Growth, physiological and biochemical responses of tomato (Lycopersicon Esculentum Mill) grown in deficiet irrigation.

ABSTRACT

Tomato (Lycopersicon esculentum Mill) plants were grown in a glasshouse to assess differential responses of partial rootzone drying and deficit irrigation on growth, physiological and biochemical processes. Plants were grown with roots divided between two pots. In the first experiment, three treatments were compared; full watering on both sides of the pots or well watered treatment (WW), half of the amount of water applied in WW given only to one side of the pots (PRD) and half of irrigation water in WW divided equally to both sides of the pot with each watering (DI).After 25d of plants in the treatments, leaf water potential of both PRD and DI was lower by 0. I to 0.18 MPa compared to the well watered plants. Fresh weight of fruit was reduced by 24% and 3 I % in PRD and DI, respectively, compared to WW.The reduction in fruit mass was mainly due to the limitation of fruit expansion that may be attributed to the peroxidase activities in the fruit exocarp. In the following experiment, plants were grown in different levels of PRD and DI. Leaf growth and stomatal conductance were sustained with a 7% reduction in volumetric soil moisture content derived from exposure of plants to 4 days of withholding water from half of the root system. Further reduction in leaf growth and stomatal conductance was observed when plants were exposed to longer duration of withholding water from half of the root system.The reduction in both parameters was much greater with increasing severity of water stress in DI treatments. Partial rootzone drying effects on PN were considerably less than gs indicating that plants can decrease water loss while maintaining PN. Both stomatal responses and leaf expansion in PRD and DI are seemingly controlled by xylem borne ABA and cell wall bound peroxidase.

Keyword: Water relations; Peroxidase; Photosynthesis rate; Stomatal responses; Water availability; Xylem sap ABA.