

Growth and Development Responses of Tomato to Varying Nutrient Regimes in Different Growth Environments

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This study was conducted to evaluate the effects of different nutrient regimes on the growth and development of the local tomato variety Thilina. The experiment was carried out in three environments: a controlled greenhouse, an uncontrolled greenhouse, and an open field at the Agricultural Biotechnology Center, Meewathura, from September to November 2022, as separate Randomized Complete Block Designs. Tomato plants were treated with the Department of Agriculture's recommended nitrogen fertilizer amounts as a control (T1), 80% nitrogen from the recommendation (T2), and 60% nitrogen from the recommendation (T3) in each environment separately. Results revealed that the highest day (30.8°C) and night (23°C) temperatures were observed in the uncontrolled greenhouse and the lowest day (27.8°C) and night (19.5°C) temperatures were observed in the open field environment. The highest relative humidity (81.7%) was observed in the controlled greenhouse and the lowest (62.2%) was observed in the open field environment, and the highest incident radiation (7.2 mol (PAR)m⁻²d⁻¹) was observed in the open field environment, while the lowest (2.3 mol (PAR)m⁻²d⁻¹) was observed in the controlled greenhouse. Sub-optimal nitrogen supply did not show a significant (P<0.05) effect on all measured growth development and yield parameters in the uncontrolled greenhouse. Treatment effects were significant for some parameters in the controlled greenhouse and open field. Total plant dry weight and total plant nitrogen increased under 60% nitrogen, the efficiency of photosynthetic light reaction as measured by chlorophyll fluorescence and total plant nitrogen was higher under 80% nitrogen compared to the control (100% nitrogen) in the controlled greenhouse. In the open field environment, both 80% and 60% nitrogen reduced photosynthetic efficiency, whereas 80% nitrogen reduced the height increase rate compared to the control. It is concluded that the sensitivity of tomato sub-optimal nitrogen supply varies with the growing environment.

Keywords: Growth parameters, Nitrogen stress, Temperature stress, Tomato, Yield parameters

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