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The Impact of Rainfall on Production of Bajra in Solapur District

Dr. Rajaram H. Choudhar
Head, Department of Geography
Vidya Pratishthans, A S C College, Baramati Dist- Pune.
rajachoudhar@gmail.com

Abstract: -

This study examines the impact of rainfall on Bajra (Pearl Millet) production in Solapur district of Maharashtra, India. Being a drought-prone region with highly variable rainfall, Solapur's agricultural productivity is directly influenced by climatic conditions. Using secondary data from 2004–05 to 2013–14 and applying Pearson's Coefficient of Correlation, the study reveals a moderate positive correlation (+0.543) between rainfall and Bajra production. However, rainfall alone explains only 29.48% of the total variation in yield, indicating that other factors such as soil type, temperature, irrigation facilities, and farmers' practices significantly affect productivity. The findings highlight the need for improved irrigation infrastructure, adoption of high-yielding seed varieties, and modern agricultural practices to stabilize Bajra production in drought-prone areas.

Key Word: - Rainfall, Bajra Production, Solapur District, Agricultural Geography, Correlation Analysis

Introduction:

Agriculture is one of the oldest and most important primary economic activities in China. The study of the relationship with the environment may well deserve the title of the science of *Geoagricultura*'. Agriculture Geography can be considered a science in view of its techniques of analysis, methods of interpretation, and approaches to the investigation of agriculture. As a science, agriculture geography is concerned with the formulation and testing of hypotheses, interpretation of the spatial distribution and location of various characteristics of agricultural activities on the surface of the earth, and measurement of geographic relationships (Singh and Dhillon,1987)

Agriculture occupies an important role in the Indian economy. Its contribution to the national income in1950-51 was up to 54%, which declined to only 18.50 per cent at present. Agriculture provides food, fodder, and raw materials and thus contributes to overall economic growth. Agriculture forms the backbone of the Indian economy, and food crops form the back bone of Indian agriculture. The importance of food crops has grown with population growth because these crops provide basic and essential food for humans. (Dr. M.M. Nangare, 2021)

Rainfall plays a significant role in the growth and production of crops in all regions. Rainfall is the main factor that directly impacts the drainage pattern and, in turn, the agricultural activity of the study region. Next to Rice, Wheat and Jawar, Bajra is the fourth most important food crop in India. Bajra is a crop in drought-prone areas. It is an extremely drought-tolerant crop, and is recommended for dry regions. Bajra is a food crop in Solapur district. It can be grown during both the Rabi and Kharif seasons. Rainfall is the only water source for Bajra cultivation. Farmers use other sources of irrigation for Bajra crops, such as canal, tank, well, and bore well water. These are all dependent on rainfall for recharge. There is wide temporal variation in Bajra production in the Solapur district. Therefore, we investigated the "impact of rainfall on Bajra production in Solapur district".

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Study Region:

For the present study, the Solapur district of Maharashtra State was selected as the study region. Geographically, the 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 southeastern fringes of the state of Maharashtra, and is bounded to the north by the Ahmednagar and Osmanabad districts, to the east by the Osmanabad and Gulbarga districts of the state of Karnataka, to the south by the Sangli and Bijapur districts, and to the west by the Pune and Satara districts.

The shape of the district resembles that of a flying eagle. The proportion of the area of Solapur district compared to Maharashtra is about five (5%). It is administratively subdivided into 11 types. The soils in the district can be classified into three main types. These are black, coarse grey, and reddish soils. Agro-climatically, the entire district is under a rain shadow area. Rainfall is uncertain and scarce. The average rainfall for the district was 545.4 mm.

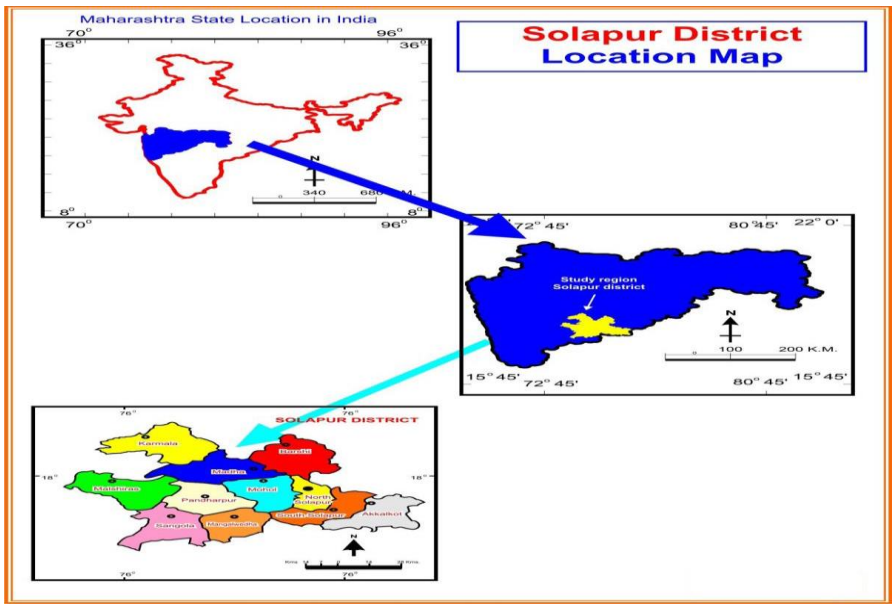

Fig. No. 01

Objective:

The main objectives of this paper are as following,

1) To study the production of Bajra in the study region
2) To examine the impact of rainfall on production of Bajra in study region

Database and Methodology:

For this study, only secondary information was collected from different sources. Secondary data such as Bajra production, rainfall, and geographical information were collected through the Socio-Economic Review and District Statistical abstract of Solapur District for the year 2004-05 to 2013-14 used. To examine the impact of rainfall on Bajra production, Pearson's Coefficient of Correlation technique was used. The degree of relationship by considering rainfall as an independent variable 'X' and production of Bajra as dependent variable 'Y' is measured.

Result and Discussion:

Bajra is a popular crop in dry farming or rain shadow regions, and grows well at temperatures between 24 °C and 30°C, but temperatures below 15°C are harmful to the crop. Bajra requires rainfall between 50 cm and 60 cm. Bajra can be grown on poor light sandy soils, black and red soils, and gravely upland soils. The Solapur district is well-

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known for Bajra production because of its climatic conditions. It grows mainly during the Kharif season. The table no. 01 shows that year wise average annual rainfall and Bajra production in the Solapur District.

Table No. 01
Average Annual Rainfall, Per Hector Yield and Production of Bajra in Solapur District (2004-05 to 2013-14)

Sr. No	Year	Average Annual Rainfall (cm)	Annual Bajra Production (`00`tone)
1	2004-05	62.05	150
2	2005-06	60.57	67
3	2006-07	52.65	77
4	2007-08	64.97	97
5	2008-09	54.37	91
6	2009-10	65.17	98
7	2010-11	80.72	97
8	2011-12	47.91	18.50
9	2012-13	41.55	61
10	2013-14	53.30	22

(Source: socio economic abstract of Solapur district 2004-05 to 2013-14)

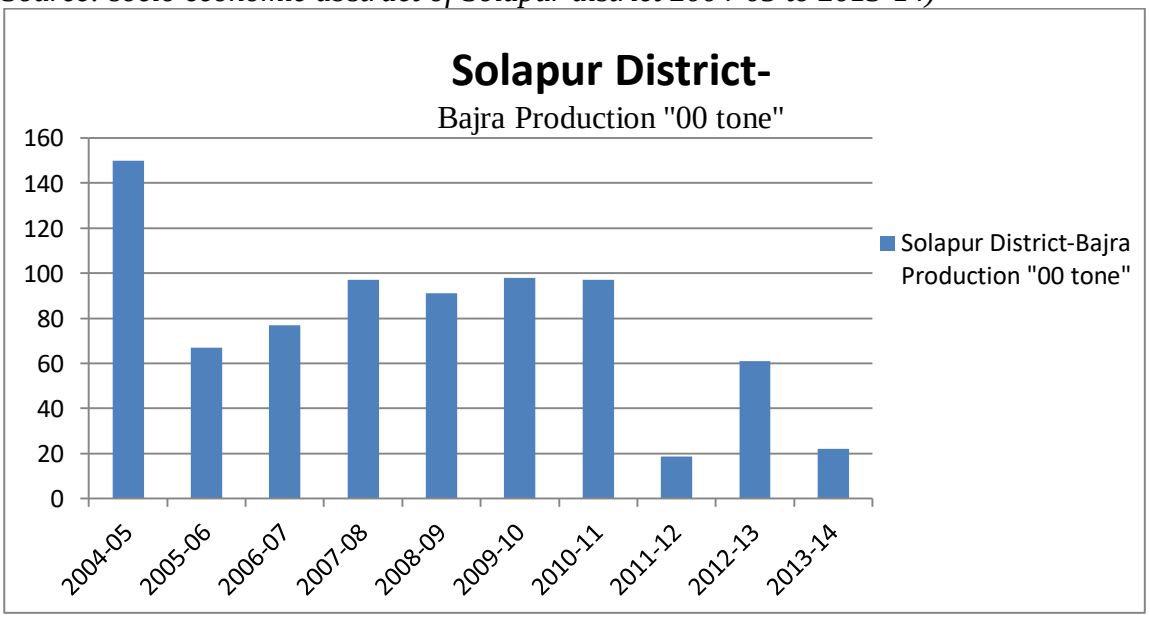

Fig. no. 02

The study region experienced fluctuating rainfall and production of Bajra during the period of investigation. During the year 2004-05, Bajra production was 15 thousand tones and rainfall was 62.05 cm, after which both production of Bajra and rainfall decreased up to 2006-07. It is 7.7 thousand tons, and the rainfall is 52.65 cm. During the year 2008-09 both Bajra production and rainfall decreased as compared to 2006-07. It has become 54.37 cm rainfall and 9.1 thousand tone Bajra production. During the year 2009-10, rainfall increased compared to the past year, and the production of Bajra increased (98 thousand tone). This was because farmers pay more attention to growing sugarcane or fruit crops than Bajra. The agriculture year 2012-13 is worth a drought-porn year in the study region. During this year, rainfall was only 41.55 cm and Bajra production was 61 hundred tons. In the year 2013-14 Bajra production was 2.2 thousand tones and rainfall was 53.30

cm. There was a wide fluctuation in the production of Bajra from a minimum of 22 hundred tones in 2012-13 to a maximum of 150 thousand tone in 2004-05.

The table 1 and fig. No.02 indicates that there is a moderate positive correlation in Bajra production, and the coefficient of correlation in this regard is + 0.543. The coefficient of determination (r2) was found to be 0.2948, which reveals that the independent variable (X), that is, rainfall, explains 29.48 percent of the total variation in the dependent variable (Y), that is, the production of Bajra. Bajra production depends not only on the amount of rainfall but also on the duration of rainfall, soil type, temperature, and contribution of farmers.

Conclusion:

From these observations, we can conclude that there is a direct relationship between rainfall and Bajra production. Years with higher rainfall generally show higher production, while years with low rainfall correspond to sharp declines in yield (e.g., 2011–12 and 2012–13). The maximum Bajra production was observed in 2004-05 (150 thousand tone) when rainfall was 62.05 cm. and the maximum amount of rainfall observed in the year 2010-11 (80.72 cm.) when Bajra production was only 97 thousand tone in the study region. ThisIt shows that rainfall is not the only factor controlling the production of the Bajra crop. It also reveals that too moist and prolonged dry conditions are not suitable for Bajra Cultivation.

The study also shows that there is a moderate positive correlation in Bajra production, with a coefficient of correlation of + 0.543. The coefficient of determination (r2) was found to be 0.2948, which reveals that the independent variable (X), that is, rainfall, explains 29.48 percent of the total variation in the dependent variable (Y), that is, the production of Bajra. Bajra production depends not only on the amount of rainfall but also on the duration of rainfall, soil type, temperature, and contribution of farmers.

The empirical results suggest an urgent need to improve irrigation facilities, use high- yield verity seeds, and use modern technology to increase Bajra production in the study region. It is also suggested that the government motivates farmers to grow Bajra crops.

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