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Investigation of the effect of first irrigation time and application of chelate and nano-chelate fertilizers of iron and zinc on Physiological, phytochemical and morpho-physiological characteristics of saffron in Kermanshah province

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Abstract:

In order to investigate the effect of the first irrigation date and chelate & nano-chelate of iron and zinc fertilizers on the morphological, physiological and qualitative characteristics of saffron in Kermanshah region, this experiment was carried out during two crop years of 2015-2016. The experiment was performed as split plots in a randomized complete block design with 3 replications. Time of the first irrigation as the main factor in the three levels of 1st, 11th and 21th of November and chelate and nano-chelate fertilizers as a secondary factor in seven levels (f1: iron and zinc chelate fertilizers at a rate of 4 kg per hectare, f2: iron and zinc chelate fertilizers at a rate of 8 kg per hectare, f3: iron and zinc chelate fertilizers at a rate of 12 kg per hectare, f4: iron and zinc nano-chelate fertilizers at a rate of 4 kg per hectare, f5 : iron and zinc nano-chelate fertilizers at a rate of 8 kg / ha, f6: iron and zinc nano-chelate fertilizers at a rate of 12 kg / ha) and control (f0, without fertilizer). The measured traits included morphological traits: number of leaves per plant, length of leaves, number of leaf sheaths, length of leaf sheaths, number of flowers per square meter, fresh and dry weight of flowers, length of petals, length of peduncles, style length, stigma fresh and dry weight; physiological traits: proline, fresh and dry leaf protein, chlorophyll a, chlorophyll b and total chlorophylls, iron, zinc and copper content in fresh and dry leaves; and qualitative traits: safranal, crocin, picrocrocin. The results of the experiment showed that the effect of first irrigation time and the amount and type of iron and zinc micro fertilizers in both years were significant on many of these traits. Also, Slicing of treatments showed that there are significant differences among chelate and nano fertilizer in the investigated traits at each levels of the first irrigation dates. The highest stigma fresh weight was obtained on the irrigation date of 1st November in both years of the experiment with 431.48 and 432.71 mg per square meter, respectively. The dates of 11th & 21th November compared to 1st of the November in the first year had 3.67 and 7.28 percent weight loss, respectively. This decrease was 2.46 and 8.57 percent in the second year, respectively. The amount of safranal was not affected by the irrigation time in the first year, but it decreased significantly on 11th & 21th November compared to 1st November in the second year. The highest value of stigma fresh weight was obtained in f5 and f6 treatments among the chelate & nano-chelate fertilizer treatments in both years of the experiment which did not have a statistically significant difference with f3 treatment. The highest amount of safranal was obtained in f5, f6 and f3 treatments in the first year of the experiment and f4 treatment in the second year was no significant difference with them. Generally, the highest weight of dry and wet stigma and desirable quality traits of safranal, crocin and picrocrocin were obtained in irrigation time of 1st of November and application of 8 and 12 kg/ha nano-chelate & 12 kg/ha of chelate fertilizer.

Keywords: first irrigation time, Iron and zinc nano-chelate, crocin, picrocrocin, safranal, stigma weight.