

## ENHANCING DROUGHT TOLERANCE OF TOMATO PLANTS GROWN UNDER DIFFERENT IRRIGATION REGIMES BY SOME CULTURAL PRACTICES

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**ABSTRACT:** *Water scarcely is a common problem especially in arid and semi-arid areas of the world like the Mediterranean region. Therefore, enormous efforts directed to improve the adaptation of plants to use less irrigation water by increasing their tolerant and resistant to water deficit by different means. In this study, tomato plants cv. "Alisa" were irrigated with three different amounts of water i.e. optimum amount which was the amount of water that added to raise soil field capacity (FC) from 70% (as re-irrigated tomato when FC drop to 70% is considered the most suitable irrigation regime) to 100% (T1), 66% (T2) and 33% (T3) of optimum water amount. Also, three different drought adaptable treatments were applied to tomato plants, i.e. drought pretreatment of seedlings (seedling priming), spraying plants with a reflecting antitranspirant (a suspension of calcium carbonate at concentration of 6%) or infected plants with arbuscular mycorrhizal fungus, as well as control which was not treat with any of adaptable treatment. Decreasing amount of irrigation water applied decreased gradually relative water content (RWC), No of fruits/ plant, average fruit weight and early and total yields, than those of well-watered plants (T1). The reduction in total yield was mainly due to the reduction of both fruit weight and fruit number. However, water deficit treatments (T2 & T3) enhanced water use efficiency (WUE) and improved fruit quality i.e. increased vit. C, TSS, titratable acidity, and lycopene contents and fruit firmness in ripe fruits. The increase in fruit quality traits by water stress could be interpreted on the base that plants grown under such conditions react by stimulate the secondary metabolism which increasing plant defense, the secondary metabolites involved sugars, organic acids, vitamins, carotenoids and etc. All adaptable treatments used, often alleviated (even partly) the detrimental effects of water deficit treated plants (T2&T3) as they promoted plant productivity of both well watered and water stressed plants than those of untreated (control) plants. The increase in total yield resulted from using adaptable treatments was mainly due to the increase in average fruit weight, and to lesser extent fruit number. Adaptable treatments also enhanced plant water relation (RWC & WUE) compared to those of untreated control, but they considerably reduced fruit quality traits. In most cases, spraying plants with the antitranspirant material gave the highest values of yield and its components particularly when combined with well watered treatment (T<sub>1</sub>) and moderate water stress treatment (T<sub>2</sub>) but not with severe water stress treatment (T<sub>3</sub>). Using mycorrhizal inoculation treatment gave the highest values of average fruit weight, also it gave the second highest values of plant water relations and productivity characters alternately with drought pretreatment. In addition, mycorrhizal treatment gave the highest total yield when combined with lowest water supply (T<sub>3</sub>) than those obtained by other two adaptable treatments.*

**Key words:** *Tomato, water stress, mycorrhizal fungus, antitranspirant, drought pretreatment, yield, fruit quality.*

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