**InSight Bulletin: A Multidisciplinary Interlink International Research Journal**
Peer Reviewed International, Open Access Journal.
*ISSN : 3065-7857 / Website: https://ibrj.us / Volume-2, Issue-12 / December - 2025*

Original Article

# A Geographical Analysis of Agricultural Development and Spatial Disparities in Jalgaon District, Maharashtra, India

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**Manuscript ID:**
IBMIIRJ -2025-021230

**Submitted:** 10 Nov. 2025

**Revised:** 15 Nov. 2025

**Accepted:** 20 Dec. 2025

**Published:** 31 Dec. 2025

ISSN: 3065-7857

Volume-2

Issue-12

Pp. 144-149

December 2025

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OPEN ACCESS

Quick Response Code:

Web. https://ibrj.us

DOI: 10.5281/zenodo.23362933

DOI Link:
https://doi.org/10.5281/zenodo.23362933

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***Abstract***

*Agriculture plays a vital role in the socio-economic development of rural regions and remains a key contributor to sustainable livelihoods. The present study examines the spatial variations in the level of agricultural development in Jalgaon District, Maharashtra, by constructing a Composite Agricultural Development Index (CADI) using selected agricultural development indicators. Secondary data collected from government sources were standardized using the Z-score technique, and a composite index was developed to classify the selected villages according to their level of agricultural development. The analysis reveals significant spatial disparities in agricultural development among the selected villages, primarily due to variations in irrigation facilities, cropping intensity, agricultural productivity, land use patterns, and infrastructural development. The findings identify comparatively developed and less-developed villages and emphasize the need for region-specific planning to achieve balanced agricultural growth. The study provides valuable insights for policymakers in formulating strategies for sustainable agricultural and rural development in Jalgaon District.*

***Keywords:*** *Composite Agricultural Development Index (CADI), Agricultural Development, Z-score Technique, Spatial Disparities,*

## Introduction

Agriculture is one of the most vital sectors of the Indian economy, contributing significantly to food security, employment generation, rural livelihoods, and overall economic development. Although the share of agriculture in India's Gross Domestic Product (GDP) has gradually declined due to the rapid growth of the industrial and service sectors, its socio-economic importance remains substantial because nearly half of the country's population continues to depend directly or indirectly on agriculture for their livelihood. Since independence, Indian agriculture has undergone remarkable transformation through various policy interventions, including Community Development Programmes, the Green Revolution, irrigation expansion, improved seed technology, farm mechanization, and institutional credit support. These initiatives have substantially increased agricultural production and productivity, enabling the country to achieve self-sufficiency in food grain production. However, regional disparities in agricultural development continue to persist due to variations in natural resources, irrigation facilities, technological adoption, infrastructure, and institutional support (Bhatia, 1965; Singh and Dhillon, 2004).

Maharashtra is one of India's leading agricultural states, characterized by considerable diversity in agro-climatic conditions, cropping patterns, irrigation facilities, and agricultural productivity. Jalgaon District, located in the north-western part of Maharashtra, is recognized as one of the state's agriculturally important districts and is popularly known as the "Banana Capital of India." The district possesses fertile black cotton soils, a favourable climate, and an extensive irrigation network supported by the Tapi River and its tributaries, making it suitable for the cultivation of banana, cotton, sugarcane, wheat, maize, pulses, and oilseeds. Despite these favourable conditions, agricultural development is not spatially uniform across the district. Significant variations exist among the fifteen tehsils with respect to cultivated area, irrigation intensity, cropping intensity, crop productivity, fertilizer consumption, agricultural credit, and crop diversification. Such disparities influence farm income, agricultural efficiency, and rural development. The assessment of agricultural development requires a multidimensional approach because no single indicator can adequately represent the overall level of agricultural performance. Composite indices provide an effective framework for integrating multiple agricultural indicators into a single measure that facilitates comparison among regions. Standardization techniques such as the Z-score method eliminate differences in measurement units and enable the construction of a scientifically reliable Composite Agricultural Development Index (CADI). The index helps identify relatively developed and underdeveloped agricultural regions, thereby providing valuable inputs for regional planning and policy formulation.

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***How to cite this article:***
*Koli, Y. A., & Gaware, R. S. (2025). A Geographical Analysis of Agricultural Development and Spatial Disparities in Jalgaon District, Maharashtra, India. InSight Bulletin: A Multidisciplinary Interlink International Research Journal, 2(12), 144–149. https://doi.org/10.5281/zenodo.23362933*

The present study aims to examine the spatial disparities in agricultural development among the tehsils of Jalgaon District using selected agricultural indicators, namely Net Sown Area, Gross Cropped Area, Cultivable Area, Net Irrigated Area, Gross Irrigated Area, Crop Productivity, Fertilizer Consumption, Cropping Intensity, Crop Diversification Index, Irrigation Intensity, and Agricultural Credit. The study employs Z-score standardization and the Composite Agricultural Development Index (CADI) to rank and classify tehsils into different levels of agricultural development. The findings are expected to identify the spatial pattern of agricultural disparities and provide a scientific basis for formulating location-specific agricultural development strategies, efficient resource allocation, and sustainable agricultural planning in Jalgaon

**Date Based and Method**

The present study evaluates agricultural development across the tehsils of Jalgaon District using the Composite Agricultural Development Index (CADI). Secondary data for 2023–24 were collected from the Socio-Economic Survey Report, Jalgaon District (2024) and publications of the Department of Agriculture, Government of Maharashtra. Eleven indicators representing various dimensions of agricultural development were selected, including land use, irrigation, crop productivity, fertilizer consumption, cropping intensity, crop diversification, and agricultural credit. All indicators were standardized using the Z-score technique to eliminate differences in measurement units. The standardized values were averaged to compute the Composite Agricultural Development Index (CADI) for each tehsil. Finally, the tehsils were ranked and classified into Very High, High, Moderate, Low, and Very Low development categories using the Mean ± Standard Deviation (SD) method to assess spatial disparities in agricultural development.

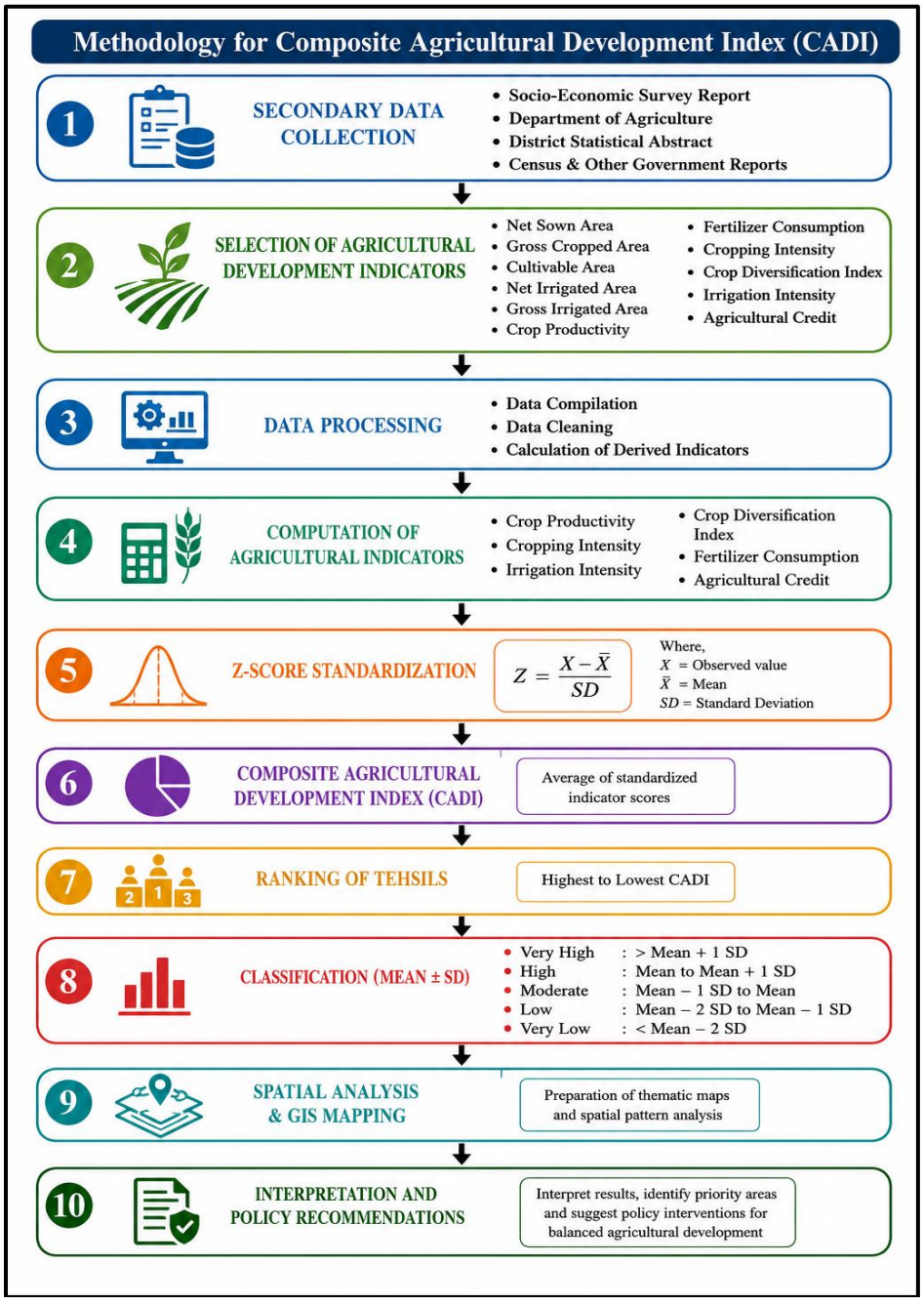


**Fig.1:** Flow chart of Methodology

**Study Area**

Jalgaon District is located in the northwestern section of Maharashtra and is an important agricultural sector in the Khandesh region. The district is located between 20°15′ and 21°22′ North latitude and 74°55′ and 76°28′ East longitude, covering an area of approximately 11,765 km². The district headquarters is in Jalgaon. Administratively, Jalgaon includes 15 tehsils: Amalner, Bhadgaon, Bhusawal, Bodwad, Chalisgaon, Chopda, Dharangaon, Erandol, Jalgaon, Jamner, Muktainagar, Pachora, Parola, Raver, and Yawal. The district includes around 1,513 villages and 20 towns. Jalgaon is bounded by Madhya Pradesh in the north, Buldhana District in the east, Chhatrapati Sambhajinagar (Aurangabad) and Nashik District in the south, and Dhule District in the west. The Satpura Hills define the district's northern boundary, and the Ajanta Hills lie to the south, providing it a diverse physiographic environment. The elevation typically ranges from 175 to 325 meters above mean sea level.

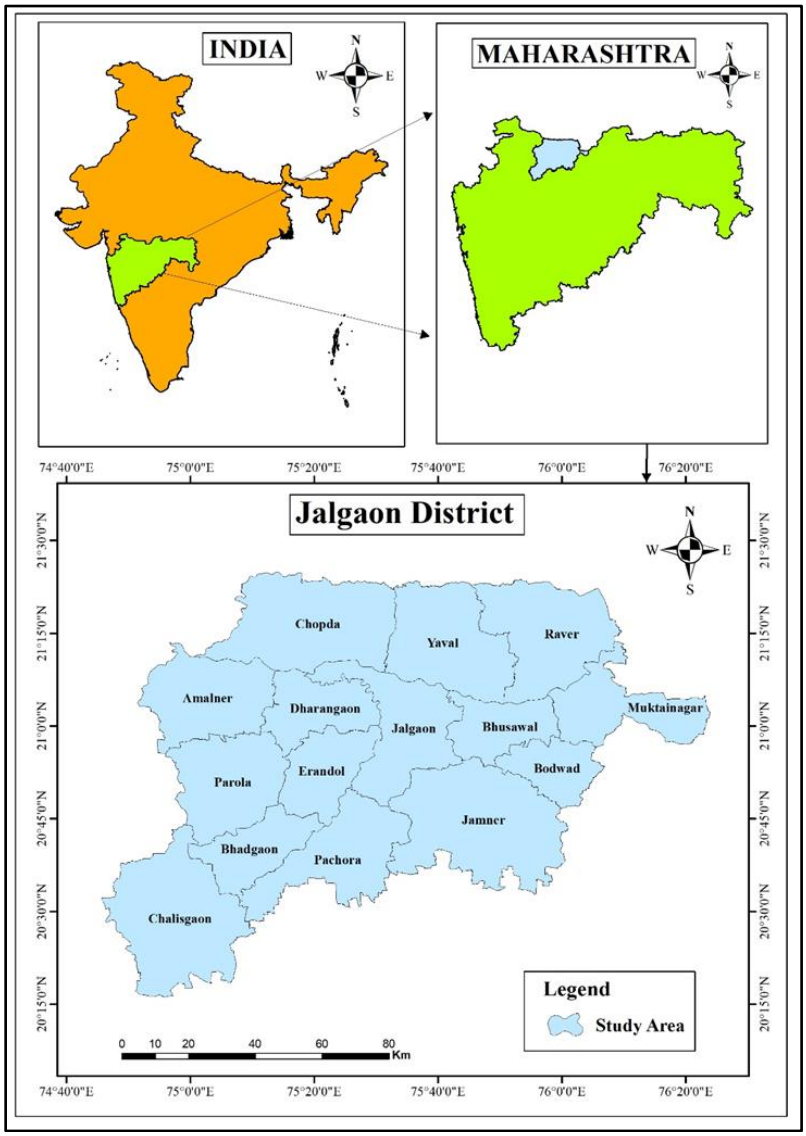


**Fig.2:** Study Area Map

**Result and Discussion**

Table no. 1 presents the selected agricultural development indicators for the tehsils of Jalgaon District, highlighting considerable spatial variation in agricultural resources and performance. Jamner records the largest net sown area (96,649 ha), while Jalgaon and Raver exhibit comparatively higher cropping intensity (144.32% and 145.80%, respectively), indicating more intensive land use. Muktainagar and Jamner show the highest irrigation intensity, reflecting better irrigation infrastructure. Raver also records the highest fertilizer consumption (1108.01 kg/ha), whereas Jalgaon has the highest agricultural credit availability (100%). Crop productivity ranges from 14.90 to 16.80 quintals per hectare, indicating moderate inter-tehsil variation. Overall, these indicators reveal significant disparities in agricultural development and provide a strong basis for constructing the Composite Agricultural Development Index (CADI) and analyzing the spatial pattern of agricultural development across Jalgaon District.

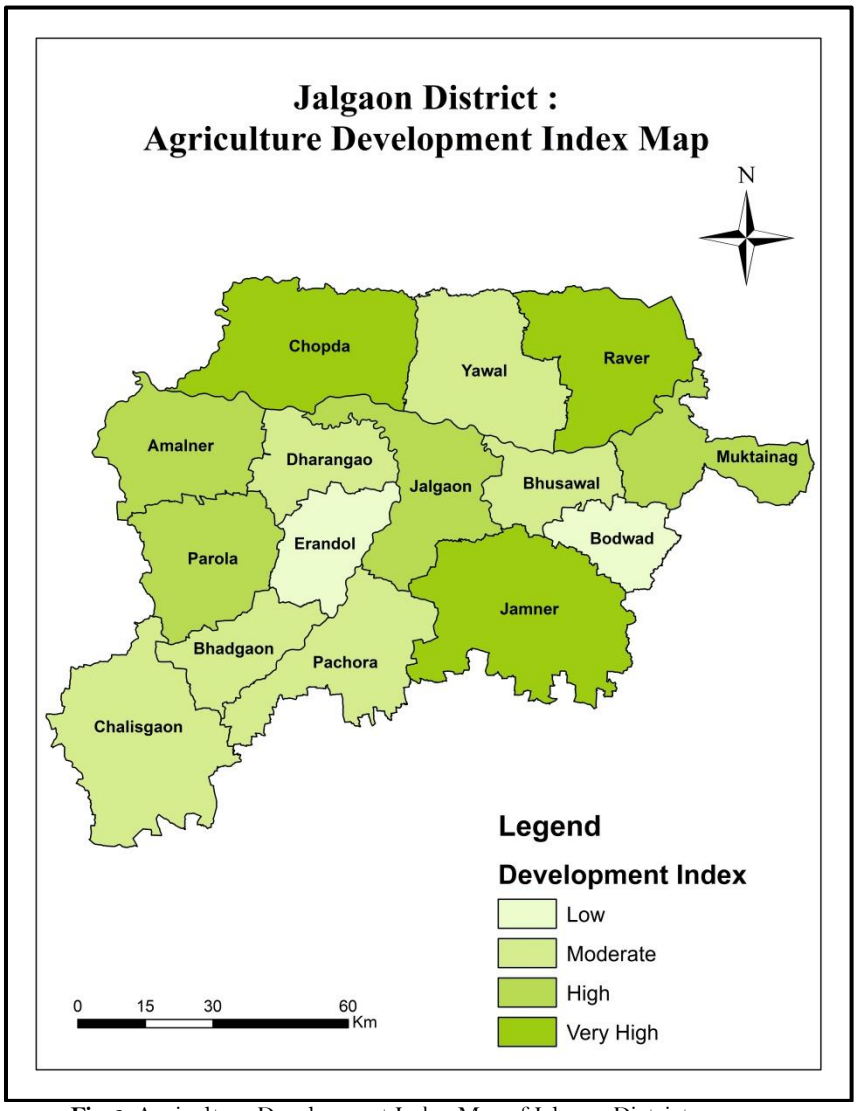


**Fig.3:** Agriculture Development Index Map of Jalgaon District

| Sr. No. | Taluka | Net Sown Area | Gross Cropped Area | Cultivable Area () | Net Irrigated Area ) | Gross Irrigated Area | Crop Productivity (quintal/ha) | Fertilizer Consumption (kg/ha) | Cropping Intensity (%) | Crop Diversification Index | Irrigation Intensity (%) | Agricultural Credit (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Chopda | 64524 | 79857 | 81659 | 36,504 | 26,929 | 16.20 | 564.95 | 123.76 | 0.71 | 73.77 | 75 |
| 2 | Yawal | 48836 | 53090 | 55446 | 20,233 | 17,717 | 15.40 | 586.43 | 108.71 | 0.66 | 87.56 | 70 |
| 3 | Raver | 43556 | 63504 | 64910 | 20,133 | 27,300 | 16.80 | 1108.01 | 145.8 | 0.75 | 135.6 | 85 |
| 4 | Muktainagar | 36133 | 41335 | 42218 | 13,012 | 20,095 | 16.10 | 921.35 | 114.4 | 0.68 | 154.43 | 72 |
| 5 | Bodwad | 28932 | 30030 | 30737 | 7,436 | 7,967 | 15.20 | 475.43 | 103.79 | 0.62 | 107.14 | 60 |
| 6 | Bhusawal | 27023 | 28955 | 29511 | 7,421 | 8,295 | 15.60 | 593.67 | 107.15 | 0.64 | 111.78 | 90 |
| 7 | Jalgaon | 51068 | 73701 | 75731 | 16,370 | 20,436 | 15.90 | 419.75 | 144.32 | 0.72 | 124.84 | 100 |
| 8 | Erandol | 34546 | 39149 | 39703 | 9,625 | 11,345 | 15.00 | 478.05 | 113.32 | 0.61 | 117.87 | 68 |
| 9 | Dharangaon | 42996 | 48329 | 49242 | 9,642 | 11,679 | 15.30 | 519.42 | 112.4 | 0.63 | 121.13 | 65 |
| 10 | Amalner | 66363 | 71355 | 72115 | 17,866 | 19,927 | 15.70 | 459.68 | 107.52 | 0.67 | 111.54 | 92 |
| 11 | Parola | 52727 | 57559 | 58695 | 15,684 | 16,233 | 15.80 | 532.04 | 109.16 | 0.69 | 103.5 | 74 |
| 12 | Bhadgaon | 36433 | 39287 | 39701 | 14,273 | 13,668 | 16.00 | 628.97 | 107.83 | 0.59 | 95.76 | 62 |
| 13 | Chalisgaon | 68423 | 70463 | 73556 | 17,444 | 15,235 | 14.90 | 561.99 | 102.98 | 0.65 | 87.34 | 88 |
| 14 | Pachora | 60633 | 64487 | 66854 | 15,500 | 16,665 | 15.50 | 471.27 | 106.36 | 0.7 | 107.52 | 86 |
| 15 | Jamner | 96649 | 104653 | 107985 | 19,761 | 30,829 | 16.40 | 480.88 | 108.28 | 0.73 | 155.99 | 78 |

**Source:** Socio-Economic Survey Report, Jalgaon District, 2024

**Table No. 2:** Composite Agricultural Development Index (CADI) of Jalgaon District, 2024

| Sr. No. | Taluka | Z-Composite Agriculture Development Index Score | Rank | Development Category |
|---|---|---|---|---|
| 1 | Jamner | 1.171 | 1 | Very High |
| 2 | Raver | 1.146 | 2 | Very High |
| 3 | Chopda | 0.683 | 3 | Very High |
| 4 | Jalgaon | 0.648 | 4 | High |
| 5 | Amalner | 0.236 | 5 | High |
| 6 | Muktainagar | 0.146 | 6 | High |
| 7 | Pachora | 0.043 | 7 | High |
| 8 | Parola | -0.09 | 8 | Moderate |
| 9 | Chalisgaon | -0.101 | 9 | Moderate |
| 10 | Yawal | -0.261 | 10 | Moderate |
| 11 | Dharangaon | -0.542 | 11 | Moderate |
| 12 | Bhadgaon | -0.625 | 12 | Moderate |
| 13 | Bhusawal | -0.637 | 13 | Moderate |
| 14 | Erandol | -0.762 | 14 | Low |
| 15 | Bodwad | -1.055 | 15 | Low |

**Source:** Compiled by Researcher

Tables 2 and 3 present the Composite Agricultural Development Index (CADI) and the classification of tehsils based on Z-score standardization (Mean ± Standard Deviation), revealing marked spatial disparities in agricultural development across Jalgaon District. Jamner (1.171), Raver (1.146), and Chopda (0.683) occupy the Very High development category, reflecting superior agricultural performance attributed to higher cropping intensity, better irrigation facilities, greater crop productivity, and improved institutional credit availability. The High development category comprises Jalgaon, Amalner, Muktainagar, and Pachora, indicating above-average agricultural development supported by relatively favorable resource utilization and agricultural infrastructure. Six tehsils Parola, Chalisgaon, Yawal, Dharangaon, Bhadgaon, and Bhusawal fall within the Moderate category, suggesting average levels of agricultural development with scope for improving irrigation efficiency, input use, and technological adoption. Erandol and Bodwad are classified as Low development tehsils due to comparatively lower values of key agricultural indicators, while no tehsil falls under the Very Low category. Overall, the CADI effectively highlights the uneven spatial distribution of agricultural development within the district and identifies priority areas for region-specific agricultural planning, balanced resource allocation, and policy interventions aimed at reducing inter-tehsil disparities.

**Table 3:** Classification of Tehsils According to Composite Agricultural Development Index

| Development Category | Z-CADI Range (Mean ± SD) | No. of Tehsils | Name of Tehsils |
|---|---|---|---|
| Very High | > Mean + 1 SD | 3 | Jamner, Raver, Chopda |
| High | Mean to Mean + 1 SD | 4 | Jalgaon, Amalner, Muktainagar, Pachora |
| Moderate | Mean − 1 SD to Mean | 6 | Parola, Chalisgaon, Yawal, Dharangaon, Bhadgaon, Bhusawal |
| Low | Mean − 2 SD to Mean − 1 SD | 2 | Erandol, Bodwad |

## Conclusion

The study reveals significant spatial disparities in agricultural development among the tehsils of Jalgaon District. The Composite Agricultural Development Index (CADI) identifies Jamner, Raver, and Chopda as the most agriculturally developed tehsils due to their better irrigation facilities, higher cropping intensity, greater crop productivity, and improved access to agricultural credit. In contrast, Erandol and Bodwad exhibit comparatively lower levels of agricultural development and require greater attention in terms of irrigation expansion, input use, and institutional support. The findings demonstrate that the CADI is an effective tool for measuring regional agricultural disparities and identifying priority areas for development. Therefore, location-specific agricultural planning and balanced allocation of resources are essential for reducing inter-tehsil disparities and promoting sustainable agricultural development in Jalgaon District.

**Acknowledgement**
The authors sincerely express their gratitude to the Department of Geography, Iqra's H. J. Thim College of Arts & Science, Mehrun, Jalgaon, for providing the necessary academic support and facilities to undertake this study.

**Financial support and sponsorship**
Nil.

**Conflicts of interest**
The authors declare that there are no conflicts of interest regarding the publication of this paper.

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