



Impact of Drought Stress on Growth Traits of Cauliflower and Broccoli

*Fatemeh Izadpanah^{1,2}, Navid Abbasi³, Forouzandeh Soltani³, Susanne Baldermann^{1,2,4}

¹Leibniz-Institute of Vegetable and Ornamental Crops, Großbeeren, Germany
²University of Potsdam, Institute of Nutritional Sciences, Food Chemistry, Germany
³University of Tehran, Department of Horticultural Science, Iran
⁴University of Bayreuth, Faculty of Life Sciences, Food Metabolome, Germany



Introduction

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 can be used to select drought-stress tolerant plants. With the global production of 26.9 million tons (FAO 2019) cauliflower (*Brassica oleracea* L. var. *botrytis*) and broccoli (*Brassica oleracea* var. *italica*) are among the most important vegetables of the Brassicaceae family.

Objective

The main objective was investigate the cultivar-dependent drought stress tolerance of three different colored cauliflower cultivars and one broccoli cultivar.

Methods

- Three different colored cauliflower cultivars were included: white; Clapton, green; Trevi and purple; Di Sicilia Violetto, and one broccoli cultivar 'Magic' (Fig. 1. d-g).
- Starting the drought stress: one week after transferring the transplants (40 days old, with 4-5 true leaves) in the greenhouse (University of Tehran, Iran), till the end of the experiment (a, b).
- Plants were subjected to different irrigation levels from 100 % irrigation (c):
 - T1: 85-100 % (control, no stress)
 - T2: 65-80 % (low drought stress)
 - T3: 45-60 % (moderate stress)
 - T4: 25-40 % (severe stress)
- At the end of the growth period, the whole plants were harvested, and different growth parameters such as floret fresh weight and size were determined.
- Data were analyzed per cultivar by IPM SPSS Statistics 26 (one-way ANOVA by Tukey HSD *post hoc* test).

Acknowledgments

The project is financially supported by the Federal Office of Agriculture and Food (BLE) for of this project (2816 DOKI07/CarCauli).

*Contact: izadpanah@igzev.de



Highlights

- In conclusion, the research demonstrates that cauliflower and broccoli are drought-resistant vegetables.



Fig. 1. University of Tehran (greenhouse a-c), Clapton (d): white; Trevi (e): green; Di Sicilia Violetto (f): Purple, and Broccoli 'Magic' (g)

Results

- In the control treatment (no drought stress), the floret fresh weight was higher in the white cultivar (~500 g) rather than in the colored cauliflower cultivars and broccoli (~300 g) (Fig. 2).
- The lowest FW was obtained by severe stress (25-40% irrigation) in the white and violet cauliflower cultivars; while no significant decrease was observed for the other cauliflower cultivar and the broccoli cultivar 'Magic' (Fig. 2).
- There is no significant difference between all the treatments for the floret size of all cultivars (Fig. 3).

Outlook

- Further research should implement additional cultivars, field studies and quality traits, such as macro- and micronutrients.

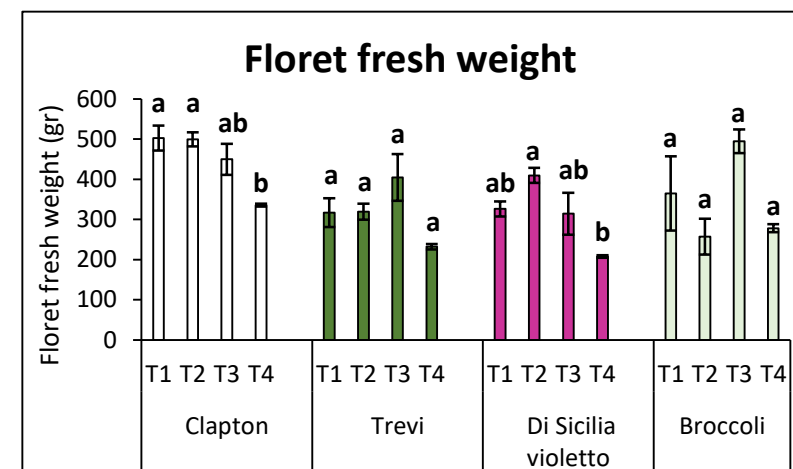


Fig. 2. Different irrigation treatments: T1, control, 85-100 %; T2, 65-80 %; T3, 45-60 %; T4, 25-40 %. The values are shown as mean ± SE, n = 3.

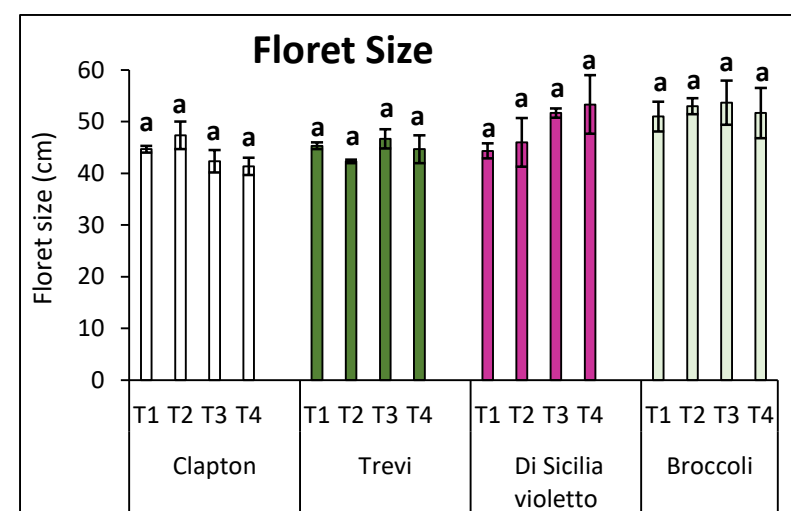


Fig. 3. Different irrigation treatments: T1, control, 85-100 %; T2, 65-80 %; T3, 45-60 %; T4, 25-40 %. The values are shown as mean ± SE, n = 3.