

ABSTRACT

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| Title of the thesis/Dissertation | : | “To Study the Effect of Physical and Biochemical Approaches on Water Use Efficiency in Tomato (<i>Solanum lycopersicum</i> L.)” |
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| Name of the University | : | Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu |

Detailed systemic studies were conducted on the effect of physical and biochemical approaches on water use efficiency in Tomato. Variety Pusa Ruby was taken as experimental material. Seeds of Pusa Ruby collected from Division of Vegetable Science and Floriculture, SKUAST-J, were sown in nursery bed at vegetable farm and at five leaf stage it has been transplanted in plastic pots filled with soil and vermicompost in the experimental area of Division of Biochemistry. After 15 days of transplanting Paclobutrazol was introduced at different concentration (1.0 ppm, 1.5 ppm, 2.0 ppm and 2.5 ppm) and data were collected at three different stages of crop growth (50 DAT, 100 DAT and at harvest). The present study was carried out to understand how different water saving irrigation regimes affect the production and quality of tomato fruits (*Solanum lycopersicum* L.). In the study, Partial Root Drying (PRD) was applied as physical technique and Paclobutrazol was used as a biochemical hormone to reduce the amount of water requirements and increase crop water use efficiency (yield/water applied) on tomatoes and to study their effect on morphological, physiological, biochemical, yield and quality parameters of tomato.

The results revealed that PRD technique and PBZ application induced the morphological, physiological, and biochemical responses in relation to improving the WUE of tomato plants. In relation to morphological responses, the highest Plant height at harvest was

recorded in control (88.33 cm) and PRD treated plants (80.66cm) and lowest in plants treated with 2.5 ppm PBZ (20.00cm) and PRD+2.5 ppm PBZ (26.00 cm). The highest stem thickness at harvest was found in plants treated with PBZ 2.5 ppm (1.600 cm) and PRD+2.5 ppm PBZ (1.733 cm) and lowest was noticed in control (0.800 cm) and PRD treated plants (0.800 cm). The highest WUE at harvest was noticed in plants treated with PBZ @ 2.5 ppm (1.510 Kg L⁻¹ F.W) as well as in PRD+2.5 ppm PBZ (1.453 Kg L⁻¹ F.W) and minimum was found in control (0.320 Kg L⁻¹ F.W) and PRD treated plants (0.507 Kg L⁻¹ F.W). The highest RWC at harvest was found in plants treated with PBZ @ 2.5 ppm (82.20 %) as well as in PRD+2.5 ppm PBZ (79.67%) and lowest was found in control (71.23%) and PRD treated plants (62.38%). The highest soluble sugar in leaves at harvest was recorded in plants treated with PBZ @ 2.5 ppm (3.903 mg g⁻¹ DW) as well as in PRD+2.5 ppm PBZ (4.080 mg g⁻¹ DW) and therefore it was also found highest in plants treated with PRD (3.617 mg g⁻¹ DW) while lowest was found in control (2.930 mg g⁻¹ DW). The highest number of fruits at harvest was recorded in plants treated with PBZ @ 2.5 ppm (219.66) as well as in PRD+2.5 ppm PBZ (218.33) and lowest was observed in control (128.33) and PRD treated plants (126.33). The highest lycopene content in fruits was noticed in plants treated with PBZ @ 2.5 ppm (2.257 mg 100 g⁻¹ FW) as well as in PRD+2.5 ppm PBZ (2.203 mg 100 g⁻¹ FW) and lowest was observed in control (1.677 mg 100 g⁻¹ FW) and PRD treated plants (1.857 mg 100 g⁻¹ FW). The highest total carotenoids in fruits was found in plants treated with PBZ @ 2.5 ppm (1.407 mg 100 g⁻¹ FW) as well as in PRD+2.5 ppm PBZ (1.387 mg 100 g⁻¹ FW) and lowest was observed in control (1.267 mg 100 g⁻¹ FW) and PRD treated plants (1.280 mg 100 g⁻¹ FW). The highest yield per plant was recorded in plants treated with PBZ @ 2.5 ppm (2.67 Kg) as well as in PRD+2.5 ppm PBZ (2.56 Kg) and lowest was recorded in control (1.63 Kg) and PRD treated plants (1.57 Kg).

Our results clearly indicated that PBZ 2.5 ppm alone and in combination with PRD technique was most effective treatment to enhance morphological, physiological, biochemical parameters, yield and quality of tomato crop.

Keywords: Pusa Ruby, Paclobutrazol, Partial Root Drying, Water use efficiency, Lycopene and Carotenoids

Signature of Major Advisor

Signature of Student

