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Comparison Between Vegetatively Propagated and Seedling Plants in African Marigold (*Tagetes erecta*) Hybrid.

S. Amruta, and M.M. Meera Manjusha

College of Agriculture, Kerala Agricultural University, Padannakkad (P.O), Kasargod district (Kerala)

ABSTRACT

A study was carried out to compare the rooted cuttings and seedlings at regional agriculture research station, Pilicode. Seeds were sown initially to produce seedlings. Rooted cuttings were prepared from seedlings. Seedlings of same age and rooted cuttings were transplanted on prepared beds. Lime and farm yard manure were applied to beds as basal dose along with fertilisers as per package of practices recommended by Kerala Agricultural University. It was observed that seedlings recorded the maximum plant height, number of primary branches and secondary branches. Seedlings also recorded maximum plant fresh weight and dry weight. Yield parameters such as number of flowers per plant (42.05), flower yield per plant (489.85g), flower yield per plot (9.8 Kg), flower yield per hectare (29.02 t/ha) and duration of flowering were significantly more in seedling originated plants. Plants raised from rooted cuttings required less number of days for first flowering (8.65d), 50 per cent flowering (17.90d) and days to first harvest (21.10d) indicating earliness. Shelf life of marigold flowers were also more (7.05) in vegetatively propagated plants compared to that from seedlings (5.45d). Plants raised from rooted cuttings recorded the maximum B:C (5.34 :1) ratio compared to seedlings (3.91:1).

Key Words: Marigold, shelf life, seedlings, cuttings.

INTRODUCTION

Marigold (*Tagetes erecta* L.) holds prominent place among the annual flower crops in India. It is extensively used as loose flower for making garlands in religious and social functions as cut flowers and for garden decoration in landscaping. Marigold has gained popularity among gardeners throughout the world on account of its easy cultivation, wide adaptability and year round flower production. Its free flowering habit, short duration to produce marketable flowers, wide spectrum of attractive colours, shapes, size and good keeping quality has attracted the attention of many amateur and commercial flower growers who utilize them for bedding, edging, herbaceous borders and for pot planting. The availability of seeds in bulk and the prohibitive cost of hybrid seeds in the market are main constraints for expansion of marigold cultivar in Kerala. In order to overcome the constraints of seed cost and hybrid seeds, propagation of marigold by cuttings is a viable option.

The commercial method of cultivating marigold crop is through seed propagation. Plants raised from seeds show a great variability with respect to vigour, precocity and quality. True to type plants cannot be obtained through seed propagation as it is an often cross pollinated crop (Bhatt and Chauhan, 2012). Vegetative propagation through cuttings is the most convenient and cheap method of obtaining a fully developed stronger plants in considerably less time. Propagation through cutting is commonly used in commercial propagation of ornamental plants (Blythe *et al*, 2004). Cuttings required comparatively less time to root and mature for field transplantation than the plants propagated through seeds. Moreover, vegetative propagation method is presumed to result in true to type plants for preservation of all characters of a particular variety (Dawane *et al*, 2015), which can be exploited for planting material production in marigold.

Corresponding Author's Email - samruta41@gmail.com

MATERIALS AND METHODS

The experimental site was located at $12^0$12'N latitude and $75^0$10'E longitude and at an altitude of 15m above mean sea level at RARS, Pilicode. The soil of the site for the experiment was lateritic loam. It was acidic in reaction with a pH of 5.98, organic carbon content 0.48 per cent, available N 225.79 Kg/ha, available P_2O_5 126.47 Kg/ha and available K_2O 431.64 Kg/ha.

Seeds were sown initially to produce seedlings. Rooted cuttings were prepared from seedlings. Seedlings of same age and rooted cuttings were transplanted to prepared beds. For experiment beds of size 2.25 × 1.2 m^2 were prepared by removing stones and weeds. Lime and farm yard manure were applied to beds as basal dose along with fertilisers adopting package of practices recommended by Kerala Agricultural University (KAU, 2016). The rooted cuttings and seedlings were planted at spacing of 30 × 45 cm^2 on beds and distance of 50 cm was maintained between beds. The bacterial wilt was too severe during experiment and copper oxychloride (COC) 50%WP 3g/l was drenched per plant. The control measures like drenching beds with bleaching powder about 10 g/l and copper oxychloride (COC) 50%WP 3g/l was practiced to overcome this. Bacterimycin @ 0.5 g/l was also tried for controlling bacterial wilt.

Plant height (cm), number of primary branches per plant, number of secondary branches per plant, total fresh and dry weight of plants (3MAP), days to first flowering, days to 50% flowering, days to first harvest, number of flowers per plant, mean flower weight (g), flower yield per plant (g), total flower yield / ha (Kg), flower diameter, duration of flowering, vase life, BC ratio were the observations made during comparison study. The data were analysed using t- test analysis

RESULTS AND DISCUSSION

Plant height

Plant height was recorded at 30 d, 60 d and 90 d after planting from both seedlings originated plants and those from cuttings. During all the stages, plant height recorded was correspondingly more in seedlings (T_2) compared to rooted cuttings (T_1). Maximum plant height was recorded by seedling originated plants at 90 DAP (90.40 cm) while the height recorded by rooted cuttings was significantly lesser (67.8 cm). This indicated that plants originated from cuttings tend to be dwarfed irrespective of the stages of growth.

Number of primary branches

Number of primary branches was also recorded at 30 d, 60 d and 90 d after planting from both seedlings originated plants and those from cuttings. A similar trend followed here also where seedling originated plants (T_2) recorded significantly more number of primary branches at all the stages observed compared to cuttings (T_1). Maximum number of primary branches were recorded in seedling originated plants at 90 DAP (10.50) while this was 36 percent lesser in rooted cuttings at the same stage (6.35). However, the increase in the number of primary branches between 60 and 90 days was minimal and most of the development of primary branches occurs within 60 days after planting in both seedlings originated plants and rooted cuttings.

Secondary branches

Production of secondary branches also followed a similar trend to that of primary branches irrespective of the stages observed whether at 30, 60 or 90 days after planting. Seedling originated plants (T_2) documented significantly higher number of secondary branches in all the stages observed compared to plants from rooted cuttings. Here also, the maximum number of secondary branches were recorded in seedling originated plants at 90 days after planting (21.97) compared to rooted cuttings (14.15). The production of secondary branches also were minimal between 60 days and 90 days as there was no significant increase in the number of secondary branches after 60 days both in seedling plants and rooted cuttings.

Plant weight

The data on total fresh and dry weight of plants recorded after the crop were analysed. The

treatments, seedlings and cuttings had shown impact on total plant fresh and dry weight. Seedling plants (T_2) recorded higher total fresh weight (211.51g) and dry weight (47.97g) compared to rooted cuttings. Flower initiation seems to be earlier in rooted cuttings as the number of days required for first flowering was lesser in rooted cuttings. The number of days required for initial flowering in rooted cuttings (T_1) was 8.65 days while this required 13.125 days in seedlings. Hence, this indicated that plants originated cuttings have earliness in flowering

Days to 50 per cent flowering

The observation on days to 50% flowering also followed a similar trend to that of days to first flowering, as the cuttings (T_1) recorded least number of days to complete 50 per cent flowering compared to seedling plants (T_2). The number of days required for cuttings (T_1) was17.9 days for 50 percent flowering while it was significantly longer (22.6) in seedling plants (T_2). For this parameter also, plants from cuttings (T_1) recorded significantly lesser number of days (21.10) to first harvest indicating earliness in this character also. Seedling originated plants required longer days (29.72) for first harvest. A reversal of trend was observed with this parameter as the number of flowers recorded was maximum (42.05) in seedling plants (T_2) compared to cuttings (T_1) where the flower production was 21.75 per cent lesser (37.45).

Flower weight

The maximum mean flower weight (8.32 g) was recorded from cuttings (T_1) which was significantly similar (8.16) to treatment seedling (T_2). The seedlings and cuttings made significant impact on flower diameter. The maximum flower diameter (6.13 cm) was found in treatment cuttings (T_1) which was significantly higher than seedlings (5.96 cm). The treatments significantly influenced the flowering duration as evidenced by the data presented. Seedling originated plants (T_2) recorded longer flowering duration (62.87 days) which was significantly superior to cuttings (T_1) in which the duration was 17.28 per cent lesser (52 days). This indicates the superiority of seedling plants over rooted cuttings for this parameter.

Flower yield

Flower yield per plant was significantly affected by the treatments. The treatment seedlings (T_2) recorded maximum flower yield per plant (489.85 g) which was significantly greater than treatment cuttings (T_1). Individual plants originated from seedling recorded 20.57 per cent higher flower yield compared to rooted cuttings (389.07 g). Flower yield per plot was significantly affected by treatments. The treatment seedlings (T_2) recorded maximum flower yield per plot (9804.8g) which was significantly greater than cuttings(T_1). Flower yield per hectare was significantly affected by the treatments. The treatment seedlings (T_2) recorded maximum flower yield (29t/ha) which was significantly greater than treatment cuttings (T_1). During all the stages, plant height, number of primary and secondary branches recorded was correspondingly more in seedlings (T_2) compared to rooted cuttings (T_1). Maximum plant height, number of primary branches and secondary branches was recorded by seedling originated plants at 90 DAP. This indicated that plants originated from cuttings tend to be dwarf and the production of primary and secondary branches were significantly lesser in them irrespective of the stages of growth compared to seedling originated plants. In both cases however, the increase in the number of primary branches between 60 and 90 days was minimal and most of the development of primary branches occurs within 60 days after planting.

The results were in agreement with the reports by Dawane *et al* (2015) and Naveen (2016) in marigold in which the plant height and number of primary and secondary branches were more in seedling plants than rooted cuttings. The reason for maximum plant height, and production of primary and secondary branches in seedlings might be due their vigorous nature of growth and the taproot system present in seedlings which helps in more absorption of nutrients and water making plants stronger, taller, well branched and well established. Vegetatively propagated plants are less vigorous and usually short in stature and less branching due to the fibrous root system is present in them and low absorption of nutrients from soil.

The propagation methods significantly influenced the total plant fresh weight and dry weight. Seedling plants recorded higher total fresh weight and dry weight compared to rooted cuttings. The results were in line with the findings by Kathiravan *et al* (2007). The dominance of seedling plants for these parameters could be because of more number of primary and secondary branches in them compared to that of cuttings.

Flowering and Yield attributes

Flower initiation seems to be earlier in rooted cuttings as the number of days required for first flowering was lesser in them. The number of days required for initial flowering in rooted cuttings was 32 per cent lesser than seedlings. Similarly, the number of days to complete 50% flowering also was significantly lesser in rooted cuttings compared to seedling plants (T_2). 50% flowering in plants from rooted cuttings completed five days earlier than seedling plants.

Earlier flower initiation and days to 50 percent flowering in rooted cuttings may be due to the reduced juvenile phase in vegetatively propagated plants as reported by Bose *et al* (1986) and early maturity of cuttings to flower (Hartman *et al,* 2002) The present results were also in agreement with reports by Dawane *et al* (2015) in marigold.

Plants from cuttings also recorded significantly lesser number of days to first harvest indicating earliness in this character also. Seedling originated plants required longer days for first harvest. Earliness in harvest might have resulted from the associated factors presented above such as earlier flower bud initiation and days to complete fifty percent flowering as observed in plants originated from rooted cutting.

A reversal of trend was observed in flower production as the number of flowers recorded was maximum in seedling plants compared to cuttings where the flower production was 39 per cent lesser. The results were in conformity with the studies by Dawane *et al* (2015) and Naveen (2016) in marigold. The production of more number of branches might have resulted in more number of flowers in seedlings.

Weight of individual flowers and diameter of flowers was not influenced by the propagation methods. Similar individual flower weight and diameter of flowers recorded by both seedling plants and rooted cuttings substantiates this. These findings were contrary to the findings by Dawane *et al* (2015) and Naveen (2016) in marigold where they reported significantly higher flower weight and flower diameter from seedling plants

Seedling originated plants (T_2) recorded longer flowering duration which the duration was 10 days longer than cuttings. This indicates the superiority of seedling plants over rooted cuttings for this parameter. The reason behind the increased duration of flowering in seedlings might be due to their vigorous and robust nature of seedlings (more number of lateral shoots). The outcomes were in conformity with the work of Dawane *et al* (2015) in marigold.

The flower yield per plant, flower yield per plot and flower yield per hectare were significantly affected by propagation methods. Seedlings plants recorded maximum flower yield per plant as well as per hectare which was significantly superior to cuttings. Individual plants originated from seedling recorded 20.73 per cent higher flower yield compared to rooted cuttings. The cause for improved flower yield per plant in seedlings might be due to more number of branches, leaves and increased assimilates for development of flowers as well as higher duration of flowering, more number of flowers per plant. The results were in conformity with the findings of Dawane *et al* (2015) in marigold. The propagation methods had significant influence on vase life. The maximum vase life was recorded by cuttings which was significantly superior to seedlings. The results were in conformity with the findings of Dawane *et al* (2015) in marigold. The increased vase life might be due to more capacity to tolerate loss in weight because of reduced transpiration and respiration and also increased quantity of antioxidants, antibiotics, phenols hormones.

The B:C ratio was significantly influenced by propagating methods. The maximum B:C was found in cuttings(T_1) which was significantly higher than seedlings (T_2). This was contrary to

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Table1. Effect of propagation methods (Seedlings and cuttings) on plant characters.

Variable	Seedlings	Std.Err.	Cuttings	Std.Err.	CD value at 0.05%	t value
Plant Height at 30 Days (cm)	51.72	0.443	39.31	0.709	1.75	14.839
Plant Height at 60 Days (cm)	87.91	0.296	66.89	0.519	1.25	35.139
Plant Height at 90 days (cm)	90.40	0.215	67.800	0.281	0.59	83.87
Primary Branches at 30 Days (No)	4.65	0.076	2.77	0.087	0.24	16.196
Primary Branches at 60 Days (No)	9.62	0.230	6.15	0.107	0.53	13.681
Primary branches at 90 days (No)	10.50	0.118	6.35	0.125	0.36	24.01
Secondary Branches at 30 Days (No)	10.15	0.155	6.77	0.126	0.41	16.919
Secondary Branches at 60 Days (No)	19.57	0.271	12.12	0.187	0.69	22.591
Secondary Branches at 90 days	21.975	0.095	14.150	0.100	0.28	56.831

Table 2. Effect of propagation methods (Seedlings and Cuttings) on flower yield parameters.

Variable	Seedlings	Std.Err.	Cuttings	Std.Err.	CD value at 0.05%	t value
Days to 1st Flowering	13.12	0.150	8.65	0.242	0.59	15.706
Days to 50% Flowering	22.60	0.371	17.90	0.180	0.86	11.399
Days to 1st Harvest	29.72	0.142	21.10	0.163	0.45	39.896
Number of Flowers/ Plant	42.05	0.44	32.95	0.57	1.52	12.56
Mean Flower Weight	8.16	0.078	8.32	0.097	0.261	2.026
Flower Diameter	5.96	0.093	6.13	0.172	0.41	0.877
Flowering Duration	62.87	0.239	52.00	0.467	1.10	20.725
Flower Yield/ Plant(g)	489.85	2.35	389.07	1.48	5.84	36.22
Flower yield per plot (g)	9804.8	46.04	7781.5	29.68	115.09	36.93
Total flower yield/ha (Kg)	29027.84	139.39	23056.18	87.95	346.28	36.23

Table3. Effect of propagation methods (Seedlings and cuttings) on physiological, qualitative characters and BC ratio.

Variable	Seedlings	Std.Err.	Cuttings	Std.Err.	CD value at 0.05%	t value
Total fresh Weight(g)	211.51	3.504	149.48	1.665	8.15	15.988
Dry Weight(g)	47.976	2.301	33.723	0.941	5.22	5.733
Vase Life(days)	5.450	0.153	7.05	0.170	0.48	7.002
BC ratio	3.91	5.34				

Naveen (2016). The reason for increased B:C ratio in cuttings might be production of more number of plants from single mother plants and high cost of hybrid seeds

CONCLUSION

The results revealed that there was significant difference on various morphological

and yield attributes. Flowering was significantly early in cuttings compared to seedlings. Maximum B:C ratio of 5.34 was obtained when rooted cuttings were used as the planting material while BC ratio was 3.91 when seedlings were used. Propagation and planting through rooted cuttings can be promoted in hybrid marigold as this helps to maintain purity of varieties as well as reduce the cost of seeds. A single mother plant can provide up to shoots amenable for rooting which can be retained as source for planting materials. This practice not only reduce cost of cultivation and ease the burden procuring seeds each season which are not available locally.

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REFERENCES

Bhatt S T and Chouhan N M (2012). Effect of auxin on rooting of African Marigold (*Tegetes erecta L.*). *Adv Res J Crop Improve* 11(3): 69-70.

Blythe E K, Sibley J L, Ruter J M and Tilt K M (2004). Cutting propagation of foliage crops using a foliar application of auxin. *Scientia Horti* 103: 31-37.

Bose T K, Mitra S K and Sadhu M K (1986). *Propagation of Tropical and Subtropical Horticultural Crops*. *Naya Prokash*, Calcutta, 27p.

Dawane P T, Desmukh M, Katwate S M, Ambad S N and Chavan S R (2015). Influence of propagation methods of marigold (*Tagetes erecta L*) on growth, yield and quality of flowers. *Indian J Agric Res Technol* 40(1): 20-24.

Hartmann H T, Kester D E, Davies J R and Geneve R L (2002). *Hartmann and Kester's plant propagation: Principles and practices,* 7th ed. Prentice hall, Upper Saddle. NJ.

Kathiravan M, Ponnuswamy A S and Vanitha C (2007). Influence of soil types on elite seedings production in Jatropha (*Jatropha curcas L.*). *Plant Arch* 8(1): 111-113.

Naveen K (2016). *Response of marigold (Tagetes erecta L.) var. Calcutta Orange to type of planting material and nutrition.* M.Sc.(Hort) thesis, University of Horticultural Sciences, Bagalkot,97p.

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