



Response of Bio-fertilizer and Plant Density in Early Growth and Germination Diversity of Sunflower

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Abstract

Background: Sunflower (*Helianthus annuus* L.) is an important oilseed crop valued for its high-quality edible oil. In Nepal, rising demand for edible oil necessitates increased domestic production, particularly in Madhesh Province, which has strong cultivation potential. However, soil infertility and low germination often reduce plant stand and yield. Therefore, this study hypothesizes that the use of bio-fertilizers and optimal spacing can improve seedling growth and enhances yield.

Methods: The field experiment was conducted at farm of College of Natural Resource Management, Bardibas, Mahottari, Madhesh Province during February to March 2026. The field experiment was conducted in randomized complete block design (RCBD) with 3 replications to study the effects of plant spacing (15×10 cm, 15×15 cm, 15×2.5 cm, and 15×5 cm) and bio-fertilizer application on germination and growth of sunflower seed. Germination diversity and growth parameter were collected and analyzed by Genstat ver 2015.

Results: The results showed that both plant spacing and bio-fertilizer significantly affected most of the observed parameters. Bio-fertilizer along with (15×5cm) spacing shows higher germination (78%) followed by (15×15cm) spacing (71%) and lowest by spacing (15×2.5 cm). The spacing (15×5cm) with bio-fertilizer also improved growth traits such as root length (29.67 cm), shoot length (15.46 cm), total plant length(73.56 cm), leaf area(58.11 cm²), and seedling vigor index. Closer spacing (15×2.5 cm) showed lower growth performance, although it performed better in some vigor indices.

Conclusion: The combined effect of spacing and bio-fertilizer played a significant role in influencing several traits. Among all treatments, (15×5 cm) spacing with bio-fertilizer gave the best results for sunflower growth.

Key Words: Bio-fertilizer, plant density, germination, growth parameter, sunflower, oilseeds

