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# IMPACT OF BIOFERTILIZERS AND NITROGEN ON GROWTH PARAMETERS OF OKRA (*Abelmoschusesculentus* L.)

**Pragya Sharma[1*], Aman Pandey[2] and Satwik Sahay Bisarya[3]**
*[1&2]Assistant Professor, Faculty of Agriculture Science and technology,*
*Madhyanchal Professional University, Bhopal*
*[3]Assosiate Professor, Faculty of Agriculture Science and technology,*
*Madhyanchal Professional University, Bhopal*

**ABSTRACT**---------------------------------------------------------------------------------------------------------
*The present investigation was conducted at research farm of the Department of Agriculture Science and Technology, Madhyanchal Professional University, Bhopal during spring-summer season of the year 2023-24.Aims to comprehend how the application of nitrogen and bio fertilizers affects the okra growth and productivity. With a plot size of 3.0 × 1.8 m2, fourteen distinct treatments with three replications were arranged in a randomized block design. The treatments included control, nitrogen, and azotobacter with PSB. The findings showed that 100% RDN (Inorganic) + Azotobacter + PSB produced the lowest number of days to 50% blooming (39.33), the highest plant height at harvest (91.93 cm), the fewest number of nodes per plant (23.60), the longest internodal length (6.90 cm), the thickest main stem (9.63 cm), and the highest harvest index (49.59).*------------------------------------------------------------------------

## INTRODUCTION

Tropical Africa is the native home of okra, or Abelmoschusesculentus (L.) Moench, which grows across the tropics and subtropics. Okra, sometimes referred to as lady finger or "Bhindi," is a significant vegetable in India. The Malvaceae family comprises upright, herbaceous, annual green plants with delicate, immature fruits. In the paper business, the stem and mature fruits that contain crude fibre are employed. In order to prepare the cane juice for "gur," the stems and roots are utilised. The high iodine concentration of fruits also controls goitre. According to Nadkarni (1927), okra is highly helpful in treating genito-urinary diseases, chronic dysentery, and spermatorrhoea. Fertiliser high in nitrogen is essential for boosting okra's growth, fruit yield, and quality. Nitrogen deficiency is observed in most Indian soils. It is a component of proteins, chlorophyll, and nucleic acids, among other things. were discovered to be connected to the use of carbohydrates, the availability of amino acids needed for the biosynthesis of proteins, and the kind of enzymes that produce proteins. These factors lead to improved crop development and, eventually, increased yield (Mani and Ramanathan 1980; Singh 1995).

Bio fertilizers release substances that promote growth and vitamins that support soil fertility. They help prevent illnesses by acting as an antagonist and suppressing the incidence of soil-borne plant infections. The bio fertilizer's nitrogen-fixing, cellulolytic, and phosphate-mobilizing microorganisms improve the amount of plant nutrients available in the soil, hence enhancing farming practices and agricultural output. When biofertilizer is applied, it promotes root development, nitrogen fixation, mineral and water intake, and vegetative growth. Certain bio fertilizers, such as Rhizobium, BGA, and Azotobacter sp., induce the synthesis of chemicals that promote growth, such as vitamin B complex, indole acetic acid (IAA), and gibberellic acids (GA3), among others (Siddiqui et al., 2014). Plants benefit from the presence of Azotobacter spp. in the soil, and the abundance of these bacteria was linked to a number of physical and chemical characteristics of the soil, including organic matter, pH, soil moisture, and temperature, as well as microbiological characteristics. The amount varies according to the soil profile's depth. Compared to the surrounding soil, azotobacter is more prevalent in the rhizosphere of plants, and this abundance varies depending on the type of crop (Jnawali et al., 2015). Vegetables and the vegetable system demonstrate how well vegetable crops react to nutrient supplies from chemical and organic fertilisers (Kumar et al., 2022).

## METHODOLOGY

The present investigation was conducted at research farm of the Department of Agriculture Science, Madhyanchal Professional University Bhopal during spring-summer season of the year 2023-24.Three replications and a randomized block design were used to set up the experiment. There were 14 treatments in the experiment: T1: 100% RDN (Inorganic) + Azotobacter + PSB; T2: 75% RDN (Inorganic) + Azotobacter + PSB; T3: 100% RDN through FYM + Azotobacter + PSB; T4: 75% RDN through FYM + Azotobacter + PSB; T5: 100% RDN through Vermicompost + Azotobacter + PSB; T6: 75% RDN through Vermicompost + Azotobacter + PSB T9: 100% RDN through FYM, T10: 75% RDN through FYM, T11: 100% RDN through Vermicompost, T12: 75% RDN through Vermicompost, T13: Azotobacter + PSB, and T14: Control. T7: 100% RDN (Inorganic), T8: 75% RDN (Inorganic). The results were interpreted after appropriate statistical analysis of the obtained data.

## RESULTS AND DISCUSSION

Impact of biofertilizers and nitrogen on plant development metrics. According to the growth parameter results shown in Table 1, T1 (39.33) had the lowest number of days to 50% blooming, followed by T2 (39.67). In contrast, a maximum of 44.00 days to 50% flowering was noted under management. The early 50% blooming seen in treated plots may be attributed to the application of larger doses of fertilizer and biofertilizer in comparison to other treatments. Better earliness results from plants receiving nutrients from inorganic sources rather than total control. Earliness could be the result of compounds created by inorganic sources that promote growth and have an impact on a plant's physiological activity. A 50% increase in blooming was also recorded in okra by Muhammad et al. (2001), Bhadoria et al. (2007), Singh et al. (2012), and Tyagi et al. (2016).T1 had the highest plant height at harvest (91.93 cm), while T2 had the second-highest plant height (91.33 cm). On the other hand, T14 reported a minimum plant height of 62.80 cm at harvest. This may be the result of increased nitrogen treatments creating a more nutrient-rich root zone for plant growth and development. One of the main nutrients thought to be necessary for a plant's healthy growth and development is nitrogen. It is also a key component of many other metabolic products, including proteins, amino acids, chlorophyll, protoplasm, and cell nuclei. The current study's findings concur with those of Manga and Muhammad (2006), Firoz (2009), Sharma and Choudhary (2011), Singh et al. (2012), Choudhary et al. (2015), and Tripathi et al. (2017) in okra and Baba et al.T1 had the highest number of nodes per plant (23.60), whereas T2 had the second-highest number (22.47). On the other hand, the control group recorded the smallest number of nodes per plant (15.80). As the amount of nitrogen applied is reduced, the number of nodes per plant and the intermodal length both drop. indications of increased protoplasmic simulation, which led to higher cell division, the creation of new tissues, and increased plant vigor. The current study's findings are consistent with those of Fayaz et al. (1999), Firoz (2009), Singh et al. (2012), and Kumar et al. (2013), who revealT1 had the highest number of nodes per plant (23.60), whereas T2 had the second-highest number (22.47). On the other hand, the control group recorded the smallest number of nodes per plant (15.80). As the amount of nitrogen applied is reduced, the number of nodes per plant and the intermodal length both drop. indications of increased protoplasmic simulation, which led to higher cell division, the creation of new tissues, and increased plant vigor. The current study's findings are consistent with those of Fayaz et al. (1999), Firoz (2009), Singh et al. (2012), and Kumar et al. (2013), who revealed a significant influence of nitrogen on the number of nodes per plant and intermodal length in okra.ed a significant influence of nitrogen on the number of nodes per plant and intermodal length in okra.

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**Table:-1 Impact of biofertilizers and nitrogen on plant development metrics.**

| Treatment | Days to 50% flowering | Plant Height at harvest (cm) | Number of nodes per plant |
|---|---|---|---|
| **T1** | 39.33 | **91.93** | **23.60** |
| **T2** | 39.67 | 91.33 | 22.47 |
| **T3** | 40.00 | 83.80 | 21.07 |
| **T4** | 40.67 | 80.73 | 20.13 |
| **T5** | 40.33 | 83.53 | 21.07 |
| **T6** | 41.00 | 80.20 | 19.87 |
| **T7** | 40.00 | 82.00 | 23.47 |
| **T8** | 40.33 | 81.67 | 21.53 |
| **T9** | 40.33 | 79.60 | 21.07 |
| **T10** | 41.33 | 77.20 | 19.87 |
| **T11** | 41.67 | 78.20 | 20.33 |
| **T12** | 42.00 | 75.13 | 18.67 |
| **T13** | 42.00 | 75.00 | 17.80 |
| **T14** | **44.00** | 62.80 | 15.80 |
| **CD 5%** | **1.92** | **11.05** | **1.87** |
| **S.E. (d)** | **0.66** | **3.78** | **0.64** |

Furthermore, Table 2 data unequivocally demonstrate that T1 recorded the longest intermodal length (6.90 cm), which was followed by T2 (6.67 cm). On the other hand, the control group recorded the least intermodal length of 4.83 cm. T1 recorded the main stem's highest thickness of 9.63 cm, followed by T2's (9.10 cm), while T14 reported the main stem's minimum thickness of 6.85 cm. As the amount of nitrogen applied dropped, the main stem's thickness dramatically shrank. These outcomes are identical to the okra research conducted by Singh et al. (2005).T1 achieved the highest harvest index value (49.59), which was followed by T2 (49.47). T14, on the other hand, showed a minimum harvest index value of 37.29. This might be the effect of more fruits being produced per plot at higher nitrogen application levels, which increases plant competition. Similar results were found by Brar et al. (1993), Kumar (2017), and Vats (2011) in fenugreek due to greater dry matter production, which resulted in a larger source for photosynthesis and more photosynthate translocation to sink.

**Table:-2 Impact of biofertilizers and nitrogen on plant development metrics.**

| Treatment | Inter-nodal length (cm) | Thickness of main stem (cm) | Harvest index |
|---|---|---|---|
| **T1** | **6.90** | **9.63** | **49.59** |
| **T2** | 6.67 | 9.10 | 49.47 |
| **T3** | 6.53 | 9.19 | 46.99 |
| **T4** | 6.40 | 8.67 | 45.31 |
| **T5** | 6.33 | 8.99 | 46.35 |
| **T6** | 6.27 | 8.26 | 45.32 |
| **T7** | 6.57 | 9.38 | 47.02 |
| **T8** | 6.50 | 9.05 | 45.98 |
| **T9** | 6.03 | 8.47 | 44.66 |
| **T10** | 5.73 | 8.25 | 44.15 |
| **T11** | 5.70 | 8.39 | 44.52 |
| **T12** | 5.37 | 8.33 | 43.54 |
| **T13** | 5.33 | 8.00 | 42.96 |
| **T14** | 4.83 | 6.85 | 37.29 |
| **CD 5%** | **0.47** | **1.03** | **2.32** |
| **S.E. (d)** | **0.16** | **0.35** | **0.79** |

## CONCLUSION

From the above findings it is concluded that 100 % RDN (Inorganic) + Azotobacter + PSB resulted minimum days to 50% flowering (39.33) and plant height at harvest (91.93 cm), number of nodes per plant (23.60), internodal length (6.90 cm), thickness of main stem (9.63 cm) and harvest index (49.59) was recorded maximum so for better growth of okra without deteriorating the soil health application of inorganic fertilizers along with biofertilizers dose treatment i.e (T1) should be adopted. Therefore it will also help in reducing the recommended dose of inorganic fertilizer.

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