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Vitamin C Enhances Growth and Productivity of Sunflower Plants Grown under Newly-Reclaimed Saline Soil Conditions

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Abstract : A field experiment was conducted during the two successive seasons of 2012 and 2013 in the Experimental Farm (newly-reclaimed saline soil; EC = 7.8 dS m-1), Faculty of Agriculture, Fayoum University, Fayoum, Egypt to investigate the effect of vitamin C foliar application at the rates of 1, 2, 3 and 4 mM on the possibility of improving growth, seed and oil yields, and some chemical constituents of Helianthus annuus L. plants under the adverse conditions of the selected soil. Significant positive influences of all vitamin C treatments were observed on growth, seed and oil yields and some chemical constituents in both seasons. Compared to unsprayed plants (control), spraying plants with various rates of vitamin C significantly increased vegetative growth traits (i.e. plant height, No. of leaves plant-1, leaf area leaf-1, total leaves area plant-1, and dry weights of leaves and shoot plant-1) and seed and oil yields and their components (i.e. head diameter, seed weight head-1, 100-seed weight, seed yield feddan-1 and oil yield feddan-1). In addition, the concentrations of chlorophyll a, chlorophyll b, total chlorophylls, total carotenoids and total phenols in fresh leaves, and total carbohydrates, total soluble sugars, free proline and some nutrients (i.e. N, P, K, Fe, Mn, and Zn) in dry leaves were also increased significantly with all vitamin C applications. Vitamin C treatment at the rate of 3 mM was generated the best results. These results are important as the potential of vitamin C to alleviate the harmful effects of salt stress offer an opportunity to increase the resistance of sunflower plants to grow under saline conditions of the newly-reclaimed soils.

Keywords : sunflower, Helianthus annuus L., ascorbic acid, salinity, growth, seed yield, oil content, chemical composition
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