

**DEVELOPMENT AND EVALUATION OF BIODEGRADABLE  
SEED CAPSULES ENRICH WITH GROWTH PROMOTING  
MICROBE AND NATURAL PEST REPELLENTS FOR  
SUSTAINABLE TOMATO (*SOLANUM IYCOPERSICUM*)  
CULTIVATION**



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## ABSTRACT

Tomato (*Solanum lycopersicum* L.) is one of the most widely cultivated and economically important vegetables. Improvement in seed germination and its early growth is imperative to attain high productivity. This study was conducted to evaluate organic input-enriched biodegradable seed capsules as a sustainable approach to enhancing early growth performance in tomato. The experiment was carried out from August to November 2025 at the Faculty of Technology, Eastern University, Sri Lanka. The treatments were arranged in a completely randomized design with five treatments and six replications. Treatments were combinations of liquid organic fertilizer and neem powder incorporated into biodegradable capsules: T1 (10 mL), T2 (5 mL fertilizer + 5 g neem), T3 (10 mL fertilizer + 5 g neem), T4 (15 mL fertilizer + 5 g neem), and a non-capsule control. The liquid organic fertilizer was prepared by fermenting cow dung (250 g), jaggery (50 g), and water (5 L) for 7 days at room temperature, following a modified Jeevamrutha formulation. Growth and reproductive parameters recorded were germination percentage, root and shoot length, seedling vigor index, leaf count, plant height, number of nodes, days to first flowering, and number of flowers per plant. The differences in germination, root development, vegetative growth, and flowering response were statistically significant ( $p < 0.05$ ). The highest germination (91.67%) was under T4, while the best vegetative growth over 8 weeks was recorded in T2. Meanwhile, T3 showed the earliest flowering (50.83 days), and T4 gave the maximum number of flowers per plant (17.50). All capsule treatments were superior to the control, ensuring better establishment and faster seedling growth. Early fruit development showed no major differences at first; however, patterns suggest future gains in output. The mean fruit weight per plant reached its peak under T3 and T4, pointing toward stronger productivity than control or other treatments. Overall, using degradable seed capsules along with liquid organic fertilizer and neem boosted initial growth and flower start. Vegetative expansion and earlier flowering appeared strongest in T2 alongside T3. This eco-friendly technology may improve nursery efficiency and subsequent field productivity. Additional research into nutrient delivery, affordability, or testing across various sites should happen prior to wide use..

**Keywords:** Biodegradable Seed Capsule, Flowering Response, Germination, Growth Performance, Organic Amendments

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