Performance and assessment of suitable container and growing media for single type tuberose genotype

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ABSTRACT

The experiment was laid out at Zonal Agricultural Research Station, Ganeshkhind, Pune, Maharashtra during the year 2018-19. The single type tuberose genotype (GK-T-E-2) was used with two types of containers viz earthen and plastic pots while the four media were used viz soil, soil + FYM (1:1), cocopeat and cocopeat + FYM (1:1). The study revealed that the single type of tuberose genotype GK-T-E-2 performed better in the treatment combination of plastic pot with media cocopeat + FYM for various characters viz number of leaves (169.66), spread of plant (54.33 cm NS, 51.32 cm EW), inter-floret length at bottom (8.20 cm), inter-floret length top (2.26 cm) and number of bulbs per clump (7.66). The treatment combination of soil + FYM in plastic pot performed better for characters viz number of bulbs per clump (8.0). The treatment combination of cocopeat + FYM in earthen pot recorded earlier sprouting (9.55 days). The single type tuberose genotype GK-T-E-2 performed well in pot culture; among the interaction between container and media, the interaction cocopeat + FYM in plastic pot, soil + FYM in plastic pot and cocopeat + FYM in earthen pot showed better performance.

Keywords: Single type tuberose; media; container; growth; flower; bulb; parameters

INTRODUCTION

Tuberose (*Polianthes tuberose* L), commonly known as Rajnigandha belongs to the family Amaryllidaceae and is native to Mexico. Tuberose is the most important commercial bulbous ornamental of sub-tropical and tropical areas and is always in great demand for its attractive and fragrant spikes as well as for loose flowers. Tuberose is largely cultivated in Italy, France, Egypt, South Africa, Taiwan and Morocco. In India it occupies a prime position because of its popularity as cut and loose flower as well as its potential in perfume industry. The total area under tuberose cultivation in the country is about 7. 95 lakh hectare. The production of loose and cut flowers is estimated to be 27,000.71 MT and 1,560.70 lakh numbers respectively (Safeena et al 2015).

Tuberose is being commercially cultivated mainly in the states of Andhra Pradesh, Assam, Gujarat, Haryana, Karnataka, Maharashtra, Orissa, Tami Naidu, Uttar Pradesh, Uttarakhand and West Bengal. The nomenclature of different types of tuberose is based on the number of rows of petals each flower possesses. The cultivar with single row petals is designated with single type while the one which bears more than three rows of petals is called double type tuberose. The cut spikes of tuberose remain fresh for long time and can also withstand long distance transportation owing to the reason that tuberose cut flowers have longer vase life. Tuberose is also grown for garden decoration in pots, beds and borders. Generally tuberose is cultivated in open field but it can have very great ornamental value as potted plant if it is grown in pot culture which can be kept in offices and homes as a substitution for cut flower in flower pot. Hence it is important to study the performance of single type tuberose genotype under pot culture.

MATERIAL and METHODS

The experiment was laid out in factorial completely block design at Zonal Agricultural Research Station, Ganeshkhind, Pune, Maharashtra during the

year 2018-19. The single type tuberose genotype (GK-T-E-2) was used with two containers viz earthen and plastic pots while the four media were used viz soil, soil + FYM (1:1), cocopeat and cocopeat + FYM (1:1) with eight treatment combinations replicated thrice. Each treatment consisted of 15 pots and in each pot one bulb was planted. Treatments used were T_1: Earthen pot + soil, T_2: Earthen pot + soil + FYM, T_3: Earthen pot + cocopeat, T_4: Earthen pot + cocopeat + FYM, T_5: Plastic pot + soil, T_6: Plastic pot + soil + FYM, T_7: Plastic pot + cocopeat, T_8: Plastic pot + cocopeat + FYM.

The planting material (bulbs) was obtained from Zonal Agricultural Research Station, Ganeshkhind, Pune, Maharashtra. The uniform size bulbs were selected and treated with carbendazim (10 g/10 l of water) for 20 minutes to prevent from stem rot. Planting was carried out on 18 April 2018 in earthen and plastic pots of size 10 inches as per experimental design.

Following equation was used for analysis of data:

$$Y_{ij} = \mu + C_i + M_j + C_iM_j + e_{ij}$$

where Y_{ij}= Flower yield from j^{th} media and i^{th} container, μ= Overall mean, C_i= Effect due to i^{th} container, M_j= Effect due to j^{th} media, C_iM_j= Interaction effect due to j^{th} media and i^{th} container, e_{ij}= Error term, $e_{ij} \sim N(0, \sigma_e^2)$

$$\sum C_i = 0, \sum M_j = 0, \sum C_iM_j = 0$$

RESULTS and DISCUSSION

Growth parameters

The results of growth parameters of single type tuberose genotypes are presented in Table 1. The treatment T_5 (Plastic pot + soil) in plastic pot recorded maximum plant height (74.36 cm) which was at par with T_8 [Plastic pot + cocopeat + FYM (73.38 cm)], T_6 [Plastic pot + soil + FYM (72.80 cm)], T_1 [Earthen pot + soil (71.72 cm)], T_2 [Earthen pot + soil + FYM (70.84 cm)] and T_7 [Plastic pot + cocopeat (70.07 cm)]. Minimum plant height (52.17 cm) was recorded in T_3 (Earthen pot + cocopeat).

Mahato et al (2016) and Ikram et al (2013) reported that coconut coir + FYM showed maximum plant height in tuberose.

Maximum number of leaves was recorded in T_8 (169.66) followed by T_6 (142.00) and T_4 [Earthen pot + cocopeat + FYM (138.00)] whereas it was minimum in T_7 (60.89), T_1 (64.22) and T_3 (66.89) the last three being at par. Dalai et al (2015) in their work recorded significantly more number of leaves in dahlia var Orange Matrix grown in garden soil + FYM + sand in 2:1:1 under controlled condition. Chauhan et al (2014) reported that the media amended with normal soil + rice husk + cocopeat + castor cake + vermicompost (1:1:1:1:1) performed better for highest number of leaves in gerbera cv Alcochete under protected condition.

The spread of plants ranged from 54.55 (T_3) to 48.33 (T_1) cm in N-S and in case of E-W direction it ranged from 44.22 (T_7) to 51.33 (T_5: Plastic pot + soil) cm. Ikram et al (2013) and Nair and Bharathi (2019) observed that different growing media with combination of organic matter like FYM, leaf mould and vermicompost had significant effect on most of the vegetative growth characteristics in tuberose. There was no effect of treatments on days for sprouting.

Flower parameters

Minimum number of days for flower stalk emergence was recorded in T_3 (58.66) and T_4 (63.88) the two being at par and maximum in case of T_5 (75.22), T_6 (74.88), T_2 (74.77) and T_7 (73.55) all the four being statistically at par. Spike length was maximum in treatments T_5 (69.34 cm), T_8 (68.38 cm), T_6 (67.73 cm) and T_1 (66.72 cm) all of which were at par and minimum in T_3 (47.24 cm). Inter-floret length at bottom was maximum in T_7 (8.82 cm), T_3 (8.61 cm), T_2 (8.31 cm), T_5 (8.24 cm) and T_8 (8.20 cm) all being at par and minimum in T_1 (7.72 cm) and T_6 (7.26 cm) the two being at par. Inter-floret length at middle was maximum in T_3 (4.95 cm) and minimum in T_1 (3.69 cm), T_6 (3.66 cm) and T_7 (3.63 cm) all the three being at par. Inter-floret length at top was maximum in case of T_3, T_8, T_4, T_2 and T_5 (2.36, 2.26, 2.12, 2.11 and 2.11 cm respectively) all of which were at par and minimum in T_6, T_7 and T_1 (1.83, 1.70 and 1.57 cm respectively) all the three being at par. Number of florets was maximum (42.88) in case of T_5 and minimum in T_4, T_8 and T_7 (33.53, 32.77 and 31.86 respectively) all of which were at par. There was no effect of treatments on rachis length, floret length, floret diameter, flower stalk longevity, number of flower stalks per plant, number of flower stalks at a time, interval between flower stalk emergence and number of flowers opened at a time.

Table 1. Growth parameters of tuberose Single cv GK-T-E-2

Treatment	Days to sprouting	Plant height (cm)	Number of leaves/plant	Spread of plant N-S (cm)	Spread of plant E-W (cm)
T_1	10.89	71.72	64.22	48.33	48.33
T_2	12.66	70.84	108.11	52.00	47.55
T_3	10.55	52.17	66.89	54.55	50.99
T_4	9.55	64.88	138.00	50.44	47.55
T_5	16.00	74.36	93.66	52.55	51.33
T_6	16.11	72.80	142.00	50.00	45.55
T_7	15.22	70.07	60.89	49.66	44.22
T_8	13.55	73.38	169.66	54.33	51.32
SE±	1.16	1.77	6.17	1.48	1.73
$CD_{0.05}$	NS	5.35	18.67	4.49	5.24

T_1: Earthen pot + soil, T_2: Earthen pot + soil + FYM, T_3: Earthen pot + cocopeat, T_4: Earthen pot + cocopeat + FYM, T_5: Plastic pot + soil, T_6: Plastic pot + soil + FYM, T_7: Plastic pot + cocopeat, T_8: Plastic pot + cocopeat + FYM, NS: Non-significant, N-S: North-South, E-W: East-West

Table 2. Flower parameters of tuberose Single cv GK-T-E-2

Treatment	Days for flower stalk emergence	Spike length (cm)	Rachis length (cm)	Inter- floret length at bottom (cm)	Inter-floret length at middle (cm)	Inter- floret length at top (cm)	Number of florets/spike
T_1	68.00	66.72	20.23	7.72	3.69	1.57	35.21
T_2	74.77	65.29	22.61	8.31	4.14	2.11	34.85
T_3	58.66	47.24	21.49	8.61	4.95	2.36	34.33
T_4	63.88	61.94	20.57	8.04	4.31	2.12	33.53
T_5	75.22	69.34	24.21	8.24	4.13	2.11	42.88
T_6	74.88	67.73	23.14	7.26	3.66	1.83	37.63
T_7	73.55	65.41	22.06	8.82	3.63	1.70	31.86
T_8	68.44	68.38	22.71	8.20	4.29	2.26	32.77
SE±	2.12	1.28	0.77	0.22	0.13	0.09	0.55
$CD_{0.05}$	6.43	3.87	NS	0.66	0.40	0.27	1.69

Table 2. Contd…..

Treatment	Floret length (cm)	Floret diameter (cm)	Flower stalk longevity (days)	Number of flower stalks/plant	Number of flower stalks at a time	Interval between flower stalk emergence (days)	Number of flowers opened at a time
T_1	5.34	4.50	13.00	3.77	1.33	92.00	9.77
T_2	5.52	4.61	14.89	5.00	1.33	83.44	9.22
T_3	5.45	4.20	14.44	4.00	1.66	96.89	9.78
T_4	5.55	4.35	13.00	5.00	1.88	97.22	10.66
T_5	5.65	5.16	13.78	4.00	1.66	113.77	10.88
T_6	5.32	5.14	15.33	8.00	1.66	117.66	11.11
T_7	5.16	4.45	13.66	5.00	1.33	129.00	11.55
T_8	5.51	4.64	14.22	7.00	2.33	125.00	11.55
SE±	0.18	0.17	0.4	0.52	0.23	7.95	0.71
$CD_{0.05}$	NS	NS	NS	NS	NS	NS	NS

T_1: Earthen pot + soil, T_2: Earthen pot + soil + FYM, T_3: Earthen pot + cocopeat, T_4: Earthen pot + cocopeat + FYM, T_5: Plastic pot + soil, T_6: Plastic pot + soil + FYM, T_7: Plastic pot + cocopeat, T_8: Plastic pot + cocopeat + FYM, NS: Non-significant

Table 3. Bulb parameters of tuberose Single cv GK-T-E-2

Treatment	Number of bulbs/ clump	Number of bulblets/ clump
T_1	3.99	13.55
T_2	4.22	25.44
T_3	4.00	31.89
T_4	5.00	35.22
T_5	4.00	21.66
T_6	8.00	25.77
T_7	5.33	55.55
T_8	7.66	61.22
SE±	0.36	1.09
$CD_{0.05}$	1.11	3.30

T_1: Earthen pot + soil, T_2: Earthen pot + soil + FYM, T_3: Earthen pot + cocopeat, T_4: Earthen pot + cocopeat + FYM, T_5: Plastic pot + soil, T_6: Plastic pot + soil + FYM, T_7: Plastic pot + cocopeat, T_8: Plastic pot + cocopeat + FYM

Similar findings were reported by Dalai et al (2015) in dahalia, Mahato et al (2016), Ikram et al (2013), Habib et al (2016) and Prakash et al (2015).

Bulb parameters

The number of bulbs per clump was maximum in T_6 (8.00) and T_8 (7.66) the two being at par and minimum in T_4, T_2, T_3, T_5 and T_1 (5.00, 4.22, 4.00, 4.00 and 3.99 respectively) the five treatments being at par. Number of bulblets per clump was maximum in T_8 (61.22) followed by T_7 (55.55) and minimum in T_1 (13.55). Similar observations were made by Nair and Bharathi (2019).

CONCLUSION

On the basis of overall performance it was found that of tuberose genotype GK-T-E-2 performed better in treatments cocopeat + FYM in plastic pot, soil + FYM in plastic pot and cocopeat + FYM in earthen pot for growth, flower and bulb parameters.

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