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Impact of Drought Stress on Growth Traits of Cauliflowers and Broccoli

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Abstract

Global climate change affects rainfall patterns and causing plants to suffer from drought, especially in arid and semi-arid regions. Drought stress, as a limiting factor, considerably impacts plant growth and development, and thus these parameters could be used to select drought-stress tolerant plants. With the global production of 26.9 million tons cauliflower (*Brassica oleracea* L. var. *botrytis*) and broccoli (*Brassica oleracea* var. *italica*) are among the most important vegetables of the Brassicaceae family. This study aimed to elucidate the responses of three different coloured cauliflower cultivars (white; Clapton, green; Trevi and purple: Di Sicilia Violetto), and one broccoli cultivar to deficit irrigation. One week after transferring the transplants in the greenhouse (University of Tehran), four levels of irrigation including 85–100 % (control, no stress), 65–80 % (low drought stress), 45–60 % (moderate stress), 25–40 % (severe stress) were applied, till the end of the experiment. At the end of the growth period, the whole plants were harvested and different growth parameters and yield were determined. In the control treatment (no drought stress) the floret fresh weight was higher in the white cultivar (~500 g) rather the coloured cultivars and broccoli (~300 g), but the deficit irrigation affected the yield in this cultivar (Clapton). The lowest yield was obtained by severe stress (25–40 % irrigation) in the white cultivar of cauliflower; while no significant decrease was observed in the other two cauliflower cultivars. It is expected that drought stress also reduces leaf size, stem extension, and root proliferation in plants. In this study, there is no significant difference revealed between all the treatments for root fresh weight, leaf area, and floret size, and only the stem fresh weight was significantly decreased by the lowest irrigation level in the white cultivar. Furthermore, severe stress (25–40 % irrigation) just reduced the plant height in the purple cultivar, but the leaf number was not changed compared to the other cultivars. In conclusion, the research demonstrates that cauliflowers and broccoli are likely drought-resistant vegetables. Further research should implement additional quality traits, such as micronutrients.

Keywords: *Brassica oleracea* L. var. *botrytis*, *Brassica oleracea* var. *italica*, irrigation, water deficit