

## **Growth and Development Responses of Tomato to Varying Water Regimes in Different Growing Environments**

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This study was conducted to evaluate the effects of water stress on selected growth and development parameters of 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, from September to November 2022, as separate Randomized Complete Block Designs with five replicates. The plants were grown in pots under three water regimes, namely, well-watered (80% field capacity, FC), 60% and 40% FC. The three environments differed significantly ( $p < 0.0001$ ) in terms of incident radiation, day and night air temperature and relative humidity. The highest day (30.8°C) and night (23°C) temperature was observed in the uncontrolled greenhouse whereas 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 in the open field environment. The highest incident radiation (7.2 mol (PAR)m<sup>-2</sup>d<sup>-1</sup>) was observed in the open field environment and the lowest (2.3 mol (PAR)m<sup>-2</sup>d<sup>-1</sup>) was observed in the controlled greenhouse. Water stress did not show significant ( $P < 0.05$ ) effects on all measured growth, development, and yield parameters except leaf temperature 36 days after transplanting in the uncontrolled greenhouse. Both 60%FC (T2) and 40%FC (T3) increased the leaf surface temperature compared to the well-watered control (T1) in the uncontrolled greenhouse. Rate of fruit initiation increased under 60%FC and 40%FC, while 40%FC decreased the leaf area per plant in the controlled greenhouse. Severe water stress decrease root dry weight and rate of height increase was decreased under 40%FC, whereas 60%FC decreased the root dry weight in the open field environment. It is concluded that tomato plants in the different growing environments show varying sensitivity to water stress.

**Keywords:** Growth parameters, Temperature stress, Tomato, Water stress, Yield parameters

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