Int.J.Curr.Microbiol.App.Sci (2018) *7*(8): 53-60

International Journal of Current Microbiology and Applied Sciences
***ISSN: 2319-7706* Volume 7 Number 08 (2018)**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2018.708.006

Evaluation of Different Genotypes of Tuberose (*Polianthes tuberosa* L.) for Yield and Quality

Bindiya C. Naik, B.S. Kamble, Shantappa Tirakannanavar* and Savita Parit

Department of Floriculture and Landscape Architecture, Kittur Rani Channamma College of Horticulture (UHS Bagalkot, Karnataka), Arabhavi-591 218, India

**Corresponding author*

Keywords

Tuberose, Genotypes, Shelf life, Bulb, Yield and flower quality

Article Info

Accepted:
04 July 2018
Available Online:
10 August 2018

A B S T R A C T

The experiment was conducted at Department of Floriculture and Landscape Architecture, Kittur Rani Channamma College of Horticulture, Arabhavi during the year 2015-16. Eight genotypes namely Shringar, Prajwal, Suvasini, Pearl Double, Calcutta Single, Mexican Single, Vaibhav and Arka Nirantara were used for the evaluation study. All the genotypes registered significant effect on yield and quality parameters. However, spike yield per hectare (2.97 lakhs), spike length (103.27 cm), flower yield per hectare (19.97 t), number of bulbs per plant (9.61), maximum corolla length (3.06 cm), vase life (9.02 days) and shelf life (6.26 days) were recorded maximum in genotype Prajwal. Rachis length (34.27 cm) and weight of 100 flowers (216.30 g) were recorded maximum in the genotype Vaibhav. Flower diameter (6.04 cm), bulb yield per hectare (2.13 t/ha) and overall acceptability was recorded maximum in genotype Suvasini, whereas genotype Shringar produced maximum number florets per spike (47.27). Maximum corolla tube length (4.48 cm) was observed in genotype Mexican Single.

Introduction

Among the wide varieties of cultivated flowers, tuberose (*Polianthes tuberosa* L.), is one of the most important tropical ornamental bulbous flowering plants cultivated for production of long lasting flower spikes. It belongs to the family Amaryllidaceae. Tuberose is native to Mexico from where it is spread to different parts of the world during 16th century. This plant being the tuberous hyacinth as distinguished from the bulbous hyacinth, the name thus is 'tuber - ose', not 'tube – rose'. Tuberose is half hardy, perennial bulbous plant. Bulbs are made of scales and leaf bases and stem remain concealed within scales. Roots are adventious and shallow. Tuberose inflorescences (spikes) bear 25 ± 10 pairs of florets which open acropetally (*i.e.*, from base to top of the spike). Flowers have a funnel shaped perianth and are fragrant, waxy white, about 25 mm long. Stamens are six in number, ovary 3 locular, ovules numerous and fruits are capsule (Anon., 2006). *Polianthes* genus contains three types of flowers. One of them is single flower type which is female fertile used in perfumery industry and breeding programme as female parent. The other two are semi-double and double flower types and generally used as cut flower. Due to

their lingering delightful fragrance and charm, these flowers are adorned with vernacular names in India like Gulchari and Gulshabbo in Hindi, Rajanigandha in Bengali, Sukandaraji and Nelasampangi in Telagu, Nilasampangi in Tamil and as Sugandharaja in Kannada (Jawaharlal *et al.*, 2006). In India its commercial cultivation is confined to Andhra Pradesh, Karnataka, Chattisgarh, Odisha and Tamil Nadu. The performance of any crop or variety largely depends upon its genetic makeup and climatic condition of the region under which they are grown. As a result, cultivars which perform well in one region may not perform well in other regions of varying climatic conditions. Hence, it is very much necessary to collect and evaluate all the available genotypes in order to select suitable and high yielding genotypes for a particular region. Considering the potentiality of this crop, it is very much necessary to find out the varieties suitable to a particular region. Yield, quality, vase life and shelf life are the important characters to be considered for the evaluation of genotypes of tuberose.

Materials and Methods

An investigation was carried out at Kittur Rani Channamma College of Horticulture, Arabhavi, Gokak Taluk, Belgavi district of Karnataka during the period from August 2015 to January 2016 to study the performance of eight tuberose genotypes for yield and quality characters. Healthy and disease free bulbs of eight tuberose genotypes were used in this experiment. The bulbs of genotypes Shringar, Prajwal, Suvasini, Pearl Double, Calcutta Single, Mexican Single and Vaibhav were collected from the Department of Floriculture and Landscape Architecture, Kittur Rani Channamma College of Horticulture, Arabhavi; and another genotype Arka Nirantara was collected from Indian Institute of Horticulture Research, Bengaluru. Altogether there were eight treatments (genotypes) and were replicated thrice. The land was brought to fine tilth by repeated ploughing and harrowing. Ridges were opened at a spacing of 30cm. The plots of required size were prepared. Well decomposed farm yard manure was applied before the land preparation at the rate of 25 tonnes per hectare and mixed well into the soil. Healthy bulbs were planted on ridges at a spacing of 30 X 30 cm and light irrigation was given immediately after planting. Gap filling was done whenever it was necessary. Five plants were selected at random within the net plot area of each treatment and replication for the purpose of recording the observations. The mean value of the data recorded from five plants in each treatment of the three replications was taken to represent a particular variety with respect to a character. The data on various biometric parameters recorded during the crop growth period of this study was subjected to statistical analysis as per the procedures suggested by Panse and Sukhatme (1969). The results are discussed at one and five per cent probability level.

Results and Discussion

Yield parameters

The data pertaining to spike yield and its attributing parameters, rachis length and number of florets per spike are presented in Table 1. The genotypes showed significant difference with respect to number of spikes produced per plant. The range was observed from 1.76 to 2.44 per plant. The genotypes Prajwal and Shringar recorded maximum number of spikes per plant 2.44 and 2.37 respectively, which were on par with each other and followed by genotypes Suvasini (2.24) and Vaibhav (2.15) and the least were recorded in the genotype Arka Nirantara (1.76). The range on number of spikes produced per hectare was from 2.14 to 2.97 lakhs per hectare. The genotypes Prajwal and

Shringar recorded maximum number of spikes per hectare 2.97 and 2.83 lakhs respectively, which were on par with each other and the least was noticed in genotype Arka Nirantara (2.14 lakhs). The genotypes under study varied significantly with respect to spike length and the range was from 63.70 cm to 103.27 cm. The maximum spike length was recorded in the genotype Prajwal (103.27 cm) and was significantly superior over other genotypes. The minimum spike length was observed in the genotype Arka Nirantara (63.70 cm). The genotypes showed significant variation in rachis length with range of 17.32 cm to 34.27 cm. The genotype Vaibhav produced longest rachis length (34.27 cm), which was statistically on par with the genotype Suvasini (33.00 cm) followed by Prajwal (31.08 cm), whereas the shortest rachis length was recorded in the genotype Arka Nirantara (17.32 cm). With respect to number of florets per spike the range was observed from 22.19 to 47.27 per spike. The genotypes Shringar and Prajwal recorded maximum number of florets per spike (47.27 and 42.02, respectively) which were on par with each other followed by Vaibhav (38.48). The least number of florets per spikes were produced in genotype Arka Nirantara (22.19).

Maximum number of spikes per plant, per plot and per hectare was observed in genotypes Prajwal followed by Shringar, whereas the genotype Arka Nirantara followed by Pearl Double and Calcutta Single recorded the least number of spikes per plant. Increased spike yield has direct relation with number of leaves produced per plants. This in turn will provide more area for photosynthesis, thus there will be a better overall growth of the plants. This in turn it will help in production of more number of spikes per plant and per hectare. Similar results were also reported by Bankar and Mukhopadhya (1988), Singh (2004) and Krishan and Misra (2005) in tuberose. The longer spike length might also due to the better vegetative growth of the genotypes. The similar variation for spike length was also reported previously by Patil *et al.,* (1987), Biswas *et al.,* (2002), Singh (2004) and Patil *et al.,* (2009) in tuberose. The increased rachis length was due to more internodal distance in between the pair of florets. The similar variations for rachis length was also reported previously by Singh (2004) and Krishan and Misra (2005) in tuberose.

The data pertaining to loose flower yield and bulb yield presented in Table 2. The genotypes showed significant difference with respect to loose flower yield per plant. The genotype Prajwal recorded maximum loose flower yield per plant (169.95 g) and per hectare (5.09 t) and was statistically on par with genotype Vaibhav (158.30 g and 4.76 t, respectively). The minimum loose flower yield per plant and per hectare was recorded in genotype Arka Nirantara (70.29 g and 2.10 t, respectively).

The genotype Prajwal recorded maximum number of bulbs per plant (9.61) as well as bulblets per plant (6.82) which was statistically on par with genotype Suvasini (8.36 and 5.31, respectively). The least number of bulbs (4.37) and bulblets per plant (2.30) was produced in genotype Arka Nirantara. The genotypes showed significant difference with respect to bulb yield per plant and per hectare. The genotype Suvasini recorded maximum bulb yield per plant (18.01 g) and per hectare (2.13 t) which was statistically on par with genotype Prajwal (15.76 g and 1.84 t, respectively). The genotype Arka Nirantara recorded minimum bulb yield per plant (8.54 g) and per hectare (1.05 t)

The Genotype Prajwal produced the highest loose flower yield followed by the genotype Vaibhav and the least was observed in genotype Arka Nirantara followed by Mexican Single and Calcutta Single.

Table.1 Spike yield and its attributing parameters, rachis length and number of florets per spike in different genotypes of tuberose

Genotypes		Number of spikes/ plant	Number of spikes/ hectare (lakhs)	Spike length (cm)	Rachis length (cm)	Number of florets/ spike
G_1	Shringar	2.37	2.83	88.73	29.31	47.27
G_2	Suvasini	2.24	2.67	89.79	33.00	37.35
G_3	Mexican Single	2.13	2.53	78.82	24.43	33.59
G_4	Prajwal	2.44	2.97	103.27	31.08	42.08
G_5	Calcutta Single	2.09	2.34	70.98	23.28	27.63
G_6	Pearl Double	1.93	2.24	65.25	19.05	25.08
G_7	Vaibhav	2.15	2.58	92.16	34.27	38.48
G_8	Arka Nirantara	1.76	2.14	63.70	17.32	22.19
S.Em.±		**0.06**	**0.08**	**2.73**	**1.03**	**1.10**
C.D. @ 5 %		**0.20**	**10.25**	**8.29**	**3.13**	**3.36**

Table.2 Loose flower yield and bulb yield in different genotypes of tuberose

Genotypes		Loose flower yield		Bulb yield			
		Per plant (g)	**Per hectare (t)**	**Number of bulbs per plant**	**Number Bulblets per plant**	**Bulb yield Per plant (g)**	**Bulb yield Per hectare (t)**
G_1	Shringar	137.79	4.13	7.34	5.26	12.86	1.59
G_2	Suvasini	146.24	4.38	8.36	5.31	17.57	2.13
G_3	Mexican Single	96.09	2.88	6.53	4.69	11.78	1.19
G_4	Prajwal	169.95	5.09	9.61	6.82	15.76	1.84
G_5	Calcutta Single	114.06	3.46	5.53	3.45	9.34	1.08
G_6	Pearl Double	125.84	3.77	6.84	2.62	10.78	1.25
G_7	Vaibhav	158.30	4.76	7.44	3.09	12.41	1.41
G_8	Arka Nirantara	70.29	2.10	4.37	2.30	6.08	1.05
S.Em.±		**4.32**	**0.11**	**0.20**	**0.14**	**0.34**	**0.03**
C.D. @ 5 %		**13.10**	**0.36**	**0.62**	**0.42**	**1.06**	**0.12**

Table.3 Flower diameter (cm), corolla length (cm), corolla tube length (cm), bulb diameter (cm), vase life (days) and shelf life (days) in different genotypes of tuberose

Genotypes		Flower diameter	100 flower weight (g)	Corolla length	Corolla tube length	Vase life	Shelf life
G_1	Shringar	3.60	118.47	2.53	4.34	7.63	5.43
G_2	Suvasini	6.04	141.42	2.40	2.94	7.41	5.31
G_3	Mexican Single	3.26	100.89	2.66	4.48	7.46	4.26
G_4	Prajwal	5.22	172.33	3.06	4.10	9.02	6.26
G_5	Calcutta Single	3.16	136.91	1.83	3.90	6.69	4.50
G_6	Pearl Double	4.01	165.41	2.80	3.10	6.93	4.83
G_7	Vaibhav	5.07	216.30	2.31	3.40	7.79	5.66
G_8	Arka Nirantara	2.83	97.96	1.50	3.80	6.20	4.16
S.Em.±		**0.12**	**4.16**	**0.08**	**0.04**	**0.10**	**0.17**
C.D. @ 5 %		**0.36**	**12.63**	**0.24**	**0.14**	**0.31**	**0.53**

Table.4 Score values for consumer acceptance of different tuberose genotypes

Genotypes		Fragrance	Spike length	Flower size	Corolla tube length	Over all acceptance
G_1	Shringar	4.44	3.83	3.87	4.35	4.13
G_2	Suvasini	4.63	4.53	4.68	3.58	4.69
G_3	Mexican Single	3.66	3.58	3.23	4.57	3.96
G_4	Prajwal	4.14	4.48	4.40	3.23	4.48
G_5	Calcutta Single	3.32	3.14	3.26	3.96	3.59
G_6	Pearl Double	3.26	3.65	3.26	2.83	3.93
G_7	Vaibhav	2.50	4.10	4.24	3.46	4.35
G_8	Arka Nirantara	3.44	2.81	2.28	2.13	1.74
S.Em.±		**0.14**	**0.13**	**0.12**	**0.10**	**0.13**
C.D. @ 5 %		**0.43**	**0.39**	**0.37**	**0.33**	**0.40**

The more production of flowers has direct relation with better vegetative growth of the plants, which leads to the production of more number of spikes per plant as well as more number of florets per spike; in turn it results in increased loose flower yield per plant, per plot and per hectare. Similar variation in loose flower yield was also reported previously by Irulappan *et al.,* (1980), Patil *et al.,* (1987), Meenakshi and Niranjanmurthy (1997) and Gupta *et al.,* (2004) in tuberose. Genotype with more number of leaves has improved photosynthetic activity, source and sink relationship and accumulates more carbohydrates which improve the bulb and bulblet yield per plant, per plot and per hectare. Similar variation in bulb yield was also reported previously by Krishnamoorthy (2014) and Singh and Singh (2013) in tuberose.

Flower quality parameters

The data pertaining to flower quality parameters like Flower diameter, 100 flower weight, corolla length, corolla tube length,

bulb diameter, vase life and shelf life in different genotypes of tuberose is represented in Table 3. Flower diameter differed significantly among the genotypes. The maximum flower diameter (6.04 cm) was recorded in genotype Suvasini which was statistically on par with genotype Prajwal (5.22 cm) followed by genotype Vaibhav (5.07), whereas minimum diameter was recorded in genotype Arka Nirantara (2.83 cm). The genotypes showed significant difference with respect to 100 flower weight. The range observed was between 97.96 to 216.30 g. The genotype Vaibhav recorded maximum weight (216.30 g) and was followed by genotype Prajwal (172.33 g).

The minimum weight was recorded in genotype Arka Nirantara (97.96 g). The variation among the genotypes was observed for trait corolla length. Maximum corolla length was recorded in genotype Prajwal (3.06 cm) and minimum was recorded in genotype Arka Nirantara (1.50 cm). The maximum corolla tube length was recorded in genotype Mexican Single (4.48 cm) and was statistically on par with genotype Shringar (4.34 cm) and these genotypes found to be superior over the rest of the genotypes, whereas minimum corolla tube length was recorded in Pearl Double (3.10 cm).

Among the vase life of genotypes Prajwal recorded maximum vase life (9.02 days) followed by genotype Vaibhav (7.79 days). The minimum days for vase life was observed in genotype Arka Nirantara (6.20) followed by Calcutta Single (6.69) days. Among the various genotypes studied for shelf life, the genotype Prajwal recorded maximum shelf life of 6.26 days and was statistically on par with genotype Vaibhav (5.66 days) and these genotypes found to be superior over the other genotypes. The minimum shelf life was observed in genotype Arka Nirantara (4.16 days).

Flower quality related traits like flower diameter, 100 flower weight, corolla length, corolla tube length, vase life and shelf life play a key role in deciding the quality of flowers and adoption of genotypes for cultivation. In present investigation genotype Suvasini followed by Prajwal and Vaibhav recorded maximum flowers. Variation in flower size due to genotypic variation is attributed to their genetic makeup. The results have been reported earlier by Nandakishore and Raghava (2001) in marigold. The highest weight of 100 flowers in genotype Vaibhav was due to bold and big sized flowers. The variation among the genotypes was mainly due to flower size. Similar results were also reported previously by Biswas *et al.,* (2002) and Sateesha (2004) in tuberose. Variation among the genotypes for vase life is due to interaction effect of spike length and harvest stage. The increase or decrease in stalk length may be attributed to their variation in reserved food material. The similar findings have been reported earlier by Sateesha *et al.,* (2011) and Varu and Barad (2010) in tuberose. The variation in shelf life might be attributed loss of weight of flowers and genetic inherent character of varieties as they have been reported earlier by Nandakishore and Raghava (2001) in marigold.

Consumer acceptance

Sensory scoring was done by different consumers for flower fragrance, flower spike length, flower size, flower diameter, corolla tube length and overall acceptability for different genotypes are presented in Table 4. The scores for fragrance is higher in genotype Suvasini (4.63) and it was on par with Shringar (4.44) followed by Prajwal (4.14) whereas, Vaibhav obtained lowest score (2.50). The genotype Suvasini recorded maximum score for spike length (4.53) and flower size (4.68) which was on par with Prajwal (4.48 and 4.40, respectively). The

minimum score for spike length and flower size was observed in Arka Nirantara (2.81 and 2.28, respectively). Scores for corolla tube length is highest in genotype Mexican Single (4.57 cm) which was on par with Shringar (4.35). The minimum score was obtained by Pearl Double (2.83 cm) genotype. Overall acceptability was higher in genotype Suvasini (4.69) and was statistically on par with Prajwal (4.48) followed by Vaibhav (4.35) and Shringar (4.13). The minimum overall acceptability was recorded in Arka Nirantara (1.74). Based on consumer's acceptance, the flower fragrance is pleasant in genotype Suvasini followed by Shringar and Prajwal. Flowers tend to be more attractive due to their size and double whorls in Prajwal, Suvasini and Vaibhav. Overall acceptability was higher in Suvasini followed by Prajwal, Vaibhav and Shringar. Similar results were observed by Perk *et al.,* 2009 in different flower crops.

References

Anonymous, 2006, Tuberose, Int. Floricul. Hand Book, EIRI Consultants and Engineers, Indian Institute of Consultants, New Delhi, pp. 517-541.

Bankar, G. J. and Mukhopadhya, A., 1988, Varietal trial on tuberose (*Polianthes tuberosa* L.). South Indian Hort., 28: 150-151.

Biswas, B., Naveen, K. P. and Bhattacharjee, S. K., 2002, Tuberose. AICRP on Floriculture, Technical Bulletin, 21: 5-6.

Gupta, N. K., Rakesh, K. S. and Mahobla, R., 2004, Performance of tuberose (*Polianthes tuberosa* L.) cultivars and their vase life in Malwa region of Madhya Pradesh. National Symposium on Recent Trends and Future Strategies in Orn. Hort, Dharwad. Pp. 19.

Irulappan, I., Doraipandian, A. and Muthuswamy. S., 1980, Varietal evaluation in tuberose (*Polianthes tuberosa* L.) In National Seminar on Production of Technology for Commercial Flower Crops, Coimbatore, India. Tamil Nadu Agric. Univ., Pp. 67-70.

Jawaharlal, M., Arumugam, T., Bhattacharjee, S. K. and Vijayakumar, 2006, Tuberose. Adv. Orn. Hort., Pointer Publishers, Jaipur, 3: 107-132.

Krishan, P, S. and Misra, R. L., 2005, Testing Single tuberose cultivars for commercial cultivation in and around Delhi. Prog. Hort., 37 (1): 67-71.

Krishnamoorthy, V., 2014, Assessment of tuberose (*Polianthes tuberosa* L.) varieties for growth and yield characters. The Asian J. Hort., 9 (2): 515-517.

Meenakshi, S. and Niranjanmurthy, 1997, High yielding tuberose (*Polianthes tuberosa* L.) hybrid 'Shringar' for concrete. Indian Perfumer, 41 (4): 157-161.

Nandikishore and Raghava, S. P. S., 2001, Variability studies in African marigold. J. Orn. Hort., 4 (2): 105-111.

Panse, V. S. and Sukhatme, P. V., 1969, Statistical methods for agricultural workers (2nd edi), Indian council of Agriculture Research, New Delhi, p.381.

Patil, J. D., Patil, B. A., Chougule, B. B. and Bhat, N. R., 1987, Performance of different tuberose (*Polianthes tuberosa* L.) under Pune conditions. Curr. Res., 3 (1): 118-119.

Patil, V. S., Munikrishnappa, P. M. and Tirakannanavar, S., 2009, Performance of growth and yield of different genotypes of tuberose under transitional tract of North Karnataka. J. Ecobiol., 24 (4): 32.

Perk, D. S., Singarwad, P. S., Tawale, J. B. and Maske, V. S., 2009, Consumer preference for flower in general and specific purpose. The Asian J. Hort., 4 (2): 338-339.

Sateesha, G. R., 2004, Performance of tuberose under transitional tract of Karnataka. M.Sc (Hort) Theisis. Univ. of Agril. Sci., Dharwad.

Sateesha, G. R., Kumar, A. and Biradar, M. S., 2011, Performance of different tuberose (*Polianthes tuberosa* L.) varieties under field conditions. J. Plant Archives, 11 (1): 359-360.

Singh, K, P., 2004, Performance of single petalled tuberose cultivars under Delhi conditions. Nat. Symposium on Recent Trends and Future strategies in Orn Hort., New Series, Dharwad, pp. 18.

Singh, K. P. and Singh, M. C., 2013, Evaluation of double petalled cultivars of tuberose (*Polianthes tuberosa* L.) under Delhi condition. The Asian J. Hort., 8 (2): 512-514.

Varu. D, K. and Barad, A. V., 2010, Effect of stem length and stage of harvest on vase life of cut flowers in tuberose (*Polianthes tuberosa* L.) Cv. Double. J. Hort, Sci., 5 (1): 42-47.

How to cite this article:

Bindiya C. Naik, B.S. Kamble, Shantappa Tirakannanavar and Savita Parit. 2018. Evaluation of Different Genotypes of Tuberose (*Polianthes tuberosa* L.) for Yield and Quality. *Int.J.Curr.Microbiol.App.Sci.* 7(08): 53-60. doi: https://doi.org/10.20546/ijcmas.2018.708.006