



Original Article:

Evaluation of Flowering Potential of Saffron Corms in Different Weight Groups under Hydroponic Conditions

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Extended Abstract

Introduction: Many of the saffron corms that are planted in the fields do not have the desired weight and have very low potential for flowering in the field conditions. It is hypothesized that due to the elimination of physical resistance of soil and appropriate control of environmental factors in hydroponic cultivation, it is possible to obtain more flowers from small corms in a controlled environment (Behdani & Fallahi, 2015). In some previous studies (Molina et al., 2005; Mollafilabi, 2014; Aghhavani-Shajari et al., 2021) saffron flowering capacity under controlled environment has been evaluated, but using large mother corms. The main goal of this research was to investigate the possibility of producing flowers from very small saffron mother corms in a controlled environment.

Materials and Methods: In this study, the effect of mother corm weight (2-4, 4-6, 6-8 and 8-10 g) on saffron flowering characteristics was investigated under controlled environment, in a completely randomized design with four replications, in horticulture laboratory, University of Birjand, Iran. Flower initiation stage was passed in the soil (in field), but the flower emergence stage took place under controlled conditions (Temperature: 15 ± 1 °C, relative humidity: 75% and light frequency: 8 hours of light and 16 hours of darkness) (Mollafilabi, 2014; Aghhavani-Shajari et al., 2021), with a planting density of 500 corms per m². Some properties of used water in hydroponic production system has been provided in Table 1. The studied traits were number of flowers, flower yield, mean flower weight, flower length, stigma and style length, as well as dry weights of stigma, style and petals. Data analysis was done using SAS ver.9.2. Means were compared by FLSD at 5% level of probability.

Results and Discussion: The results showed that the number of flowers produced in the weight groups of 2-4, 4-6, 6-8 and 8-10 g, were 0, 56.2, 193.7 and 425 No m⁻², respectively (Fig 1), which indicates the production of at least one flower per corm is 0, 11.2, 38.7 and 85% of the corms in the mentioned weight groups of corms, respectively. This can probably indicate that regardless of the cultivation environment

(field or hydroponic), very small corms are not able to produce flower or their flowering capacity is very limited (Behdani & Fallahi, 2015; Fallahi et al., 2018). Flower yield in the weight groups of 2-4, 4-6, 6-8 and 8-10 g were 0, 24, 96.6 and 198 g m², respectively (Fig. 3), and dry pistil yield (style & stigma) were 0, 0.25, 0.98 and 2.13 g m⁻², respectively (Fig. 7). Under field conditions and planting the corm in the soil at a depth of about 20 cm, usually the mother corms weighing 4-6 g rarely have the ability to flower (Behdani & Fallahi, 2015). The results of this experiment showed that planting these corms in hydroponic environment makes at least 11% of them produce flowers. It seems that if both stages of saffron flowering (flower initiation and flower emergence) are spent in a controlled environment, a higher percentage of small corms are able to produce flowers. The results of this research, compared to the field experiments that have been done on saffron before (such as Fallahi et al., 2018), showed that the cultivation of saffron in a controlled environment can lead to the flowering of a higher percentage of corms, and this advantage increases significantly with the increase in the mother corm weight.

Conclusion: In general, corms weighing less than 4 g did not have flowering capacity, but it seems that corms weighing 4-8 g could produce more flower under controlled conditions than in the natural environment.

Conflict of Interest: There is no conflict of interest.

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Keywords: Corm, Flower initiation, Flowering, Hydroponics, Temperature, Stigma.

Five Important References

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Table 1. Some properties of used water in hydroponics production system of saffron

HCO ₃ ⁻	Mg ²⁺	Ca ²⁺	Na ⁺	EC (dS m ⁻¹)	pH
meq l ⁻¹					
2.8	1.1	2.45	7.6	1.14	7.7

Table 2. Mean squares of the effect of corm weight on saffron flowering indices under hydroponic cultivation

S.O.V	df	Number of flowers	Mean weight of flower	Flower yield	Flower length	Stigma length	Style length
Treatment	3	143229.1**	0.2154**	31647.8**	68.70**	9.82**	22.20**
Error	12	369.7	0.0008	84.8	0.17	0.06	0.17
C.V. (%)	-	11.39	8.59	11.56	6.77	10.44	11.79

** Significant at 1% level of probability

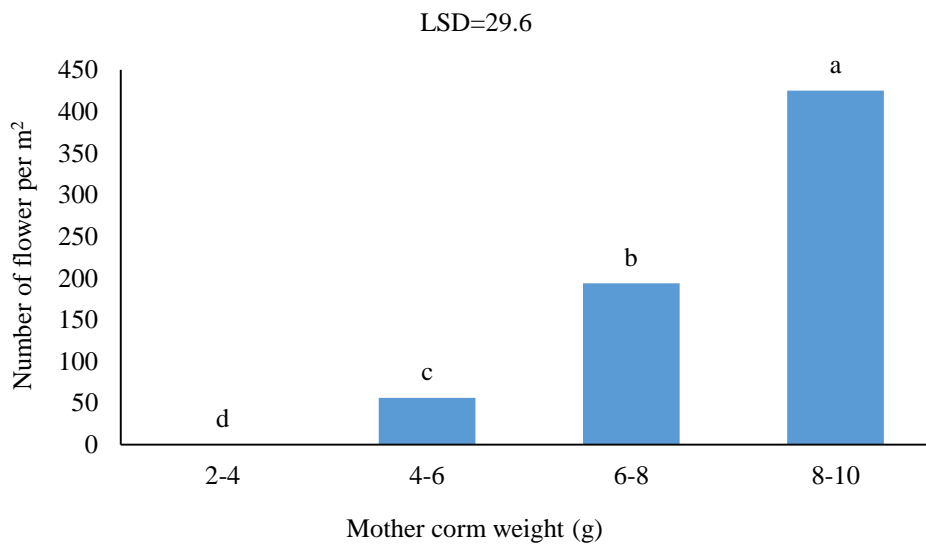


Fig 1- Mean comparisons for the effect of mother corm weight on the number of flower of saffron under hydroponic cultivation

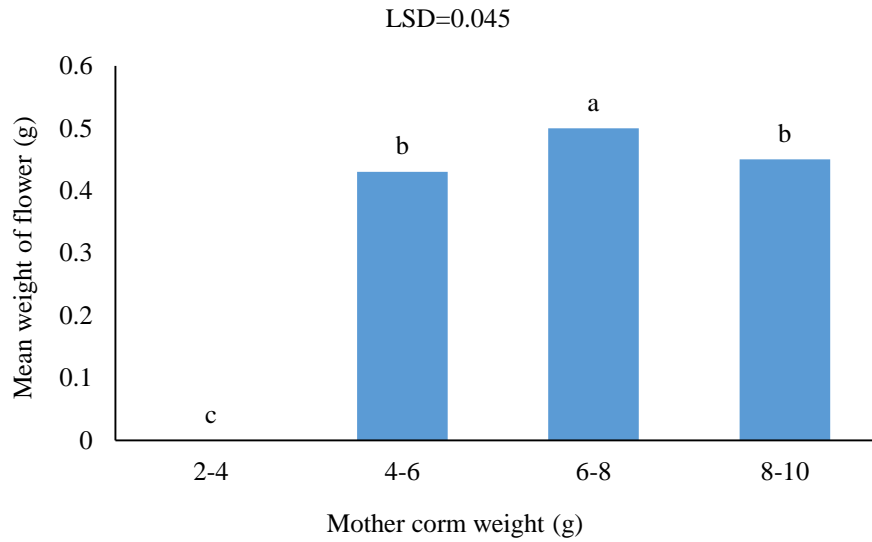


Fig 2. Mean comparisons for the effect of mother corm weight on mean flower weight of saffron under hydroponic cultivation

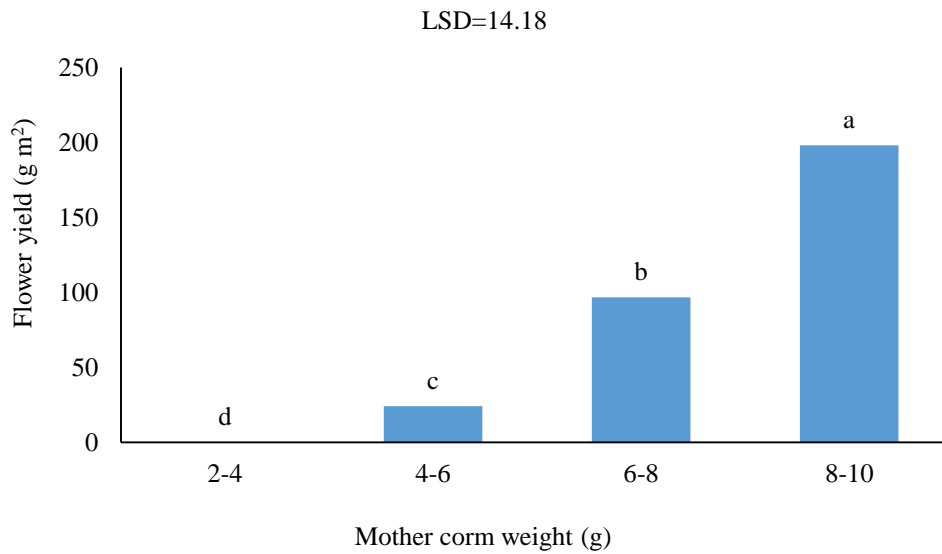


Fig 3. Means comparison for the effect of mother corm weight on flower yield of saffron under hydroponic cultivation

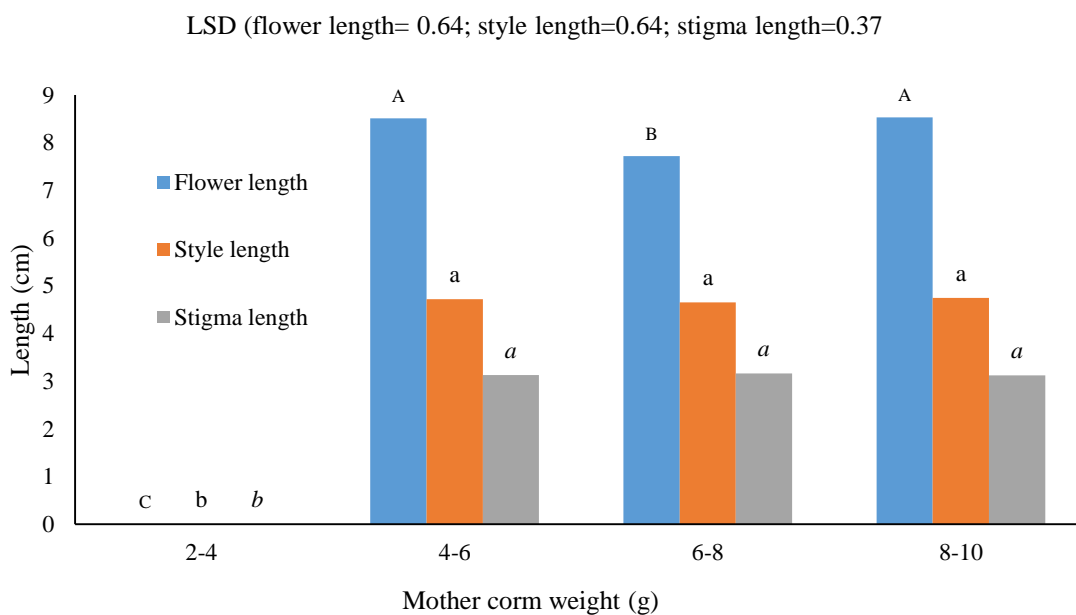


Fig 4. Means comparison for the effect of saffron mother corm weight on the length of flower, style and stigma under hydroponic cultivation

Table 3. Mean squares for the effect of corm weight on saffron petal and stigma yields, under hydroponic cultivation

S.O.V	df	Petal yield	Anther yield	Stigma yield
Treatment	3	95.40**	6.466**	3.677**
Error	12	0.24	0.008	0.008
C.V. (%)	-	9.75	7.93	10.77

** Significant at 1% level of probability

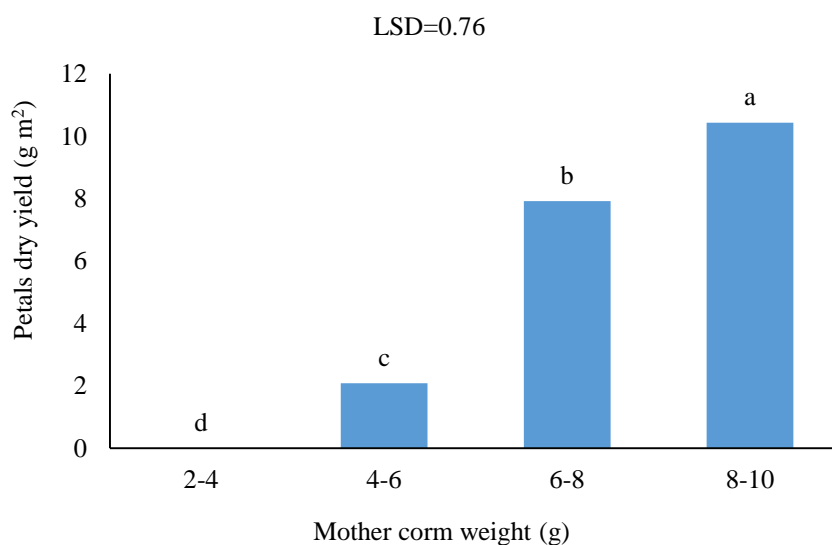


Fig 5. Mean comparisons for the effect of mother corm weight on petal dry yield of saffron under hydroponic cultivation

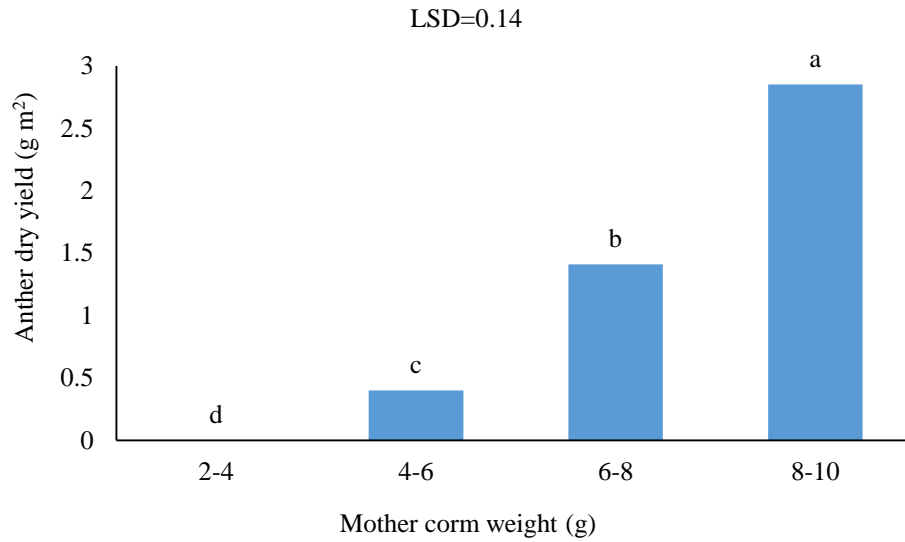


Fig 6. Means comparison for the effect of mother corm weight on anther dry yield of saffron under hydroponic cultivation

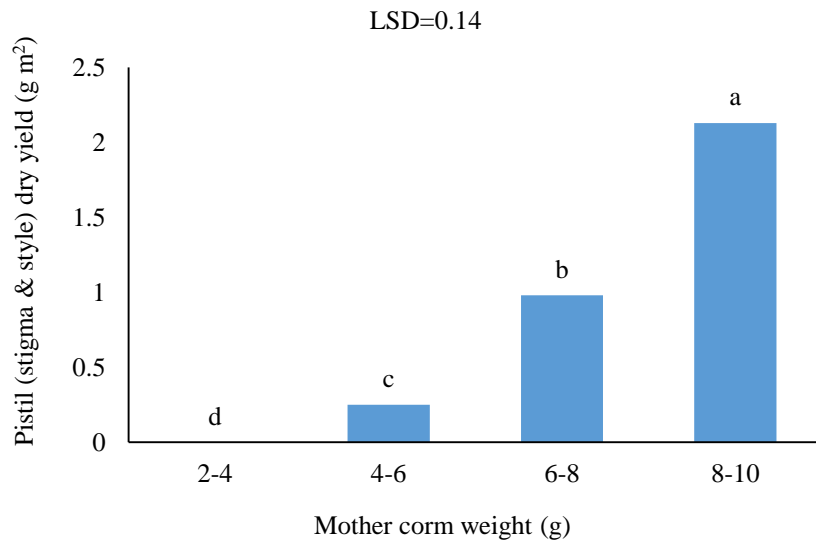


Fig 7. Means comparison for the effect of mother corm weight on pistil dry yield of saffron, under hydroponic cultivation

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