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Impact of Irrigation on Per Hectare Yield of Wheat in Solapur District (2024-25)

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Abstract:

Agriculture plays an important role in the rural economy of Solapur district, where rainfall is uncertain and scanty because the district lies in the rain-shadow region. Therefore, irrigation plays an important role in maintaining agricultural production and improving crop productivity. The present study examines the impact of irrigation on the per hectare yield of wheat in Solapur district during 2024–25. The study is based on secondary data collected from the Agriculture Department, District Statistical Department, and Socio-Economic Review of Solapur district. The study covers the 11 tahsils of the district and considers irrigated area as an independent variable and per hectare yield of wheat as a dependent variable.

Pearson's coefficient of correlation was used to examine the relationship between irrigation and wheat yield. The analysis shows a positive correlation of +0.5425 between irrigated area and per hectare yield of wheat. The coefficient of determination is 0.2943, indicating that irrigated area explains about 29.43 per cent of the variation in wheat yield, while the remaining 70.57 per cent is influenced by other factors. Mohol records the highest wheat yield, whereas Sangola records the lowest. The study indicates that irrigation has a significant positive influence on wheat productivity, although other agricultural, climatic, technological, and socio-economic factors also affect yield.

Key Words: *Impact, Irrigation and Wheat Per Hectare Yield.*

Introduction:

Agriculture occupies an important position in Indian economy. Cotton and sugarcane are one of the most important commercial crops produced in India. Sugarcane is most benefited commercial crop. Sugarcane cultivation and development of sugar industry run parallel to the growth of human civilization and is as old as agriculture. The importance and use of sugarcane and sugar in the country's socio-economic milieu is deep rooted and immense. In the current day rural economy set up sugarcane cultivation and sugar industry has been focal point for socio-economic development in rural areas by mobilizing rural resources, generating employment and higher income, transport and communication facilities (M.F. Pathan, 2017).

Irrigation plays a crucial role in agricultural production, especially in regions where rainfall is irregular, insufficient, or unevenly distributed. It refers to the artificial supply of water to crops at required intervals, ensuring that agricultural activities are not solely dependent on monsoon rains. In many developing countries like India, irrigation has become a key factor in enhancing agricultural productivity, stabilizing crop yields, and supporting multiple cropping patterns.

Wheat is cultivated since pre-historic times in the world. From all possible records, it seems that its center of origin is South Western Asia. Wheat is the one of the staple foods of Indian population. Wheat grains are ground in to flour (*Atta*) and consumed mostly in the form of *chapati* or leavened bread. India is second largest producer of wheat in the world after China with about 15% share in total world's wheat production. Currently, India is surplus in wheat production and in a position to export. (M. R. Nangare, 2014) An attempt is made here to assess the impact of irrigation on per hector yield of Wheat in Solapur district.

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 and the district is bounded on the north by the Ahmednagar district and Osmanabad district, on the east by Osmanabad and Gulbarga district of the state of Karnataka, on the south by Sangli and Bijapur district of Karnataka and on the west by Pune and Satara district.

The shape of district resembles flying eagle. The proportion of area of Solapur district as compare to Maharashtra is about five (5%) percent.

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.

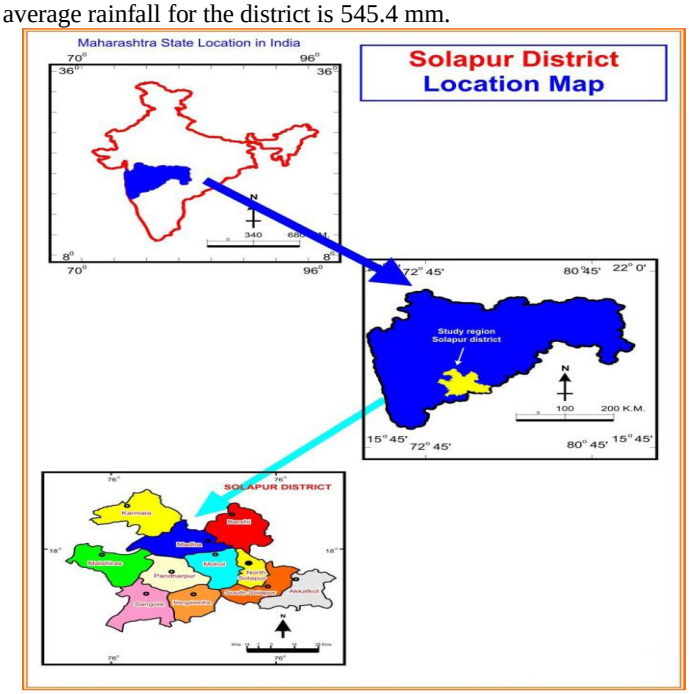

Fig. No. 1

Objective:

The main objectives of this paper are as following.

1) To study the per hector yield of wheat in various tahsil of Solapur district.

2) To study the impact of irrigation on per hector yield of wheat in study region.

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. The secondary data like irrigated area, per hector yield of Wheat and geographical information collected through Agriculture Department, District Statistical Department of Solapur and socio-economic abstract of Solapur district in 2024-25 is used.

To examine the impact of irrigation on the per hector yield of Wheat, Pearson's Coefficient of Correlation technique has been utilized. The degree of relationship by considering irrigated area as an independent variable 'X' and per hector yield of Wheat as dependent variable 'Y' is measured.

Impact of Irrigation On Per Hectare Yield Of Wheat

The irrigation is an important factor influencing wheat cultivation and productivity, particularly in a region characterized by variable rainfall conditions. The table no. 01 shows the relationship between **irrigated area and per hectare yield of wheat in the different tahsils of Solapur district.** It is showing considerable spatial variation in both the extent of irrigated area and wheat yield among the tahsils.

Table No. 01 Impact of Irrigation on Per Hector Yield of Wheat in Solapur District-2024-25

Sr. No.	Tahsil	X (Net irrigated area)	Y (PHY of Wheat)
1	Akkalkot	16176	1945.32
2	Karmala	33167	2404.20
3	Barshi	20233	1301.96
4	Madha	38692	2238.42
5	Malshiras	20685	2187.77
6	Mangalwedha	36106	1374.35
7	Mohol	55585	2509.02
8	North Solapur	15516	1338.76
9	Pandharpur	45648	1845.14
10	Sangola	18487	428.76
11	South Solapur	20150	1620.57
Coefficient of correlation			0.5425
Coefficient of determination			0.2943

Source: Compiled by Researcher on the basis of Agriculture Department and Socio-Economic review and district statistical abstract of Solapur District 2024-25

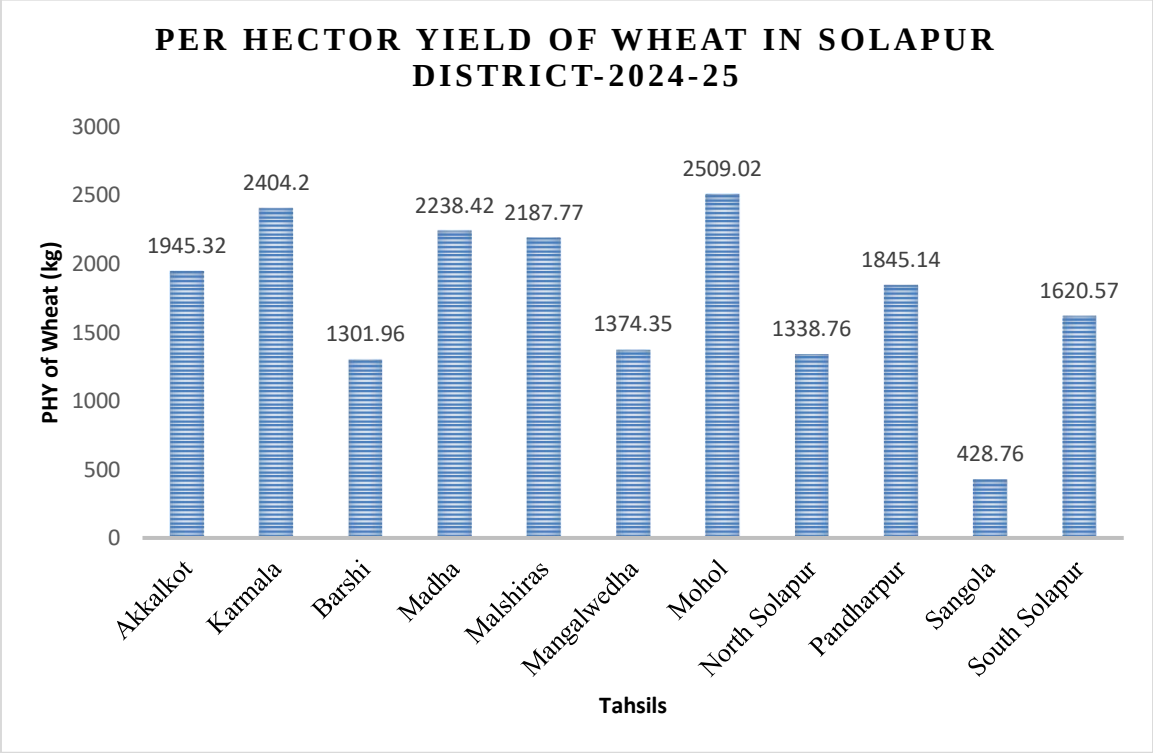

Fig. No. 2

According to table no.1, the high level of per hectare wheat yield is observed in **M**ohol tahsils i.e. 2,509.02 kg/ha, followed by Karmala (**2**,404.20 kg/ha), Madha (2,238.42 kg/ha). The relatively higher yield indicates favorable agricultural conditions and better availability or utilization of irrigation for wheat cultivation. The low level of wheat yield is observed in Sangola tahsil i.e. **428.76 kg/ha,** followed by Barshi (1,301.96 kg/ha), North Solapur (**1,338.76 kg/ha**), and Mangalwedha (1,374.35 kg/ha). The very low yield in Sangola, despite an irrigated area of 18,487 ha, suggests that irrigation alone does not determine wheat productivity; other factors may also influence yield.

The high positive correlation is observed in between irrigated area and per hector yield of Wheat in the tahsils of Solapur district. The coefficient of correlation in this regard is +0.5425. The degree of linear association between these two-variable obtained by using the coefficient of determination (r2) is found to be at 0.2943, which reveals that the independent variable (X) i.e. irrigated area is explaining 29.43 per cent of the total variations in dependent variable (Y) i.e. per hector yield of Wheat of Solapur district. It is good explanation because 29.43 per cent of variation in "Y" per hector yield of Wheat of Solapur district to be influenced by the variable "X" i.e. irrigated area and about 70.57 percent of variation is left to be influenced by other variables.

Conclusion and Suggestion:

From the above observation we can concluded that, there is considerable spatial variation in wheat productivity among the tahsils. Mohol has the highest per hectare yield of 2,509.02 kg/ha, followed by Karmala and Madha, while Sangola has the lowest yield of 428.76 kg/ha. The variation indicates that merely increasing irrigated area may not be sufficient to achieve higher productivity. Efficient utilization of irrigation water and the adoption of improved agricultural practices are equally important.

It also concludes that irrigation has a positive relationship with the per hectare yield of wheat in Solapur district. The correlation coefficient of +0.5425 indicates a moderate to high positive relationship between irrigated area and wheat yield. The coefficient of determination of **0**.29**43** shows that approximately 29.43 percent of the variation in per hector yield of wheat is explained by the irrigated area. Thus, irrigation is an important factor in improving wheat productivity in the district. However, about 70.57 per cent of the variation remains unexplained by irrigation alone, indicating the importance of other factors such as rainfall, soil conditions, quality of irrigation, improved and HYV seeds, fertilizers, new agricultural technology, farming practices, and climatic conditions.

The empirical results suggest that; there is an urgent need to use of modern irrigation technology like drip irrigation in low and moderate per hector yield of Wheat region. It is also suggested that, High-yielding and locally suitable wheat varieties should be promoted to increase per hector yield of Wheat and Farm ponds, watershed development, rainwater harvesting, and groundwater recharge measures should be promoted to ensure sustainable water availability.

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

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