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Exogenous glutathione-mediated tolerance to deficit irrigation in salt affected *Capsicum frutescence* (L.) plants is connected with higher antioxidant content and ionic homeostasis

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Abstract

As an important medicinal plant used in traditional and modern medicine, chili peppers are sensitive or moderately sensitive to drought or salt stress, respectively. Therefore, potential changes due to foliar-applied glutathione (GSH; 0, 0.4 and 0.8 mM) response on growth, yield, and physio-biochemical attributes, as well as water use efficiency (WUE) and fruit alkaloid capsaicin of chili pepper plants were investigated when grown under deficit irrigation in salt-affected soil (EC = 6.74 dS m⁻¹). Two deficit irrigation water (DiW) regimes (80% and 60% of soil field capacity; FC) were used versus 100% of FC as a control. Both DiW treatments negatively affected growth and yield parameters, SPAD chlorophyll index, nutrient status, K⁺/Na⁺ ratio, and plant anatomical features. In contrast, osmoprotectants, ascorbate, glutathione, capsaicin, and phenolic contents, as well as WUE were increased in association with higher Na⁺ and Cl⁻ contents. However, exogenously-applied GSH caused significant increases in the above-mentioned parameters along with an additional increase in osmoprotectants, antioxidants, and capsaicin contents, and a decrease in Na⁺ and Cl⁻ levels compared to corresponding controls. The highest WUE, growth, and fruit yield responses were recorded at 0.8 mM GSH applied to plants under DiW at 80% FC + salinity (6.74 dS m⁻¹). Therefore, this study suggested the use of leafy-applied GSH at 0.8 mM for satisfactory growth and yield with the highest WUE of chili pepper plants grown under salt-affected conditions with deficit irrigation.

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