OP328

Mitigating Effects of Ascorbic Acid and Potassium Nitrate on Salt-induced Oxidative Stress in Tomato Plants

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Aim of the study: To determine roles of ascorbic acid (AA) and potassium nitrate in tolerance of tomato (*Lycopersicon esculentum* Mill.) to salt stress, the protective effects of ascorbic acid and potassium nitrate against salt-induced oxidative stress in the leaves of tomato were evaluated.

Material and Methods: The study was carried out in the field of application of Mugla Sıtkı Koçman University on tomato (*Lycopersicon esculentum* Mill.) that is widespread Muğla; Köyceğiz, Ortaca and Fethiye. Two seedlings of same size were planted into each pot filled with 2 L of a medium including peat and sand in 1:1 ratio. The experiment was carried out under natural conditions with an air temperature of 25–30°C during the day and 18–25°C during the night.Nutrition solution was replaced with fresh solution every 4 days during the growth period. The experiment was carried out with three replications. On day 21, two levels of potassium nitrate (10 and 20 mM K) and ascorbic acid (1 and 2 mM AA) and at different concentration combination of mentioned applications (15 mM K+1,5 mM AA) were started by adding sodium chloride (NaCl:125 mM) to the nutrient solution. Also, the same applications were made in the control group. After three weeks of treatments, leaves were collected. Fresh leaves were analysed for total chlorophyll (TCh), carotenoids, dry-weight (DW), membrane permeability (EC), relative water content (RWC), proline, malondialdehyde (MDA), superoxide dismutase (SOD), peroxidase (POD), catalase (CAT),hydrogen peroxide (H_2O_2).

Results: The results showed that salinity had a deleterious impact on plant biochemical and physiological parameters studied. The applications of potassium nitrate and ascorbic acid alleviated this adverse effect by increasing leaf relative water content and dry weight under stress conditions. Moreover, the activities of antioxidant enzymes (SOD, POD and CAT) as well as total chlorophyll and carotenoid content of plants were increased, although the MDA and proline contents were decreased after AA and K applications. The exogenous applications of potassium and ascorbic acid through either way significantly alleviated the adverse effects of salinity on growth and biochemical parameters of tomato plants. These higher levels of antioxidant enzymes might be attributed to their property to help develop the plant's resistance against oxidative damage.

Keywords: Antioxidative enzymes, *L. esculentum*, potassium nitrate, ascorbic acid, salt-stress.