://data.desagri.gov.in/website/crops-report-major-contributing-district-web
5. Ministry of Statistics and Programme Implementation. Ministry of Agriculture & Farmers Welfare. [Internet]. Available from: https://www.mospi.gov.in/, https://agriwelfare.gov.in
6. National Academy of Agricultural Sciences (NAAS). Big Data Analytics in Agriculture. Policy Paper No. 101. New Delhi; c2021.
7. Mishra SK. Application of Pivot Tables in Agricultural Research; c2017.
8. Mishra AK. Big Data Analytics in Agriculture: A Review; c2019.
9. Kumar M, Mayura N. Big Data analytics in agriculture and distribution channel. IEEE International Conference on Computing Methodologies and Communication; c2017.
10. Kumar P, Kumar A, Panwar S, Ray M. Role of big data in agriculture - A statistical perspective. Ann. Agric. Res. New Series. 2018;39(2):210-215.
11. Arjun S, Joshi A, Das HP, Amutha R. Big Data Analytics for Agricultural Development in India. International Journal of Engineering Research & Technology, 2016, 4(22).
12. Joshi A, Kaushik V. Big Data and Its Analytics in Agriculture. In: Upadhyay AK, Sowdhamini R, Patil VU, editors. Bioinformatics for agriculture: High-throughput approaches. Singapore: Springer; c2021.
13. Khatal MM, Kolhe P, Jadhav V, Thul PP, Kutwal A, Kale AA, *et al*. IRJMETS, 2023, 5(9).
14. Kahar GS, Jawake P, Sawant AA, Bansode PB, Langote KS. Shelf-life enhancement of guava by using ethylene inhibitor and different coating material.
15. Bhagwat SM, Ingle PM, Kadam US, Patil ST, Bansode PB. Effect of different irrigation and fertigation levels on water use efficiency, fertilizer use efficiency and biometric parameter of strawberry crop under coastal climatic condition of Konkan region. The Pharma Innovation Journal. 2023;12(7S):2564-2569.
16. Nandyala CS. Big and Meta Data Management for U-Agriculture Mobile Services. International Journal of Software Engineering and Its Applications, 2016, 10(2).
17. Gosavi RA, Khodke SU, Rupanawar HD. Evaluation of physical properties of different varieties of sorghum grain; c2023.
18. Gosavi RA, Gethe RA, Kale SM. Determination of physical properties of pearl millet (bajra) and finger millet (ragi). Indian Journal of Agriculture and Allied Sciences. 2023;9:109-112.
19. Gethe RA, Kale SM, Gosavi RA, Kamble GK. Comparative evaluation of hybrid agro-processing unit operated by bullock and solar power (flour mill). Indian Journal of Agriculture and Allied Sciences. 2023;9:114-118.
20. Kale SM, Gethe RA, Gosavi RA, Kamble GK. Study of statistical characteristics of rainfall and evaporation for Parbhani district of Maharashtra state. Indian Journal of Agriculture and Allied Sciences. 2023;9:99-103.