

Evaluation of a core collection of *Crocus sativus* L. and *Crocus* spp. for tolerance to salinity stress

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Abstract

Using saline water, especially in arid and semi-arid areas is unavoidable to overcome increasing water demand and drought. Salinity is a widespread stress limiting the growth and productivity of cultivated plants. In this frame, the identification and selection of genotypes able to produce under salt stress conditions are necessary for the success of the cultivation in marginal areas of the Mediterranean basin. Activities during the two years took into account the evaluation for salt tolerance of 40 accessions of *Crocus sativus* L. and 14 of *Crocus* spp. Corms were provided by the Bank of Plant Germplasm of Cuenca, Spain (BGV CU). The plants were grown in flowerpots with peat and volcanic sand (1:1 in volume), as substrate. Corms were sown with a density of 161 n m⁻² (21 corms per pot). Salinity levels were 820, 4070, and 6420 $\mu\text{S cm}^{-1}$, produced by 0, 1.5, and 3.0 g L⁻¹ NaCl, respectively. Flowering and cormlets' growth parameters were evaluated during both growing seasons. The number of produced flowers was strongly decreased, in all accessions, with the increase in salinity level, especially during the second year, where only a few accessions produced some flowers. BCU 1672, 1640 and 1782 (obtained from Teruel, Albacete, and Cagliari, respectively) were more tolerant accessions of *Crocus sativus* in the first year. Among the wild crocus, *C. laevigatus* (BCU 1835) was the most tolerant to salt stress with 0.5 flowers plant⁻¹ at the highest levels of salinity (6420 $\mu\text{S cm}^{-1}$). On average of all accessions subjected to salt stress, 1.95, 1.0, and 0.54 flowers plant⁻¹ were obtained at salinity levels of 820, 4070 and 6420 $\mu\text{S cm}^{-1}$, respectively. Concerning *C. sativus*, the average weight of the corms at the beginning of the test was equal to 13 g with a reduction at the end of the two years of 58%, while for the *Crocus* spp. with an initial weight of 1.5 g, a reduction of 68% was recorded at the end of the second year cycle.

Keywords: corm, environmental stresses, flowering, medicinal plants

INTRODUCTION

Crocus sativus L. (saffron) is a crop belonging to the *Iridaceae* family (Gresta et al., 2008). It is a high-income crop, referred to as “red gold”. The three main components of this crop are picrocrocin, which gives the bitter taste, safranal, responsible for the odor, and crocin, a carotenoid pigment that gives its red colour (Ahmed et al., 2016). Furthermore, saffron extracts have been shown to have anticancer, antidepressant, antihyperglycemic, hypoglycemic, and memory-enhancing effects (Talaie et al., 2015). It has been known for over 4000 years and has been used mainly in traditional medicine as an antidepressant drug (Shokrpour, 2019). In Italy, saffron is not cultivated as a main income crop but is inserted in the context of family and niche agriculture (Branca and Argento, 2010; Cardone et al., 2020; Fernández et al., 2011). The cultivation of saffron represents a valid opportunity for diversification in multifunctional farms, especially in mountain areas (Cardone et al., 2019). Incorrect soil and water management practices contribute to increasing the salt concentration in already naturally saline areas and also to contaminating salt-free areas. About 76 million

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