

Short Communication

Varietal evaluation of tuberose (*Polianthes tuberosa* L.) for growth and yield characters

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Abstract

Tuberose (*Polianthes tuberosa* L.) is one of the most popular tropical ornamental bulbous flowering plant grown on a commercial scale throughout different states of India. An experiment was carried out at the department of Floriculture and Landscaping, College of Agriculture, Padannakkad, Kasaragod to evaluate tuberose varieties for growth and yield characters and to screen varieties for northern Kerala, during 2019-2020. The experiment was laid out in Randomized block design using ten varieties and three replications. Among the ten genotypes of tuberose, single types viz., Arka Prajwal, Arka Shringar, and Culcutta Single, the semi-double type, Arka Vaibhav and the double types viz., Arka Suvasini and Culcutta Double were found to be superior in terms of growth and flower yield under northern Kerala condition.

Key words: Northern Kerala, Tuberose, Varieties, Yield.

Tuberose (*Polianthes tuberosa* L., Family: Amaryllidaceae) one of the most popular bulbous ornamental crops is grown commercially for its attractive and fragrant cut flowers as well as loose flowers. The long lasting flower spikes are largely used for vase decoration, flower arrangement and bouquet preparations. Loose flowers have great demand for making artistic garlands and floral ornaments. Climatic factors play a critical role for successful production of tuberose. It is best suited for cultivation in tropical to subtropical and temperate climates. Tuberose prefers open sunny locations and grows in a mild climate without extremes of high or low temperature. It can be successfully grown under warm humid areas having temperature around 30°C and approximate day length of 16 hours which make it suitable for cultivation under Kerala conditions. Tuberose is a heavy feeder and highly exhausting crop, responds well to the application of organic and inorganic nutrients. The quality and production of any crop or variety is largely influenced by its genetic makeup

and climatic condition under which they are grown. Hence, the cultivar which performs well in one region may not perform well in other regions of varied agro-climatic conditions. As the commercial cultivation of tuberose is gaining importance, introduction and identification of high yielding varieties is necessary. Therefore, the present study was carried out to evaluate tuberose varieties for growth and yield and to screen varieties for the northern part of Kerala.

The study was conducted at the Department of Floriculture and Landscaping, College of Agriculture, Padannakkad, Kasaragod during 2019-2020. The materials used for the experiment were ten genotypes of tuberose (*Polianthes tuberosa* L.) comprising seven single genotypes, one semi-double genotype and two double genotypes. The experiment was laid out in Randomized Block Design with three replications under open field conditions. Land was brought to a fine tilth by tractor ploughing and levelled properly. Healthy,

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pest and disease free bulbs, having a size of 2-5 cm were selected for planting. The bulbs were pre-treated with Carbendazim solution (2g/L) for half an hour in order to control the incidence of fungal diseases. Bulbs of uniform size were planted at a depth of 5 cm at a spacing of 20cm x 25 cm. Uniform cultural operations and crop management practices were followed for all varieties. Fertilizers, farm yard manure and lime were given as per the package of practices recommendations for crops (KAU, 2016). Hand weeding was done periodically to keep the field weed free and staking was done when it was needed. Periodic irrigation was also given. Five plants were randomly selected and tagged from each treatment and replication for the purpose of recording observation. Observations on different characters were tabulated and statistically analysed using the OPSTAT online Agriculture Data Analysis.

Vegetative characters like plant height, number of leaves per hill and number of tillers per hill differed significantly among the genotypes (Table 1). The variation among the plant height might be due to the differences in the genetic makeup and the diversified origin of the cultivars, which results in changes in the expression of phenotype under specific geographical location. The results of variation in plant height due to genotypic differences and environmental variation are in agreement with the findings of Sateesha et al. (2011), Ranchana et al. (2015) and Dimri (2017) in tuberose. Variety Culcutta Double (70.60 cm) recorded greater plant

height which was on par with Phule Rajani, Arka Suvasini and Arka Prajwal (66.87, 65.53 and 63.33 cm, respectively). The increased plant height might be due to increased photosynthetic capacity of the genotype. Leaves are the primary site of photosynthesis, which greatly influence the growth and yield of any crop. Greater number of leaves was observed in Arka Vaibhav (90.21) whereas lower number of leaves was recorded in Arka Prajwal (24.53). The variation in number of leaves per hill is attributed by the hereditary traits which are further modified by the environmental factors like temperature, relative humidity and light intensity, which has been in accordance with the findings of Ramachandrudu and Thangam (2009) and Mahawer et al. (2013) in tuberose. The number of tillers per hill was the greatest in Arka Vaibhav (4.39) followed by Arka Suvasini (3.60). The differential response with regard to the vigorous growth might be due their genetic makeup.

The data pertaining to floral characters are furnished in Table 2. Duration from planting to spike emergence and days to first floret opening indicates the early or delayed flowering habit of a cultivar, which is an important parameter for selecting a variety for a particular area. Early spike emergence was found in Arka Shringar (63.25 days), Arka Suvasini (65.08 days), Bidhan Ujwal (65.88 days) and Arka Sugandhi (66.82 days). Bidhan Ujwal took lower days to first floret opening (11.73 days) which was on par with Arka Shringar (11.87 days). This variation is primarily due to the genetic difference. The significant difference in days to spike emergence and days to first floret opening was also reported by Ramachandrudu and Thangam (2009), Patil et al. (2009), Chaturvedi et al. (2014) and Dimri (2017). In a tuberose spike, florets open in acropetal succession. The number of days to complete the opening of the spike varies with the number of florets per spike. In the present investigation more number of days to complete opening of spikes was found in Arka Suvasini and Arka Vaibhav. The variation among blooming periods is also reported by Ramachandrudu and Thangam (2009), Singh et

Table 1. Vegetative characters of tuberose varieties

Treatments (Varieties)	Plant height (cm)	Number of leaves	Number of tillers per hill
Arka Vaibhav	57.13	90.21	4.39
Arka Prajwal	63.33	25.17	2.21
Arka Niranthara	55.00	37.90	2.49
Arka Shringar	59.60	56.11	1.58
Arka Suvasini	65.53	83.18	3.60
Arka Sugandhi	39.93	31.52	1.64
Bidhan Ujwal	49.47	62.91	1.86
Phule Rajani	66.87	44.70	2.73
Culcutta Single	46.87	36.91	1.52
Culcutta Double	70.60	48.92	1.91
CD	12.55	5.87	0.56
SE(m)	4.19	1.96	0.19

Table 2. Floral characters of tuberose varieties

Treatments (Varieties)	Days to spike emergence	Days to 50% flowering	Days to first floret opening	Days to complete opening of spike	Length of spike (cm)	Girth of peduncle (cm)	Length of rachis (cm)	Longevity of spikes (days)	No. of florets per spike	Length of floret (cm)	Diameter of floret (cm)	Weight of 100 florets (g)	Loose flower yield (g)
Arka Vaibhav	71.83	110.09	20.00	23.17	91.17	2.65	44.53	11.5	63	5.68	2.43	174.13	106.28
Arka Prajwal	68.12	108.38	16.67	15.80	111.8	3.05	40.00	7.40	51.67	6.97	2.79	140.93	77.29
Arka Niranthara	82.46	124.61	14.73	14.20	92.53	2.42	36.47	7.67	50.67	6.69	2.60	90.76	51.23
Arka Shringar	63.25	108.83	11.87	15.27	75.20	2.44	30.20	10.00	53.80	6.07	2.51	91.46	51.47
Arka Suvasini	65.08	111.23	22.93	26.15	109.07	2.82	47.60	13.60	62.1	5.28	3.53	235.43	131.31
Arka Sugandhi	66.82	109.03	13.07	21.87	65.87	2.11	32.07	7.80	60.20	5.59	2.21	80.67	52.49
Bidan Ujwal	65.88	108.62	11.73	14.73	65.73	2.29	24.90	9.27	51.40	5.65	2.67	110.27	51.33
Phule Rajani	69.13	126.15	19.60	17.50	76.60	2.52	35.10	7.68	51.20	5.78	2.65	88.17	49.30
Culcutta Single	68.54	122.93	17.67	15.53	106.00	2.39	37.60	10.20	47.47	7.03	2.38	99.50	42.47
Culcutta Double	88.88	126.03	24.87	19.80	101.07	2.77	44.77	9.30	56.80	5.78	3.14	187.47	104.33
CD	4.84	2.83	2.39	3.97	13.73	0.33	11.18	1.71	9.38	0.41	0.44	27.67	28.22
SE(m)	1.62	0.95	0.8	1.33	4.59	0.11	3.74	0.57	3.13	0.14	0.15	9.24	9.43

al. (2018) in tuberose and Simmy (2004) in gladiolus.

Tuberose has gained popularity as a cut flower owing to its attractive, elegant and fragrant spikes. Long spike, large number of closely arranged florets makes it an ideal cut flower. In the present study longer spikes were observed in Arka Prajwal (111.80 cm), Arka Suvasini (109.07 cm), Culcutta Single (106.00 cm) and Culcutta Double (101.07 cm) which were statistically on par. The longer spikes in these varieties may be due to more internodal distance. The variation in spike length is also reported by Susila (2013), Krishnamoorthy (2014), Prakash et al. (2015) and Bindiya et al. (2018) in tuberose. This variation among spike length might be due to genetic traits and prevailing environmental conditions. Girth of the peduncle determine the firmness and strength of the spike. Sturdy and rigid peduncle will provide greater mechanical support in vases. In the present investigation girth of peduncle recorded greater in Arka Prajwal (3.05 cm) which were statistically on par with Arka Suvasini (2.82 cm) and Culcutta Double (2.77 cm). A long rachis with more closely arranged florets is desirable, which gives a compact appearance to the spike. The number of florets per spike is closely associated with length of rachis, as longer the rachis more the number of florets on the spike. The varieties under study exhibited significant differences in rachis length. Longer rachis was observed in Arka Suvasini (47.60 cm) which was on par with Culcutta Double (44.77 cm), Arka

Vaibhav (44.53 cm), Arka Prajwal (40.00 cm) and Culcutta Single (37.60 cm). This variation among cultivars might be due to genetic traits and prevailing climatic conditions. The findings are in accordance with Singh and Singh (2013) and Ranchana et al. (2013) in tuberose. Longevity of spike was Higher in Arka Suvasini (13.60 days) followed by Arka Vaibhav (11.50 days). It may be due to the longest spike and more number of florets per spike in these varieties.

Floral parameters like number, length, diameter and weight of florets plays an important role when the quality of flower is concerned. Variety Arka Vaibhav had higher number of florets per spike (63.00) which was on par with Arka Suvasini (62.10) Arka Sugandhi (60.20), Culcutta Double (56.80) and Arka Shringar (53.80). For the better appearance of spike, it should have larger florets. As the diameter of the floret increases, the tendency of crowding by overlapping will increase; this will further enhance the beauty of the spike. In the present experiment, greater length of floret was observed in Culcutta Single (7.03 cm) which was statistically on par with Arka Prajwal and Arka Niranthara (6.97 and 6.69 cm, respectively). Greater floret diameter was in Arka Suvasini (3.53 cm) which were on par with Culcutta Double (3.14 cm). Similar finding in tuberose was observed by Bindiya et al. (2018). Variation in floret size might be due to the difference in genetic makeup and the environmental condition during the growing period. Accumulation of more

carbohydrate in bud also contributes to more floret size.

Higher weight of 100 florets was recorded by Arka Suvasini (235.43 g); it might be due to bold and big size florets. Higher loose flower yield was observed in Arka Suvasini (131.31g) followed by Arka Vaibhav (106.28g) which were on par. The higher loose flower yield in Arka Suvasini, and Arka Vaibhav might be due to more number of florets, increased floret size and weight of individual florets. This is supported with the findings of Mahovia (2003) in tuberose.

Out of the ten genotypes of tuberose (*Polianthes tuberosa* L.), the variety Arka Prajwal, Arka Shringar, and Culcutta Single among single petalled type, Arka Vaibhav the only semi petalled type and the variety Arka Suvasini and Culcutta Double among double petalled type were found to be superior in terms of growth and flower yield under northern Kerala condition. These varieties can be used for the large-scale commercial production in northern parts of Kerala.

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