



Impact of Organic and Inorganic Fertilization on the Growth and Yield Dynamics of Tomato (*Lycopersicon esculentum*) in the Young Meghna Estuarine Floodplain, Bangladesh

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Abstract

Tomato (*Lycopersicon esculentum*) productivity is heavily reliant on strategic nutrient management to optimize both vegetative growth and reproductive performance. Efficient nutrient application is also essential for reducing yield gaps while maintaining soil biodiversity in subtropical floodplain agroecosystems. This study evaluated the comparative effects of organic and inorganic fertilizers on the growth and yield of tomato at Noakhali Science and Technology University, Bangladesh (AEZ-18: Young Meghna Estuarine Floodplain), during the *Rabi* season from December 2022 to March 2023. The experiment was conducted using a Randomized Complete Block Design (RCBD) with three replications and three treatments: T₁ = control (no fertilizer), T₂ = recommended organic fertilizer (cow dung at 10 t ha⁻¹), and T₃ = recommended inorganic fertilizers (urea, TSP, MP, gypsum, zinc, and boric acid at BARI-recommended doses). Results revealed that fertilizer application significantly improved all measured growth and yield parameters. The inorganic fertilizer treatment (T₃) showed the highest performance, with maximum plant height (81.08 cm), leaf number (52.56), and enhanced flowering efficiency. Yield-contributing traits such as fruit length, diameter, and individual fruit weight were also highest under T₃, resulting in a yield of 2.61 kg per plant compared to 1.36 kg per plant in the control. Although inorganic fertilizers provided immediate yield benefits, the findings highlight the importance of integrated nutrient management for sustaining soil health and ensuring long-term productivity in the AEZ-18 region of Bangladesh. These findings provide practical insights for improving tomato productivity in coastal floodplain systems and have broader implications for sustainable intensification in similar agroecological regions worldwide.

Keywords: Tomato productivity, Inorganic fertilizer, Organic fertilizer, Yield attributes, Sustainable agriculture

