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The Spatio-Temporal Changes in Use of chemical Fertilizers in Solapur District (2015-2025)

Dr. Konade Bhairappa Naganna

Abstract

Chemical fertilizers play an important role in increasing agricultural productivity by supplying essential nutrients required for crop growth and development. The present study examines the spatio-temporal changes in the use of chemical fertilizers in Solapur district of Maharashtra during 2014–15 and 2024–25. The study is based on secondary data collected from the Agriculture Department, District Statistical Department, and Socio-Economic Abstract of Solapur district. The analysis focuses on the spatial distribution and changes in fertilizer use across the 11 tahsils of the district. The findings reveal that the total use of chemical fertilizers increased from 323,841 tonnes in 2014–15 to 399,297 tonnes in 2024–25, representing an increase of 75,456 tones. Considerable spatial variation was observed among the tahsils. Pandharpur recorded the highest increase of 18,209 tones, followed by Malshiras with 17,193 tonnes, while South Solapur was the only tahsil to record a decline of 1,093 tonnes. Higher fertilizer use was generally associated with areas having better irrigation development and greater agricultural intensity. The study highlights the changing spatial pattern of fertilizer use and its importance in agricultural development in Solapur district. At the same time, balanced and scientific fertilizer application is necessary to maintain soil health and support sustainable agricultural development.

Keywords: Sustainable Agricultural Development, Chemical Fertilizers, Spatio-temporal variation.

Introduction:

Agriculture occupies an important position in the Indian economy and provides livelihood, employment, and food security to a large proportion of the rural population. Agricultural productivity is influenced by several physical and human factors, including climate, soil, irrigation, improved seeds, agricultural technology, and the use of fertilizers. Among these inputs, fertilizers play an important role in supplying essential plant nutrients and improving crop productivity. The increasing adoption of modern agricultural practices has consequently made fertilizer use an important component of agricultural development.

Chemical fertilizers, particularly nitrogenous, phosphatic, and potassic fertilizers, provide essential nutrients required for crop growth and development. Their appropriate and balanced use can increase crop productivity and support intensive agriculture. However, continuous and indiscriminate application of chemical fertilizers may result in nutrient imbalance, deterioration of soil health, and environmental problems. According to the Indian Council of Agricultural Research (ICAR) the spatial distribution of fertilizer use is not uniform because it is influenced by differences in cropping pattern, irrigation facilities, soil characteristics, agricultural intensity, farm size, economic conditions, and farmers' access to agricultural inputs. Similarly, fertilizer consumption changes over time in response to changes in crop choices, agricultural technology, market conditions, government policies, and awareness among farmers. Thus, the study of both spatial and temporal variations in fertilizer use is important for understanding changes in agricultural development.

Solapur district is an important agricultural region of Maharashtra. The district has considerable variation in rainfall, soil, irrigation, cropping pattern, and agricultural practices. Therefore attempt is made here to study the Spatio-Temporal Changes in Use of Chemical Fertilizers in Solapur District during the year 2014-15 and 2024-25.

Study Region:

For the present investigation Solapur district is selected as a study region. Geographically Solapur district is located between $17^{0}10'$ North to $18^{0}32'$ North latitude and $74^{0}42'$ East to $76^{0}15'$ East longitude. It covers an area of 14,895 sq. km. The district is situated on the south eastern fringes of the state of Maharashtra.

The shape of district resembles flying eagle. The proportion of area of Solapur district as compare to Maharashtra is about five (5%) per cent. It is administratively sub-divided into 11 tahsils. The soils of the district can be classified into three main types. These are black soil, coarse grey soil and reddish soil. Agro-climatically, the entire district comes under the rain shadow area. Rainfall is uncertain and scanty. The average rainfall for the district is 545.4 mm.

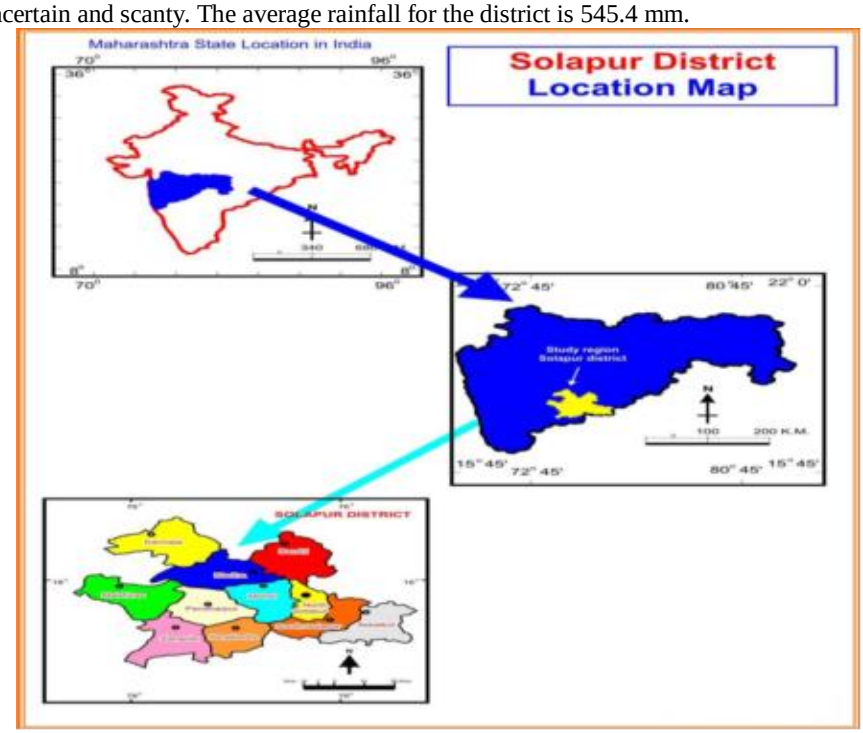

Fig. No. 01

Objective:

The main objectives of this paper are as following.

1. To study the spatial distribution of use of chemical fertilizers in Solapur district.
2. To study the spatio-temporal changes in use of chemical fertilizers in Solapur district.

Database and Methodology:

The study was conducted in the Solapur district of Maharashtra state. For the purpose of the study, only secondary information was collected from different sources. Data regarded to use of chemical fertilizer and geographical information collected through Agriculture Department, District statistical Department of Solapur and Socio-economic abstract of Solapur district in 2014-15 and 2024-25.

Result And Discussion:

The chemical fertilizers play an important role in agricultural production by supplying essential plant nutrients and improving crop productivity in Solapur district. The semi-arid climatic conditions, limited and variable rainfall, and increasing demand for agricultural output leads to farmer used fertilizers to maintain soil nutrient availability and achieve higher yields. The use of chemical fertilizers is essential in the cultivation of crops such as sugarcane, Jawar, wheat, maize, pulses, and oilseeds. Therefore, understanding the spatial and temporal pattern of fertilizer consumption is important for assessing agricultural development and sustainable land-use practices in Solapur district. Following table no. 01 shows that spatio-temporal changes in use of chemical fertilizers in Solapur district during the year 2014-15 and 2024-25

Table No.1

Spatio-Temporal Changes in Use of Chemical Fertilizers in Solapur District

Sr. No.	Tahsil	2014-15	2024-25	Changes
1	Akkalkot	29145	31562	2417
2	Karmala	34975	38414	3439
3	Barshi	37889	41580	3691
4	Madha	32061	40797	8736
5	Malshiras	28822	46015	17193
6	Mangalwedha	22993	30189	7196
7	Mohol	32384	37662	5278
8	North Solapur	12628	15780	3152
9	Pandharpur	41452	59661	18209
10	Sangola	21698	28936	7238
11	South Solapur	29794	28701	-1093
	District	323841	399297	75456

Source: District Statistical Abstract / Socio-Economic Review of Solapur District.2014-15 and 2024-25

The Table no 01 and Fig. no. 02 indicate that the overall use of chemical fertilizers in the district increased from 323,841 in 2014–15 to 399,297 in 2024–25, showing an overall increase of 75,456 units. This indicates a considerable rise in fertilizer use over the ten-year period.

The table No. 01 indicates that during 2014-15, there is 323841 tonne use of chemical fertilizers in study region but spatial distribution varies from tahsil to tahsil. The high use of chemical fertilizer was recorded in Pandharpur and Barshi tahsil i.e. above 35000 tonne, due to development of irrigation. The moderate use of chemical fertilizer in Mohol and Karmala tahsil i.e. 30000 to 35000 tonnes, whereas it is low in Akkalkot, Sangola, Malshiras, Mangalwedha, South Solapur, Madha and North Solapur tahsil i.e. below 30000 tonnes.

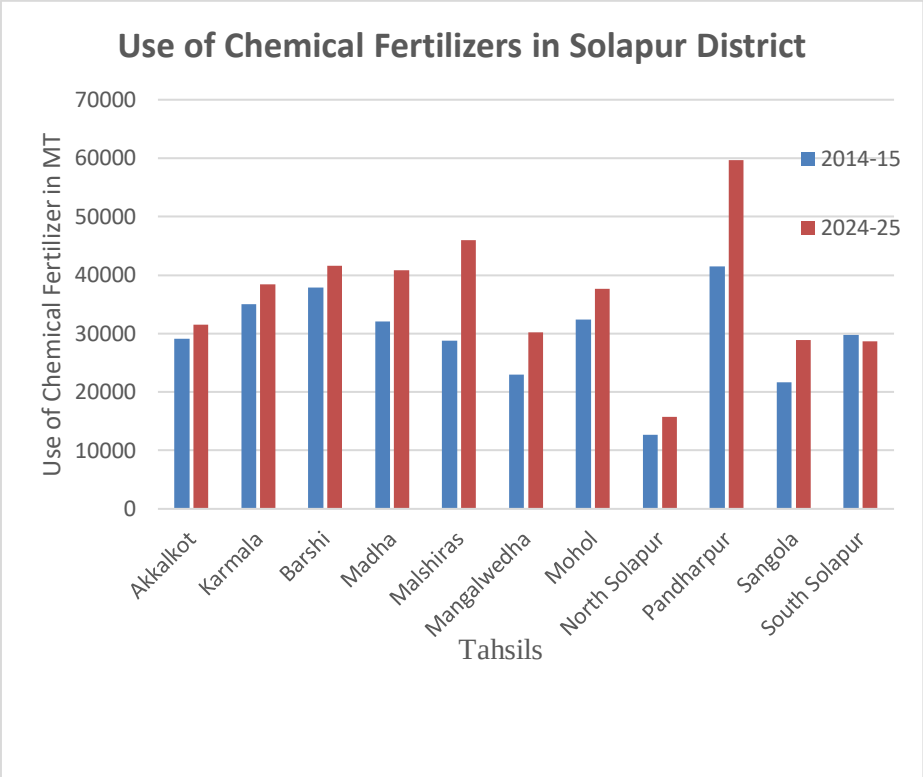

Fig. No. 02

During the year 2024-25, there are 399297 tonne uses of chemical fertilizers in study region but spatial distribution varies from tahsil to tahsil. The high use of chemical fertilize was recorded in Madha, Malshiras, Pandharpur and Barshi tahsil i.e. above 40000 tonnes, due to development of irrigation. The moderate use of chemical fertilizer in Mohol and Karmala tahsil i.e. 35000 to 40000 tonnes, whereas it is low in Akkalkot, Sangola, Mangalwedha, South Solapur and North Solapur tahsil i.e. below 35000 tonnes.

Among the tahsils, Pandharpur recorded the highest increase, with fertilizer use rising from 41,452 to 59,661, an increase of 18,209 tone. The tahsil Malshiras also showed a increase of 17,193 tones, followed by Madha. In contrast, South Solapur was the only tahsil to record a decline use of chemical fertilizer in study region, decreasing from 29,794 to 28,701, representing a reduction of 1,093 units. The spatial variation in fertilizer use may be associated with differences in cropping patterns, irrigated area, agricultural intensity, soil conditions, crop productivity, and farmers' adoption of modern agricultural practices.

Conclusion and suggestion:

From the above observation we can concluded that, the total consumption of chemical fertilizers increased from 323,841 tons to 399,297 tones, registering an overall increase of 75,456 tons during the study period. This increasing trend reflects the growing importance of chemical fertilizers in maintaining agricultural productivity

It is also concludes that, the greatest increase was recorded in Pandharpur followed by Malshiras and Madha. In contrast, South Solapur was the only tahsil where fertilizer use of declined. These differences indicate that fertilizer consumption is influenced by variations in irrigation, cropping patterns, agricultural intensity, soil conditions, crop productivity, and the adoption of modern agricultural practices.

The empirical results suggest that, there is an urgent need to farmers should be encouraged to use nitrogen, phosphorus, and potassium fertilizers in appropriate proportions according to crop requirements rather than applying fertilizers indiscriminately. It is also suggested that, Agricultural departments and extension agencies should organize training programmes on the right fertilizer, right dose, right time, and right method of application.

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

References:

1. District Statistical Abstract / Socio-Economic Review of Solapur District.2014-15 and 2024-25
2. Indian Council of Agricultural Research (ICAR). (2026). *Balanced Fertilizer Use Essential for Sustainable Soil Health and Crop Productivity*. ICAR, New Delhi.
3. Indian Council of Agricultural Research (ICAR). (2026). *Awareness Programme on Importance of Bio-fertilizer Application and Balanced Fertilizer Use*. ICAR–Directorate of Floricultural Research, Pune.
4. Government of Maharashtra, Directorate of Economics and Statistics.
5. Raj R. and Bilas R. (2010): Ground Water Management in Chanduli District Uttar Pradesh: A Case Study, National Geographical Journal of India, 56, PP. 93-100.
6. Reddy M. V. and. Reddy B. K. (1992): Change Pattern of Irrigation in Andhra Pradesh, Concept publishing company, New Delhi, Vol. 3, PP.239.
7. Sharma S. K. and Jain C. K. (1992): Perspective of irrigation in Madhya Pradesh, Concept publishing company, New Delhi, Vol.3, P. 277