Journal of Phytology 2011, 3(7): 47-49
ISSN: 2075-6240
www.scholarjournals.org

JOURNAL OF PHYTOLOGY

www.journal-phytology.com

Behaviour of Saffron (*Crocus sativus* L.) Corms for Daughter Corm Production

Mohammad Anwar Khan *, Sabeena Naseer, Shaheena Nagoo, F.A. Nehvi

Saffron Research Sub-Station, K.D. Research, Station, Post Box No. 905 (G.P.O-Srinagar), Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir Shalimar, Srinagar, Jammu and Kashmir, India

Article Info

Article History

Received : 10-02-2011
Revised : 07-03-2011
Accepted : 07-04-2011

*Corresponding Author

Tel : + 91-9419712102
Fax : +91-1942305084

Email: anwarkhan143@gmail.com

Summary

Behaviour of saffron corms for daughter corm production has a paramount importance for commercial scale corm production under efficient nursery management system. Saffron corms weighing 1g to 16 g were planted in nylon nets, replicated twice for daughter corm production under annual planting cycle. Five corms were planted under each category supplemented with adequate nutrients. Maximum daughter corm production was observed in corms weighing above 15g, followed by corms weighing from 14g-10g. No substantial increase in number and weight of corms have been observed for corms weighing between 1g to 4g. However, under 5-7g category there was substantial increase in number of corms associated with bigger size daughter corms. Average diameter of daughter corms ranged from 18.48mm (8g) to 8.80 mm (1g). Maximum number of daughter corms/mother corm (3.3) were observed in bigger corms weighing 15 g and least number of daughter corms (0.6) were observed in 2 g category. Study reveals that initial corm weight has paramount effect on daughter corm production.

Key Words: Saffron corms, Daughter corm production

Introduction

Saffron (*Crocus sativus* L.) is an important spice, known for its aroma, colour and medicinal properties and is regarded as the most costly spice in the world. The saffron is used in preparation of saffronic kehwas (a kashmiri speciality) and is also used in Kashmiri wazwan. More specifically it has been recognized as an anticancer medicinal herb [1]. Saffron cultivation in the world extends through 0^0-90^0E, longitudinal (Spain-Kashmir) and 30^0-45^0N latitude (Persia-England). A native of Mediterranean region is also known in Iran, India, Spain, France, Turkey, Italy, China, Egypt, Azerbhaijan, Israel and recently started in Tasmania.

Despite its wide popularity which has enabled all saffron producing countries to increase production during the last 30-40yrs, there has been a decrease in saffron production in all the countries in more recent years, with exception of Iran [2]. Urgent measures are required to prevent a sharp curtailment in the production of saffron worldwide. It is therefore essential that the cultivation and processing of saffron becomes more profitable. This could be achieved by initiating specific plant breeding programmes Such breeding programs are still in infancy, with as yet no visible results, as there is only one known cultivar of saffron worldwide, named simply as saffron. The only differences are in the commercial varieties [3] or ecotypes [4]. Many researchers have addressed this problem through clonal selection of saffron. But, due to problems of sterility caused by triploid nature of saffron, which prohibits its use in hybridization programmes, methods of conventional breeding are not relevant in terms of saffron breeding program's and other methods such as experimental mutagenesis and cultivar techniques offer an ample scope for saffron improvement. The natural propagation rate of most geophytes including saffron is relatively low. Corm accounts for single most costly input in saffron cultivation. At a spacing of 20 x 10 cm about 5 lac/ha of corms are required. At 10 g/corm it amounts to 5 t/ha corm. In monetary terms it comes to INR 250000 /ha at a market rate of INR 50,000/t [5]. In Kashmir, the longer planting cycles (10-12 years) practiced by the saffron growers decrease further the chances of availability of corms [6]. Since the saffron reproduce vegetatively by the corms, any attempt to modernize saffron cultivation will therefore require efficient mass production of corms. Saffron research at Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Shalimar, Srinagar, India have also confirmed importance of corm size in improving saffron productivity [5]. Thus, it is realized that the study of behavior of saffron corms for daughter corm production is of paramount importance for economizing the commercial scale corm production and making corms available for area expansion.

Experimental

Saffron corms weighing 1g to 16g were planted in nylon nets, replicated twice for daughter corm production under annual planting cycle. Corms were planted under each category supplemented with adequate nutrients as per the recommendations of Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Shalimar, Srinagar, India.

Results and Discussion

Maximum daughter corm production was observed in corms weighing above 15g, followed by corms weighing from 14g to 10g (Table 1). No substantial increase in number and

weight of corms has been observed for corms weighing between 1g to 4g (Table 2). However, under 5g-7g category there was substantial increase in number of corms associated with bigger size daughter corms. Average diameter of daughter corms ranged from 18.48mm (8g) to 8.80mm (1g). Maximum number of daughter corms per mother corm (3.3) was observed in bigger corms weighing 15g and least number of daughter corms (0.6) was observed in 2g category. Study reveals that initial corm weight has paramount effect on daughter corm production. Saffron yields (dry stigmas) were highest from mother corms >4 cm in diameter [7]. The study of Kaushal and Upadhyay [8] also showed that the yield of flowers was dependent on the initial size of the corm of planting. In other scarce literatures, the effect of corm size on flowering was evaluated based on corm diameter. Munshi et al [9] indicated that the largest corms (3.25-3.75 cm) resulted in the highest number of flowers per corm, while Mariz [10] advocated that Saffron yields (dry stigmas) were highest from mother corms >4 cm in diameter.

Table 1. Average effect of initial weight of corms on daughter corm production in saffron

Initial Corm weight (g)	Number of Corms				Daughter Corms/ mother corm	Average Wt. (g)		Average Diameter (mm)	
	Corms Sown	Mother Corms (a)	Daughter Corms (b)	Total Corms (a+b)		Mother Corm	Daughter Corm	Mother Corms	Daughter Corms
1	5	-	5.0	5.0	1.0	-	0.53	-	8.80
2	5	2.0	3.0	5.0	0.6	4.07	1.13	18.62	13.10
3	5	2.5	5.0	7.5	1.0	3.0	0.40	17.30	7.97
4	5	1.2	3.7	4.9	0.74	4.2	1.33	21.70	12.00
5	5	-	6.6	6.6	1.3	-	0.55	-	8.85
6	5	-	10.0	10.0	2.0	-	0.67	-	10.51
7	5	-	8.3	8.3	1.66	-	1.54	-	13.08
8	5	-	3.7	3.7	0.74	-	1.36	-	18.48
9	5	1.0	4.0	5.0	0.8	9.0	1.09	28.80	11.71
10	5	3.0	7.0	10.0	1.4	10.0	2.24	27.25	15.70
11	5	2.0	20.0	22.0	1.0	11.25	1.50	28.42	13.53
12	5	-	16.6	16.6	3.3	-	0.75	-	11.05
13	5	3.0	15.0	18.0	3.0	13.0	1.80	30.26	13.00
14	5	-	21.2	21.2	4.2	-	1.20	-	11.77
15	5	-	22.5	22.5	4.5	-	2.70	-	16.95
16	5	-	40.0	40.0	8.0	-	2.39	-	15.22

Table 2. Behavior of corms for daughter corm production

Initial weight of Corms	Effect
>15g	Maximum daughter corm production (6-7)
5g-7g	Substantial increase in daughter corm production- 18.48mm (8g)
1g to 4g	No substantial daughter corm production

Conclusions

Under nursery management system maximum yield gain in terms of corm yield is achieved from corms with initial weight of 7-8 g, followed by 5-6 g category. Corms weighing <3 g to 5 g reveal 100% proportion of non flowering corms without any significant increase in number of corms or corm weight. Under 5-8 g category increase in number of corms is by 128% (from 50 corms to 114 corms/m^2) with an average number of 2.29 daughter corms/mother corm. Corms weighing 5-8 g are suitable for corm raising under nursery management system.

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