

## Original Research Article

### **Varietal Evaluation of Single-Petalled Tuberose (*Agave amica* Medik.) Germplasm for Growth and Flowering Attributes**

#### **Abstract**

The present experiment was to evaluate eight single petalled tuberose germplasm for growth and flowering attributes. All the tuberose germplasm showed a significant variation in the results. In vegetative parameters, the highest plant height (79.3cm) was observed in the germplasm 'Mexican Single', while maximum leaf length (35.1cm) and leaf width (3.4cm) was observed in the germplasm 'Arka Keerthy' and 'Bidhan Rajani', respectively, then high number of leaves seen in the germplasm 'Mexican Single'. In flowering parameters, germplasm 'Nilakottai local' found superior in days taken for spike emergence (64.7 days), Spike length (90.9cm), Rachis length (31.4cm), respectively. While floret length (7.28cm) and Single floret weight (1.57g) observed in 'Bidhan Rajani'.

**Keyword:** Tuberose, Single-petalled, Growth and flowering

#### **INTRODUCTION**

Tuberose is a fragrant flower crop that is grown for its ornamental and commercial value. It is botanically called *Agave amica* (Medik), (Thiede & GovaeRTS, 2017), formerly known as *Polianthes tuberosa* which comes under the family Asparagaceae. The plant is native to Mexico and Central America (Kumar et al., 2022). *Polianthes* is a genus of about fifteen species, twelve of which have been identified in Mexico and Central America. Nine of these species have white blossoms, one has a white flower with a red tinge and the other two have red flowers. Except for *Polianthes tuberosa*, others can be found growing naturally (Mandal et al., 2018). With 30 chromosomes in total, of which 5 are large and the remaining 25 are small and it is a diploid species (Sarkar et al., 2010). Tuberose flowers are desirable in the flower market because they may be transported long distances while remaining fresh for an extended period of time (Patil et al., 1999). In the perfumery industry, tuberose is

primarily grown for its essential oil. For the trade in cut flowers and production of essential oils, it offers huge potential for profit (Alan *et al.*, 2007).

## MATERIALS AND METHODS

### Planting material

The planting material selected for the present study consisted of eight single-type tuberose cultivars collected from different parts of India (Table 1). Tuberose bulbs were planted in the research field at the Department of Floriculture and Landscape Architecture, Tamil Nadu Agricultural University, Coimbatore in a randomised block design with three replications during the month of March 2023 and morphological observations were recorded.

**Table 1. List of tuberose germplasm used for the study along with their characteristics**

S. No.	Germplasm	Characteristics
1.	Arka Prajwal	A cross between Shringar x Mexican Single, with single flowers on tall, rigid spikes
2.	Arka Keerthy	Flowers having single row of corolla
3.	Bidhan Rajani	Single type, tall steady spikes with bold florets and pink tinge in tepal tip
4.	Mexican Single	Flowers are having only one corolla segment
5.	Nilakottai local	Florets showing a single corolla segment
6.	Tenkasi local	Single-flower type, single rows of petals are present
7.	Arka Nirantara	It has high spike production and single-type flowers. It blooms early and has a long blooming season of 6 - 8 months.
8.	Arka Shringar	It produces a single variety of fragrant blooms and medium-sized spikes. The flower buds are attractive and have a little pinkish tint.

The experimental field is ploughed 2-3 times with a 5-tyne cultivator, and then the clods are brought to a fine tilth by using a rotavator. Root debris, crop stubble, weeds, root exudates were removed. Raised beds were formed with a length of 40 m, a height of 30 cm and a width of 1m each and then split into 8 small plots of 5m x 1m (5 m<sup>2</sup>) size. 100 g of *Trichoderma viride* were applied to each bed and kept as such for 2 days. Then, 100 kg of vermicompost were uniformly distributed and thoroughly mixed.

Installing one lateral drip of 16mm at the centre of two rows with a discharge rate of 4 lph at 45 cm apart was done. Uniformly sized (5-8 cm diameter) disease and pest-free bulbs were selected for planting and the bulbs were treated with 0.2 % carbendazim for control of incidence of fungal diseases. Hand weeding was done periodically to keep the field weed free and field labelling was done. Periodic irrigation was also provided. Required cultural, Nutrients operations and crop management practices were carried out during the period of study.

**Table 2. Vegetative characters of tuberose germplasm**

<b>Germplasm</b>	<b>Days taken for sprouting bulb (days)</b>	<b>Plant height (cm)</b>	<b>Leaf length (cm)</b>	<b>Leaf width (cm)</b>	<b>Number of leaves per plant</b>
<b>Arka Prajwal</b>	15.3	62	30.5	2.7	42.5
<b>Arka Keerthy</b>	20.4	46.8	35.1	3.4	22.3
<b>Bidhan Rajani</b>	10.7	42.25	33.4	3.7	32.2
<b>Mexican single</b>	14.8	79.3	26.7	3	45.8
<b>Nilakottai local</b>	11.5	68.3	33.5	3.3	35.3
<b>Tenkasi local</b>	23.7	39	22.6	2.4	30.2
<b>Arka Nirantara</b>	14.6	70.06	27.3	1.9	37.2
<b>Arka Shringar</b>	13.2	44.3	30.2	3.3	30.1
<b>SEd</b>	<b>0.39</b>	<b>1.01</b>	<b>0.57</b>	<b>0.05</b>	<b>0.69</b>
<b>CD (0.05)</b>	<b>0.84</b>	<b>2.17</b>	<b>1.23</b>	<b>0.12</b>	<b>1.48</b>

**Table 3. Floral characters of tuberose germplasm**

<b>Germplasm</b>	<b>Days taken for spike emergence</b>	<b>Length of spike (cm)</b>	<b>Rachis length (cm)</b>	<b>Number of florets per spike</b>	<b>Floret length (cm)</b>	<b>Weight of single floret (g)</b>
<b>Arka Prajwal</b>	68.4	79.3	24.6	38.8	6.12	1.29
<b>Arka Keerthy</b>	79.3	75.8	23.5	39.7	6.09	1.38
<b>Bidhan Rajani</b>	70.1	90.1	30.3	40.1	7.28	1.57
<b>Mexican single</b>	76.7	87.2	28.9	39.9	6.7	1.4
<b>Nilakottai local</b>	64.7	90.9	31.4	41.5	6.14	1.35
<b>Tenkasi local</b>	81.2	68.5	22.8	33.8	5.43	0.78
<b>Arka Nirantara</b>	72.9	82.4	27.4	42.1	5.96	1.37
<b>Arka Shringar</b>	78.5	80.7	25.9	41.7	5.82	1.2
<b>SEd</b>	<b>0.91</b>	<b>2.08</b>	<b>0.42</b>	<b>0.91</b>	<b>0.14</b>	<b>0.02</b>
<b>CD (0.05)</b>	<b>1.96</b>	<b>4.48</b>	<b>0.91</b>	<b>1.96</b>	<b>0.31</b>	<b>0.05</b>

**Results and discussion**

The pooled mean data of all the germplasm observed for different characters are presented in Table 2 and 3. An analysis of variance revealed significant differences among the varieties in terms of various morphological traits.

Days taken for the sprouting of bulbs of different tuberose germplasm are presented in (Table 2). The genotypes differed significantly with respect to the days taken for the sprouting of the bulb. Among the single types, the germplasm ‘Bidhan Rajani’ recorded the least number of days for sprouting of the bulb (10.7 days), while the germplasm ‘Tenkasi

local' recorded the most number of days (23.7 days). Among eight tuberose germplasms, the plant height varied significantly, among the germplasm, Mexican single has a plant height of 79.3cm, while 'Tenkasi local' (39 cm) observed least plant height (Table 2), this was in accordance with Singh *et al.*, 2017 and Gogoi and Talukdar 2019 found that, the variability in plant height may be the result of genotypic variations that led to the phenotypic behaviour of the traits, which may have been further influenced by the agro-climatic conditions. Among the germplasm, 'Arka Keerthy' showed a leaf length of (35.1cm), it was followed by the germplasm 'Tenkasi local' (22.6 cm) (Table 2). Similar findings were published by (Madhumathi *et al.*, 2018) and (Prashanta *et al.*, 2016), where the varietal difference was observed for a variety of parameters. Among the germplasm, 'Bidhan Rajani' recorded the maximum leaf width of (3.7 cm), While the 'Arka Nirantara' (1.9cm) found to be minimum (Table 2). Among the tuberose germplasm, 'Mexican single' recorded the highest number of 46 Whereas it was least in 'Arka Keerthy' (22.3) (Table 2). These variations were observed among the genotypes for the number of leaves, which might be attributed to hereditary characteristics, mother bulb size and the prevailing environmental conditions was confirmed by (Kusum & Ranjan, 2012) and (Dimri, 2017).

### **Floral Parameters**

Days to spike the emergence of different germplasm are presented in (Table 3). The germplasm differed significantly for this character. Among the tuberose germplasm, 'Nilakottai local' recorded a lower number of days to spike emergence (64.7 days), while 'Tenkasi local' recorded a higher number of days (81.2 days). The results are in close conformance with the findings of (Chaturvedi *et al.*, 2014) and (Chawla *et al.*, 2019). The tuberose germplasm showed significant differences with respect to the length of the spike (Figure1). Among the germplasm, increased spike length (90.9 cm) was recorded in 'Nilakottai local, which was on par with 'Bidhan Rajani' (90.1 cm), while in 'Tenkasi local', it was the least (68.5 cm) (Table 3). Among the single types, the maximum rachis length (cm) was observed in the germplasm 'Nilakottai local' (31.4 cm), which was on par with 'Bidhan Rajani' (30.30 cm), while it was the minimum (22.8 cm) in 'Tenkasi local' (Table 3.) There was a significant difference with respect to the number of florets per spike. Among the tuberose germplasm, 'Arka Nirantara' registered the highest number of florets per spike (42.1), followed by 'Arka Shringar and Nilakottai local' (41.7 and 41.5), respectively, while in 'Tenkasi local' it was the least (33.8). (Table 3). The tuberose germplasm showed

significant differences in floret length (Table 3). Among germplasm, 'Bidhan Rajani' (7.28 cm) recorded the maximum floret length. The floret length was the minimum (5.43 cm) in 'Tenkasi local'. On the other hand, variations in genetic make-up and environmental factors during the growing period may be responsible for the genotype differences. This was in accordance with the findings of (Singh *et al.*, 2018),(Madhumati *et al.*, 2018), (Chawla *et al.*, 2019), (Dogra *et al.*, 2020)and (Sivakumar *et al.*, 2020)

Tuberose germplasm differed significantly for single floret weight (Table 3). The germplasm 'Bidhan Rajani' showed the maximum single floret weight (1.57 g), while it was the minimum in 'Tenkasi local' (0.78 g).

## Conclusion

Out of the eight germplasms studied, Arka Prajwal, Mexican Single, Nilakottai local, and Tenkasi local were found to be superior in terms of various growth and floral parameters studied. Hence, these can be used for large-scale commercial cultivation owing to their high yield potential over others under the tropical climatic conditions of Coimbatore.

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**Figure 1. Differences in spike length in single type tuberose germplasm**



**G1- Arka Prajwal**



**G2- Arka Keerthy**



**G3- Bidhan Rajani**



**G4- Mexican Single**



**G5- Nilakottai local**



**G6- Tenkasi local**



**G7- Arka Nirantara**



**G8- Arka Shringar**