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Effect of potting media on growth and flower yield of rose (*Rosa hybrida* L.) cv. top secret under protected condition

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Abstract

The present experiment entitled "Effect of potting media on growth and flower yield of rose (*Rosa hybrida* L.) cv. Top Secret under protected condition." was carried out at Hi-Tech Horticulture Park, Department of Horticulture, Junagadh Agricultural University, Junagadh (Gujarat) during 2016-17. The results of the study indicated that growth parameters *viz.*, plant height (60.46 cm), leaf area (36.98 cm²), number of leaf per stalk (20.33) and stalk length (36.23 cm) were significantly maximum obtained in T₄ treatment which followed by treatment T₇. Whereas, flowering parameter *viz.*, number of days to bud initiation (13.23 days) were recorded significantly minimum with the T₄ treatment followed by treatment T₇. Similarly, the significantly maximum flower diameter (8.23 cm), number of petals per flower (27.65) and number of flowers per plant (19.48) and were recorded in T₄ treatment and were followed by treatment T₇.

Keywords: Growing media, rose, top secret

Introduction

Rose is one of the nature's beautiful creation and is usually acclaimed as "Queen of flowers" due to its majestic fragrance, brilliant colour, attractive shape, varying sizes and excellent keeping quality. It belongs to Rosaceae family. Globally, about 150 species of roses are found, out of these 34 species are cultivated in India. It is the most powerful symbol in metaphysics. Rose is the most preferred species of cut flower in the international market, accounting about 19% of global trade. However, in India rose has been grown under open condition, as loose flower as well as cut flower and occupies second place next to marigold. In our country, the flower is used for worship at home, temple, mosque, tomb, making garlands, bouquets and flower arrangements. The flower is used at all occasions of festivals, religious or social functions. This way, flowers are among the loveliest objects on this earth and among them, the rose is the most common.

Materials and Methodology

The present investigation was carried out at Hi-Tech Horticulture Park, Department of Horticulture, Junagadh Agricultural University, Junagadh (Gujarat) during 2016-17. Junagadh is situated at 21.5° N latitude and 70.5° E longitude with an altitude of 60 meters above the mean sea level on the western side at the foot hills of mountain Girnar sierra. The experiment was laid out in Completely Randomized Design (CRD) with three replications and seven treatment combinations of different available growing media *viz.*, cocopeat, FYM, leaf mould, perlite and soil (control). The treatment comprised of seven different combinations of growing media *viz.*, soil (control) (T₁), soil + FYM (1:1 v/v) (T₂), soil + cocopeat (1:1 v/v) (T₃), soil + cocopeat + leaf mould (1:1:1 v/v) (T₄), soil + cocopeat + FYM (1:1:1 v/v) (T₅), soil + perlite (1:1 v/v) (T₆), soil + cocopeat + perlite (1:1:1 v/v) (T₇).

Results and Discussion**Growth parameters**

The result indicates that the different combination of growing media had produced significant effect on growth parameters *viz.*, plant height (cm), leaf area (cm²), number of leaf per stalk and stalk length (cm).

Plant height: The significant effect of potting media on plant height presented in (Table-1). The maximum plant height (60.46 cm) at first flower appearance stage was recorded in T₄ - soil + cocopeat + leaf mould (1:1:1) which was statistically at par with T₇ - soil + cocopeat +

perlite (1:1:1) (47.36 cm). It might be due to the fact that growth substrate provides all the essential nutrients and water to the plants, which is very essential to obtain the maximum plant height. If any nutrient in the selected growing medium is absent or in less amount, then it reduced the plant growth and development. Result showed that the cocopeat and leaf mould show better quantitative effects on plant height as compared to the other treatments because of high nutritional level in cocopeat and leaf mould Younis *et al.* (2015). Similar results were recorded by Yaseem *et al.* (2012)^[14] in Carnation, Gupta *et al.* (2004)^[6, 7] in Gerbera and Jawaharlal *et al.* (2001)^[8] in Anthurium.

Leaf area: The leaf area was markedly influenced by the different potting media. The maximum leaf area (26.70 cm²) was found in T₄ - soil + cocopeat + leaf mould (1:1:1), which was at par with treatment T₇ - soil + cocopeat + perlite (1:1:1) (35.33 cm²). This may be due to the favourable physiochemical properties and high nutrient content of media that supported proper growth of plant. This is probably due to the vigorous growth of the plant growing in the substrate. These results corroborate the previous findings of Younis *et al.* (2015) in Rose, Mani and Nagaraju (2005)^[9] in *Cymbidium* hybrids, Rani *et al.* (2005)^[11] Liliium and Nagaraju and Mani (2005)^[9] in *Zygopetalum intermedium*.

Number of leaf per stalk: The number of leaf per flowering stalk is vital parameter of growth as stated in (Table-1). The data indicated that the maximum number of leaf per stalk (20.23) was found in T₄ - soil + cocopeat + leaf mould (1:1:1) which was at par with treatment T₇ - soil + cocopeat + perlite (1:1:1) (18.98). This may be due to the environmental conditions readily affect the number of leaves per stalk. If the soil has high content of nitrogen, then the plant condition a large number of leaves per stalk. Nutritional level plays a major role in increasing the number of leaves per stalk. It was also conformity by Yonis *et al.* (2015)^[15] and Ahmed *et al.* (2012)^[11] in Rose, Riaz *et al.* (2008)^[12] in Zinnia.

Stalk length: The data indicated that the maximum stalk length was found significant with respect to different potting media (Table-1). The maximum stalk length was recorded in T₄ - soil + cocopeat + leaf mould (1:1:1) (27.75 cm) which was statically at par with T₇ - soil + cocopeat + perlite (1:1:1) (19.69 cm). Increase in the stalk length of the rose grown in coconut coir piece was due to decrease in phenolic compound or organic acids they were leached from the substrate due to irrigation water. A good amount of leaves coupled with conductive root environment which would have led to proper nutrient uptake in the substrate may resulted in greater accumulation of food by Yonis *et al.* (2015)^[15] in Rose, Aswath and Pillai (2004)^[3] in Gerbera and Jawaharlal *et al.* (2001)^[8] in Anthurium.

Yield parameters

The result indicates that the different combination of growing medias had produced significant effect on yield parameters viz., days taken to bud initiation (days), diameter of flower (cm), numbers of petals per flower and number of flowers per plant.

Days taken to bud initiation: Data revealed that the days taken to bud initiation was affected significantly by different

potting medias (Table-1). The data indicated that the minimum days taken to bud initiation (13.23 days) is observed in T₄ - soil + cocopeat + leaf mould (1:1:1). This might be due to vigorous growth of the plant growing in the media and the rapid uptake of nutrients and water has a pronounce effect on early production. This is also attributed to accumulation of more photosynthetic in this media might have induced early flowering. This is probably due to more protein formation from manufactured carbohydrate deposit in vegetative part and more in protoplast formation. Similar result was also found by Gupta *et al.* (2004)^[6, 7] in Gerbera, Barreto and Jagtap (2006)^[5] and Sekar and Sujata (2001)^[13] in Gerbera, Jawaharlal *et al.* (2001)^[8] in Anthurium.

Diameter of flower: The significant effect of potting medias on diameter of flower presented in (Table-1). The diameter of flower (8.23 cm) were found maximum in T₄ - soil + cocopeat + leaf mould (1:1:1) which was statistically at par with T₅ - soil + cocopeat + FYM (1:1:1). The increase in diameter of flower may be cumulative effect of all growth parameters. The increase in flower size may be due to the increase leaf area which could be due to increased production and accumulation of photosynthetic from leaves to flower. It was also conformity by t was also conformity by Yonis *et al.* (2012)^[14] and Barman *et al.* (2006)^[4] in Rose, Yaseem *et al.* (2012)^[14] in Carnation, Gupta *et al.* (2004)^[6, 7], Barreto and Jagtap (2006)^[5] in Gerbra.

Numbers of petals per flower: Data revealed that the numbers of petals per flower was affected significantly by different potting medias (Table-1). The number of petals per flower (27.65) were found maximum in T₄ - soil + cocopeat + leaf mould (1:1:1) which was statistically at par with T₅ - soil + cocopeat + FYM (1:1:1). This may be due to the increase in size of flowers by potting media like cocopeat and leaf mould could be attributed to the higher K₂O content, good physiochemical properties like high porosity, good water holding capacity and higher retention of moisture which leads to improve the diameter of flowers and numbers of petals per flower. This may also have observed by Yonis *et al.* (2015)^[15] and Barman *et al.* (2006)^[4] in Rose, Yaseem *et al.* (2012)^[14] in Carnation, Gupta *et al.* (2004)^[6, 7], Barreto and Jagtap (2006)^[5] in Gerbera, Bhatia *et al.* (2004)^[6] in Carnation, Rani *et al.* (2005)^[11] in Lillium.

Number of flowers per plant: The data indicated that the maximum number of flowers per plant was found significant with respect to different potting media (Table-1). The maximum number of flowers per plant (19.48) was recorded in T₄ - soil + cocopeat + leaf mould (1:1:1) and which is statistically at par with T₇ - soil + cocopeat + perlite (1:1:1). This might be due to higher water retention by cocopeat thereby decreasing substrate temperature in the pots (Barreto and Jagtap, 2006)^[5] and vigorous growth of plants increase the flower production. The plant growing in soil + cocopeat + leaf mould express their potentiality at optimum bulk density, EC, pH and hence higher flower production. Similar result was obtained by Yonis *et al.* (2015)^[15] in Rose, Bhatia *et al.* (2004)^[6] in Carnation, Arumugam and Jawaharlal (2004)^[8] in *Dendrobium* Orchid, Sekar and Sujata (2001)^[13], Gupta *et al.* (2004)^[6, 7] and Aswath and Pillai (2004)^[3] in Gerbera.

Table 1: Effect of potting media on growth and flower yield of rose (*Rosa hybrida* L.) cv. Top Secret under protected condition.

Sr. no.	Treatment	Growth parameters				Yield parameters			
		Plant height (cm)	Leaf area (cm ²)	Number of leaf per stalk	Stalk length (cm)	Days taken to bud initiation (days)	Diameter of flower (cm)	Numbers of petals per flower	Number of flowers per plant
1.	T ₁	47.3	26.70	12.54	28.62	19.62	6.02	19.41	11.80
2.	T ₂	55.81	28.16	13.69	29.11	19.49	6.46	20.03	12.03
3.	T ₃	53.44	32.95	15.35	31.36	18.81	7.10	24.04	14.65
4.	T ₄	60.46	36.98	20.23	36.23	13.23	8.23	27.65	19.48
5.	T ₅	49.94	33.40	16.73	33.15	15.76	7.76	25.84	14.42
6.	T ₆	51.68	28.84	13.76	29.73	18.73	6.99	22.18	14.58
7.	T ₇	59.87	35.33	18.98	34.36	14.78	7.82	26.65	18.66
	S. Em	1.53	0.84	0.43	0.98	0.50	0.17	0.64	0.43
	C. D. at 5%	4.63	2.54	1.29	2.96	1.52	0.52	1.94	4.96
	C. V. %	4.90	4.58	4.65	5.35	5.07	4.15	4.64	1.31

Conclusions

The observations recorded from the present investigation revealed that among the maximum plant height, stalk length, leaf area and number of leaves per stalk was recorded in treatment T₄ - soil + cocopeat + leaf mould (1:1:1) which was statistically at par with T₇ - soil + cocopeat + perlite (1:1:1). The minimum number of days to bud initiation and maximum number of flowers per plant were observed in treatment T₄ - soil + cocopeat + leaf mould (1:1:1) and it was statistically at par with T₇ - soil + cocopeat + perlite (1:1:1). Similarly, number of petals per flower and flower diameter number of flowers per plant were recorded in T₄ - soil + cocopeat + leaf mould (1:1:1) and which is statistically at par with T₅ - soil + cocopeat + FYM (1:1:1).

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