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Changing Cropping Patterns in Solapur District : A Comparative Analysis

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Abstract:

This study examines the transformation of cropping patterns in Solapur District, Maharashtra, over 34 years (1990–2024). The research uses official data from the District Socio-Economic Abstract, along with information from agricultural censuses and other reports. Over the past three decades, there has been a steady decline in traditional rain-fed crops, such as jowar and bajra. At the same time, there was a notable increase in the cultivation of sugarcane, wheat, and horticultural crops (fruits and vegetables). This paper provides a detailed comparison of crop areas in 1990, 2009, and 2024. It also explores the reasons behind these shifts in farming and examines their effects on farmers' lives and the environment. The findings show that more irrigation, better prices for certain crops, and government policies were key reasons for these changes. However, unpredictable weather and water shortages continue to be challenges. The recommendations aim to help achieve a balance between making farming profitable and ensuring it is environmentally sustainable for the future.

Keywords: Cropping patterns, Major Crops, Agricultural Land Use.

1. Introduction:

Cropping patterns describe how agricultural land is used for different crops in a specific area. These patterns are shaped by a mix of natural factors (like soil type, rainfall, and climate), economic factors (such as market prices, production costs, and availability of farming supplies), and technological factors (like new seed types and irrigation methods).

Solapur district, located in a dry part of Maharashtra, traditionally relied on rain-fed farming. Jowar (sorghum) and bajra (pearl millet) were common crops because they could handle dry conditions and low rainfall. However, over time, the introduction of irrigation from the Ujani Dam canals, combined with government programs promoting horticulture and sugarcane, dramatically changed the farming landscape.

This study focuses on three key years—1990, 2009, and 2024—to understand how and why cropping patterns have shifted, and what these changes mean for farmers' livelihoods, water resources, and the long-term sustainability of agriculture.

2. Objectives:

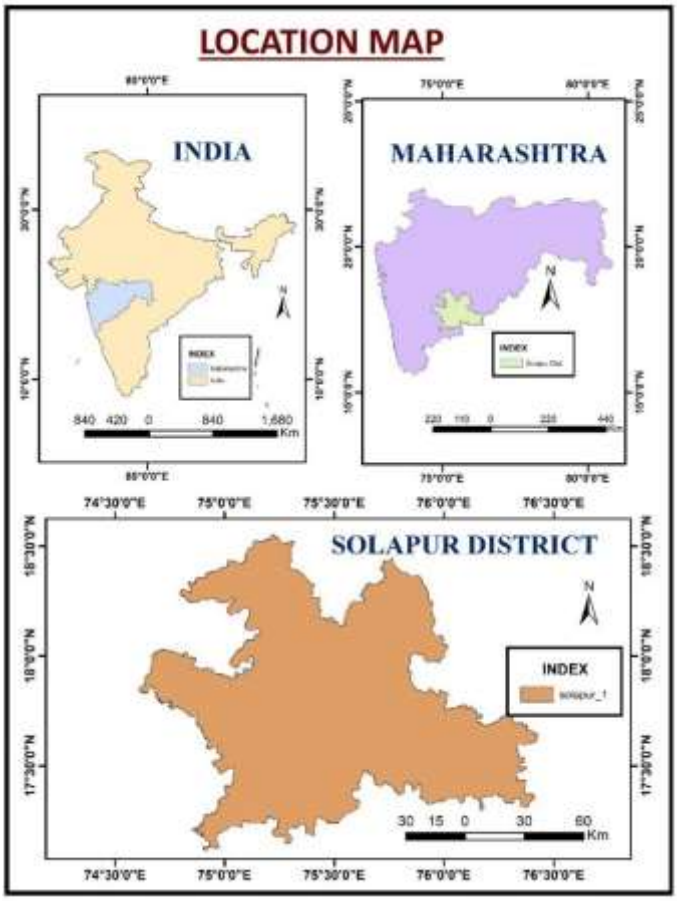
The primary objectives of this study are to:

- Analyse the changes in cropping patterns within Solapur district, Maharashtra, over the period from 1990 to 2024.
- Compare the area under cultivation for major crops during the key years of 1990, 2009, and 2024 to identify clear trends.
- Investigate the key socio-economic, technological, and policy factors responsible for driving these shifts in agricultural land use.

3. Study Area:

Solapur district is located in the southeastern part of Maharashtra, bordering the states of Karnataka and Telangana. The district spans approximately 14,895 square kilometres. Solapur's climate is semi-arid, characterised by hot summers, mild winters, and irregular monsoon rainfall, with an annual average of about 545 mm. The entire district falls within a rain-shadow region, making it consistently susceptible to drought.

The soil in Solapur is predominantly deep and medium black, suitable for cultivating cereals, pulses, and sugarcane. Irrigation is primarily supported by canals from the Ujani Dam, supplemented by other methods such as percolation tanks, lift irrigation schemes, wells, and tube wells. Agriculture serves as the primary economic driver in Solapur, with significant contributions from rural industries including sugar factories, pomegranate orchards, and dairy farming.



4. Data Sources And Methodology

The methodology for this research is based on a quantitative and descriptive approach, utilizing secondary data sources to analyze the changes in cropping patterns within the Solapur district of Maharashtra. The study period spans 34 years, from 1990 to 2024, with specific comparative analyses focused on the key years of 1990, 2009, and 2024.

The primary data for this study was collected from a variety of official and academic sources. Key datasets were sourced from:

- The District Socio-Economic Abstract for Solapur for the years 1990-91, 2008-09, and 2023-24.
- Agricultural Census reports for the periods 1990-91, 2000-01, 2010-11, and 2020-21.

To support the analysis and provide a broader context, additional secondary academic papers and reports were also reviewed.

This data was then compiled into comparison tables to quantitatively illustrate the changes over time. Specifically, a three-part analysis was conducted to show the changes between 1990 and 2009, 2009 and 2024, 1990 and 2024. This approach allowed for the identification of clear trends and shifts in agricultural land use. The percentage change for each crop's cultivated area was calculated to highlight the magnitude of these transformations.

5. Data Analysis:

This section presents a comparative analysis of crop-wise area changes in the study region between 1990, 2009, and 2024, based on secondary data sources (District Socio-Economic Abstracts; Agricultural Census of Maharashtra).

Table 1. Change in crop area between 1990–2009,2009-2024 and 1990–2024

Crop	Area in 1990 (Ha)	Area in 2009 (Ha)	Area in 2024 (Ha)	Change in crop area					
				1990–2009 (Ha)	1990–2009 (change in %)	2009–2024 (Ha)	2009–2024 (change in %)	1990–2024 (Ha)	1990–2024 (change in %)
Jowar	4,50,000	3,11,000	2,45,000	-1,39,000	-30.89	-66,000	-21.22	-2,05,000	-45.56
Bajra	1,00,000	1,60,000	1,39,000	60,000	60.00	-21,000	-13.13	39,000	39.00
Wheat	90,000	1,14,000	1,25,000	24,000	26.67	11,000	9.65	35,000	38.89
Tur (Pigeon pea)	1,50,000	1,69,000	1,54,000	19,000	12.67	-15,000	-8.88	4,000	2.67
Sugarcane	50,000	86,000	1,03,000	36,000	72.00	17,000	19.77	53,000	106.00
Groundnut	60,000	37,000	27,000	-23,000	-38.33	-10,000	-27.03	-33,000	-55.00
Fruits & Vegetables	30,000	50,000	65,000	20,000	66.67	15,000	30.00	35,000	116.67

6. Results And Discussion:

6.1 Key Observstions:

The temporal analysis of crop area data from 1990, 2009, and 2024 reveals distinct trends in the agricultural land-use pattern.

1. Jowar recorded a consistent decline in cultivated area, decreasing from 450,000 ha in 1990 to 311,000 ha in 2009 (-30.89%), and further to 245,000 ha in 2024 (-21.22% from 2009).
2. Bajra exhibited substantial expansion between 1990–2009 (+60.00%), rising from 100,000 ha to 160,000 ha. However, the area contracted by -13.13% between 2009– 2024, settling at 139,000 ha.

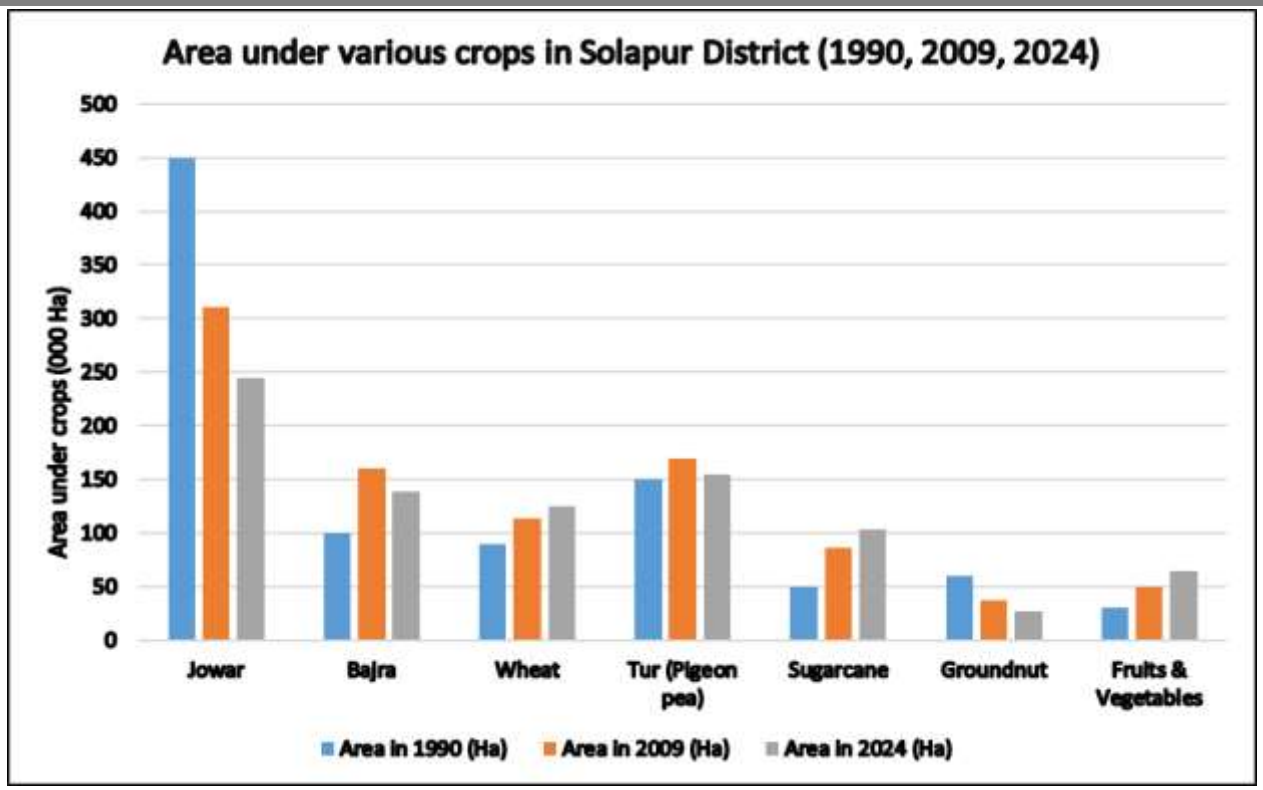


Fig.1 Temporal Analysis of Crop Area data from 1990, 2009, and 2024

3. Wheat demonstrated a steady increase throughout the study period, growing by +26.67% between 1990–2009 and +9.65% between 2009–2024, with the area expanding from 90,000 ha to 125,000 ha.
4. Tur (Pigeon pea) showed moderate growth in the first period (+12.67%), rising from 150,000 ha to 169,000 ha, followed by a decline of -8.88% in the second period, reaching 154,000 ha in 2024.
5. Sugarcane exhibited the most significant positive change, expanding from 50,000 ha in 1990 to 86,000 ha in 2009 (+72.00%), and further to 103,000 ha in 2024 (+19.77%).
6. Groundnut experienced a substantial and continuous decline, with a -38.33% reduction in the first period and a further -27.03% decline in the second, decreasing from 60,000 ha to 27,000 ha over the entire study period.
7. Fruits and Vegetables recorded consistent expansion, increasing by +66.67% between 1990–2009 and by +30.00% between 2009–2024, with the total cultivated area rising from 30,000 ha to 65,000 ha.

6.2 Changes In Cropping Patterns And Responsible Factors

6.2.1 Decline in traditional coarse cereals

A significant reduction was observed in Jowar (-45.56% over 34 years) and Groundnut (-55.00%), indicating a structural shift away from traditional rainfed crops. This decline may be attributed to lower market prices, reduced household consumption, and increasing climatic vulnerability.

6.2.2 Expansion of high-value crops

Sugarcane and Fruits & Vegetables exhibited substantial increases, with sugarcane area more than doubling and horticulture more than tripling over the study period. This trend reflects a transition towards market-oriented agriculture, supported by irrigation infrastructure, agro-processing demand, and higher profit margins.

6.2.3 Mixed performance of Bajra and Tur

Both crops recorded moderate to high gains during 1990–2009, possibly due to drought resilience and supportive agricultural schemes. However, the subsequent decline in 2009–2024 suggests replacement by more profitable irrigated crops.

6.2.4 Wheat's consistent growth

Wheat area expanded steadily (+38.89% overall), likely driven by increased irrigation coverage, favourable procurement policies, and changing dietary patterns favouring wheat- based products.

6.2.5 Role of irrigation and market linkages

Crops showing sustained area growth (Sugarcane, Wheat, Fruits & Vegetables) are largely dependent on irrigation, underscoring the role of water availability as a critical determinant in crop selection. Market integration and price incentives further amplified this trend.

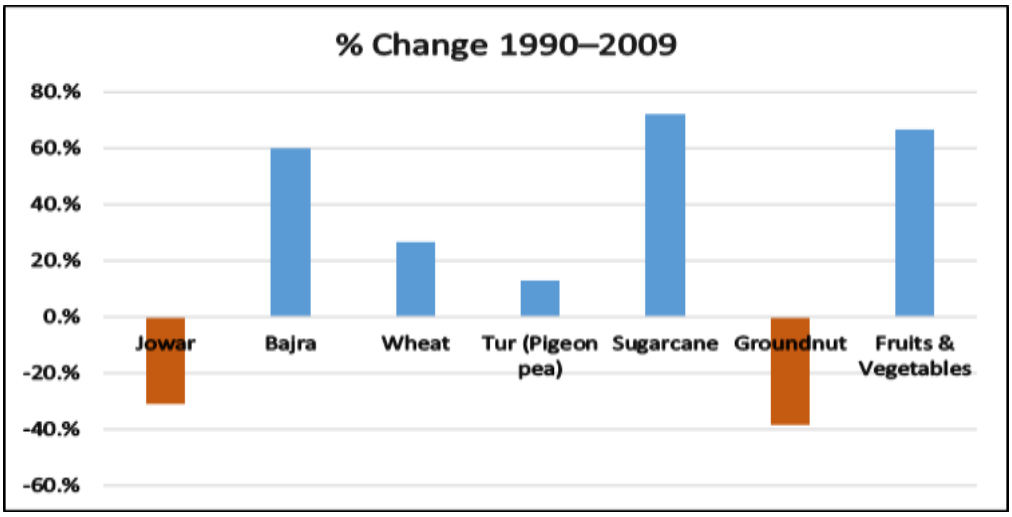


Fig.2 Changes in Cropping Patterns(1990-2009)

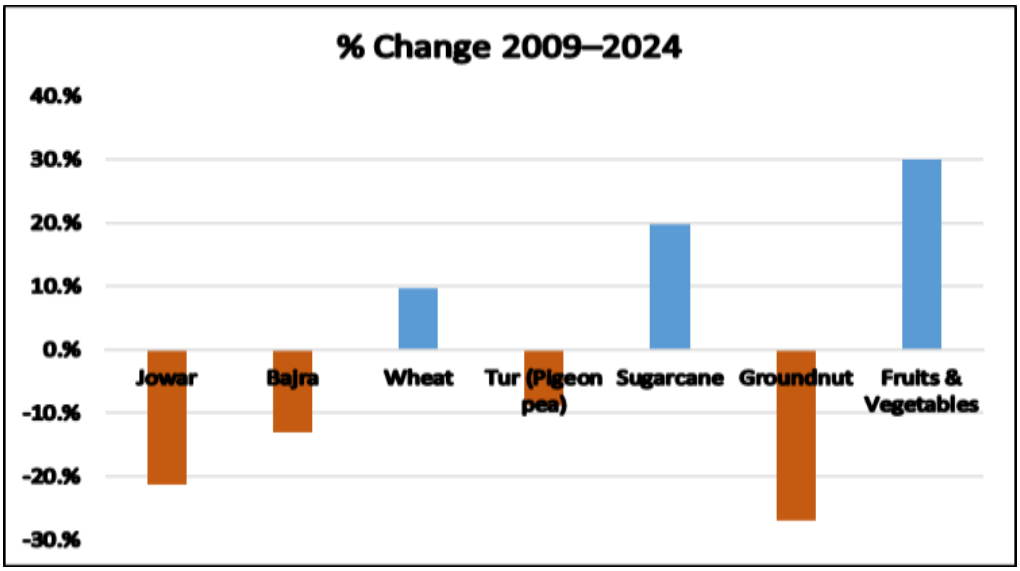
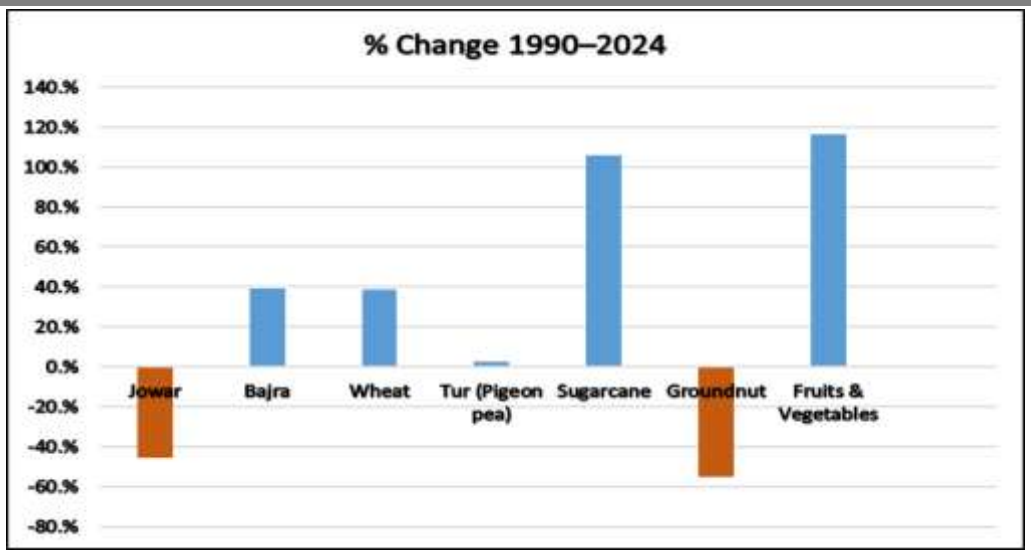


Fig.3 Changes in Cropping Patterns(2009-2024)



7. Conclusion:

The research reveals a clear shift from subsistence-oriented to commercially-oriented agriculture between 1990 and 2024. This transformation is characterised by:

• Decline in rainfed staple crops (Jowar, Groundnut)

• Expansion of irrigation-intensive cash crops (Sugarcane, Wheat)

• Growing emphasis on horticulture for urban and export markets

The analysis of agricultural data from 1990 to 2024 reveals a clear and significant shift in the cropping patterns of Solapur district. The traditional reliance on rainfed subsistence crops like jowar and groundnut has been replaced by an expansion of market-oriented, high-value crops such as sugarcane, wheat, and horticulture. This transformation has been mainly driven by the availability of irrigation from Ujani Dam, combined with favourable government policies and strong market demand for these new crops. While these changes have increased profitability and created economic opportunities for many farmers, they also pose a critical challenge to the region's environmental sustainability, especially in a drought-prone area with limited water resources. The findings highlight the need for a balanced agricultural strategy that can both capitalise on economic opportunities and ensure the long-term viability of farming. A sustainable approach must prioritise water-efficient practices, crop diversification, and improved market infrastructure to build a resilient agricultural economy capable of adapting to future climatic and economic pressures.

8. Recommendations

To promote sustainable and equitable agricultural development in Solapur district, we suggest several important steps. Farmers should be encouraged to grow a variety of crops, including traditional grains like millets, along with crops that sell for more money, such as fruits and vegetables. This will help ensure both a steady food supply and different ways for farmers to earn income. It is also crucial to use water wisely by increasing the use of efficient irrigation systems like drip and sprinkler irrigation, especially for crops like sugarcane, to save water. New types of crops that grow quickly and can survive dry spells should also be introduced. To help farmers sell their products better and reduce waste after harvest, market facilities need to be improved by building more cold storage and processing centres for fruits and vegetables. Finally,

it will be very helpful to provide farmers with training on sustainable farming methods and how to manage resources efficiently.

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