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Effect of drought stress on morpho-physiological traits and yield of safflower (*Carthamus tinctorious* L.) in response to potassium application under saline water irrigation

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Abstract

Improving the pattern of water consumption in the agricultural sector, especially in areas where farmers have little water for cultivation, is one of the necessary measures to manage the water crisis in the country. Therefore, the present study was conducted to investigate the effects of drought stress on yield and physiological and quality characteristics of safflower under different amounts of potassium fertilizer. The experiment was performed as a combined analysis in a randomized complete block design with three replications during 2018 and 2019. The main plot consisted of drought stress at three levels of 45, 65 and 85% of permissible moisture drain and the sub plot consisted of potassium fertilizer at four levels of zero (control), 75, 150 and 225 kg of potassium sulfate per hectare. The results showed that in the second year compared to the first year, the amount of proline was significantly higher by 23.4% and the amount of seed oil, carbohydrates and chlorophyll a were significantly lower by 4.45%, 11.9% and 27.4%, respectively. With increasing potassium intake, the amount of chlorophyll a increased significantly and the highest amount of chlorophyll a at the rate of 16.7 mg/l was obtained in the treatment of 225 kg of potassium per hectare. In the second year compared to the first year, the traits of the number of heads per plant and the number of seeds per head significantly decreased and the trait of 1000 seed weight significantly increased. With increasing the intensity of stress from 45 to 85% of moisture drain in different levels of potassium fertilizer, seed yield decreased significantly. Treatment of 85% moisture drain in no application of potassium showed the highest amount of proline. In general, it seems that the application of potassium is effective in modulating the negative effects of drought stress on seed yield, qualitative and physiological characteristics of safflower.

Keywords: Number of heads per plant, Proline, Seed oil, Seed yield