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## Performance of tuberose (*Polianthes tuberosa* L.) varieties for growth and flowering under agro-climatic conditions of Akola

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### Abstract

A study was conducted under Akola conditions of Maharashtra to evaluate twelve varieties of tuberose (*Polianthes tuberosa* L.) during the year 2021-22. The experiment was laid out in Randomized Block Design (RBD) with three replications. The results revealed that among all the cultivars, Prajwal was found superior with respect to maximum plant height (76.28 cm), number of leaves per plant (73.59), leaf area per leaf (201.89 cm<sup>2</sup>) and leaf area per plant (14859.70 cm<sup>2</sup>), minimum days for commencement of spike (59.61 days) whereas minimum days for opening of first floret (77.63 days), days for 50 percent flowering (106.70 days) and maximum number of florets per spike (54.13) were observed in variety Bidhan Ujwal. Based on the performance of all the varieties, variety Prajwal appears to be superior as compared to the other varieties for Akola conditions.

**Keywords:** Tuberose (*Polianthes tuberosa* L.), performance, varieties

### Introduction

Tuberose (*Polianthes tuberosa* L.) is an important tropical ornamental perennial bulbous flowering plant originated from Mexico belongs to family Amaryllidaceae having basic chromosome number  $n = 30$  (Jadhav *et al.* 2020)<sup>[3]</sup>. It is cultivated for its long-lasting flower spike that bears  $25 \pm 10$  pairs of florets that opens acropetally (*i.e.*, from base to top of the spike) (Naik *et al.* (2018)<sup>[7]</sup>. Tuberose is classified into four types based on the number of rows of the petals *i.e.*, single, double and semi-double. Tuberose flowers are used for making garlands, vein, floral ornaments for bridal makeup, religious and ceremonial purposes. Cut flowers for artistic garlands, bouquets and buttonholes in both household and social settings. It also has a lot of potential in the essential oil industry for perfume and cosmetics production. In India tuberose is commercially cultivated in Andhra Pradesh, Haryana, Karnataka, Orissa, Maharashtra, Tamil Nadu, Uttar Pradesh and West Bengal (Madhumathi *et al.* 2018)<sup>[5]</sup>.

As commercial cultivation is gaining popularity due to its ease in cultivation, wider adaptability, multipurpose use and higher return a specific cultivar that performs better in one region, may not perform same in the other regions having different ago-climatic conditions (Krishan *et al.*, 2017)<sup>[4]</sup>. Since the performance of the crop vary from region to region it is important to study the variation and performance of the varieties for new locations to enhance the production efficiency and to obtain sustainable and economic profit by the farmers. Hence the present investigation was undertaken to evaluate the performance of twelve tuberose varieties for vegetative and flowering parameters under Akola (Maharashtra) conditions.

### Material and Methods

The present investigation was carried out during the year 2021-22 at Department of Floriculture and Landscape Architecture, Dr. Panjab Rao Deshmukh Krishi Vidyapeeth, Akola. The experiment was laid out in Randomized Block Design (RBD) with 12 treatments and 3 replications. The experimental material consists of twelve varieties *viz.*, Mexican Single, Arka Sugandhi, Phule Rajani, Prajwal, Bidhan Ujwal, Arka Shringar, Phule Rajat, Arka Suvasini, Calcutta Double, Bidhan Shrigandha, Swarn Rekha and Arka Nirantara. The experimental plot was brought to fine tilth by ploughing and harrowing and the field was properly leveled. The bulb having a diameter of 2.5-3.0 cm were selected and planted on flat bed at spacing of  $30 \times 30$  cm with 36 plants per plot.

All the standard cultural practices were followed to raise the crop. Five plants were randomly selected from each plot in each replication for recording the observation for vegetative and flowering characters. Statistical analysis of data was carried out by standard methods of analysis of variance at 30, 60, 90 and 120 days after planting as given by Panse and Sukhtame (1967)<sup>[8]</sup>. The results are discussed at five percent probability level.

### Results and Discussion Growth Parameters

All the varieties evaluated showed significant variations for different morphological characters and flowering traits. The data with respect to vegetative parameters in different

tuberose varieties are presented in Table 1. The data revealed that the variety Prajwal exhibited significantly maximum plant height (27.40 cm, 44.04 cm, 63.96 cm and 76.28 cm) at 30th, 60th, 90th and 120th days after planting respectively whereas minimum plant height (11.56 cm, 42.10 cm and 51.48 cm) at 30th, 90th and 120th days after planting were recorded in Calcutta Double while at 60 days after planting Phule Rajat (23.38 cm) recorded minimum plant height. The highly significant variation in plant height among the different varieties may be due to their hereditary traits. The results are in close conformity in accordance with the findings of Ramchandrudu and Thangam (2009)<sup>[10]</sup>, Mahawer *et al.* (2013)<sup>[6]</sup> and Chaturvedi *et al.* (2014)<sup>[11]</sup>.

**Table 1:** Performance of tuberose varieties with respect to vegetative parameters

Treatment	Plant height (cm)				Number of leaves per plant				Leaf Area (cm <sup>2</sup> )	Leaf Area per plant (cm <sup>2</sup> )
	30 DAP	60 DAP	90 DAP	120 DAP	30 DAP	60 DAP	90 DAP	120 DAP		
V <sub>1</sub> : Mexican Single	22.79	37.73	57.15	68.71	15.53	20.89	33.89	49.66	183.26	9094.70
V <sub>2</sub> : Arka Sugandhi	12.59	26.48	47.74	54.03	16.67	21.80	35.36	51.60	176.70	9129.70
V <sub>3</sub> : Phule Rajani	16.72	30.71	49.70	63.50	26.18	33.07	46.77	67.73	178.37	12083.81
V <sub>4</sub> : Prajwal	27.40	44.04	63.95	76.28	23.73	27.40	52.17	73.59	201.89	14859.70
V <sub>5</sub> : Bidhan tamwil	15.87	31.42	50.71	60.94	24.53	29.58	44.29	65.72	175.70	11551.44
V <sub>6</sub> : Arka Shringar	17.12	32.44	52.09	58.75	27.55	36.80	45.66	68.33	177.33	11777.38
V <sub>7</sub> : Phule Rajat	15.19	23.37	44.89	57.76	20.73	24.84	38.63	57.03	182.60	10410.71
V <sub>8</sub> : Arka Suvasini	14.74	25.40	46.09	62.41	24.20	28.79	41.68	63.87	174.32	11132.08
V <sub>9</sub> : Calcutta Double	11.56	28.40	42.10	51.48	21.97	25.98	40.86	59.10	181.55	10727.88
V <sub>10</sub> : Bidhan Shrigandha	24.13	40.90	59.43	70.56	25.18	30.07	43.07	62.73	189.22	11864.64
V <sub>11</sub> : Swam Rekha	18.46	34.21	54.25	65.65	17.67	18.95	30.41	44.93	180.68	8118.72
V <sub>12</sub> : Arka Nirantara	19.66	35.46	6.39	67.65	18.27	23.87	36.29	53.22	185.30	9856.23
F test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE. (m) ±	0.78	0.98	1.52	1.83	1.04	1.03	1.57	1.89	1.85	374.61
CD A D%	2.31	2.90	4.46	5.38	3.07	3.07	4.61	5.54	5.44	1098.76

The observations regarding number of leaves per plant revealed that the variety Arka Shringar recorded maximum number of leaves per plant (27.55 and 36.80) at 30th and 60th days after planting whereas at 90th and 120th days after planting the maximum leaves per plant (52.17 and 73.59) were observed in variety Prajwal. However, at 30th days after planting minimum number of leaves per plant were recorded in variety Mexican Single (15.53) and at 60th, 90th and 120th days after planting minimum number of leaves per plant (18.95, 30.41 and 44.93) were recorded in variety Swam Rekha. The variation in the production of leaves per plant in all growth stages by different varieties of tuberose might be due to the variation in their genetic makeup. Present findings were in conformity with the findings reported by Mahawer *et al.* (2013)<sup>[6]</sup> and Gorivale *et al.* (2020)<sup>[2]</sup> in tuberose.

Leaf area is an important growth parameter as it has direct relationship with interception of light and photosynthesis and ultimately with overall growth and development of plant. Significantly maximum leaf area was recorded in variety Prajwal (201.89 cm<sup>2</sup>) which was significantly superior to rest of all the treatments which was followed by the variety Bidhan Shrigandha (189.22 cm<sup>2</sup>), Arka Nirantara (185.30 cm<sup>2</sup>), Mexican Single (183.26 cm<sup>2</sup>) and Phule Rajat (182.60 cm<sup>2</sup>). However, significantly minimum leaf area (174.32 cm<sup>2</sup>) was recorded in variety Arka Suvasini. Similar results were also reported by Vijayalaxmi *et al.* (2010)<sup>[13]</sup> in tuberose. However maximum leaf area per plant was recorded in variety Prajwal (14859.70 cm<sup>2</sup>) which was significantly superior to rest of all the treatments and was followed by the variety Phule Rajani (12083.81 cm<sup>2</sup>). However, significantly

minimum leaf area per plant (8118.72 cm<sup>2</sup>) was recorded in variety Swam Rekha. The difference among the varieties for the leaf area of may be attributed to their variation in their genetic makeup.

### Flowering Parameters

The data regarding the flowering parameters is presented in Table 2. The variety Prajwal recorded minimum days for commencement of spike (59.61 days) which was significantly superior as compared to the other varieties and it was found at par with variety Bidhan Ujwal (61.24 days), Phule Rajani (63.41 days) and Bidhan Shrigandha (65.75 days) and was followed by Arka Shringar (67.52 days), Arka Nirantara (69.80 days) and Mexican Single (70.56 days). However significantly maximum days for commencement of spike was recorded in variety Swam Rekha (79.48 days). The variations in the days required for spike commencement in different varieties of tuberose might be due to varied growth rate, different genetic makeup and due to different climatic conditions prevailing in particular area.

The least number of days required for opening of the first pair of florets was recorded in variety Bidhan Ujwal (77.63 days) which was at par with Prajwal (78.91 days), Phule Rajani (80.32 days), Arka Shringar (82.93 days) and Arka Nirantara (83.46 days) while Maximum days for opening of the first florets was observed in variety Swam Rekha (94.41 days). Significant difference in opening of the first floret among the twelve varieties of tuberose may be due to the different genetic makeup of the cultivars and prevailing environment conditions. Similar variations in different varieties have been

recorded previously by the workers *viz.* Mahawer *et al.* (2013) [6].

Minimum number of days (106.70 days) for 50% flowering were observed in variety Bidhan Ujwal which was at par with the variety Prajwal (109.93 days), Phule Rajani (110.43 days), Bidhan Shrigandha (111.51 days), Arka Nirantara (112.81 days), Arka Shringar (113.49 days), Phule Rajat (115.79 days) and Mexican Single (116.65 days). Similarly maximum days required for 50% flowering was recorded in variety Swarn Rekha (123.90 days). Variation in different tuberose varieties for 50% flowering might be due to the variation in their genetic factor. The results are in close conformity with

Sateesha *et al.* (2011) [12] in tuberose.

The variety Bidhan Ujwal (54.13) recorded maximum number of florets per spike which was significantly superior to rest of all the treatments and was at par with variety Phule Rajat (50.80) and Prajwal (50.53) whereas significantly minimum number of florets per spike were recorded in variety Arca Sugandhi (37.00). A significant variation among different tuberose varieties for number of florets per spike may be due to genetic variability among the varieties and prevailing environment conditions. The findings are in close conformity with results obtained by Mahawer *et al.* (2013) [6] and Safeena *et al.* (2019) [11].

**Table 2:** Performance of tuberose varieties with respect to flowering parameters

Treatment	Days for commencement of spike	Days for opening of 1 <sup>st</sup> floret	Days for 50% flowering	Number of florets per spike
V <sub>1</sub> : Mexican Single	70.56	85.25	116.65	43.67
V <sub>2</sub> : Arka Sugandhi	77.00	93.63	120.86	37.00
V <sub>3</sub> : Phule Rajani	63.41	80.32	110.43	40.27
V <sub>4</sub> : Prajwal	59.61	78.91	109.93	50.53
V <sub>5</sub> : Bidhan Ujjwal	61.24	77.63	106.70	54.13
V <sub>6</sub> : Arka Shringar	67.52	82.93	113.49	46.60
V <sub>7</sub> : Phule Rajat	72.33	87.89	115.79	50.80
V <sub>8</sub> : Arka Suva Sini	73.21	92.70	117.45	39.27
V <sub>9</sub> : Calcutta Double	75.31	93.67	120.72	42.40
V <sub>10</sub> : Bidhan Shrigandha	65.75	89.85	111.51	46.80
V <sub>11</sub> : Swarn Rekha	79.48	94.41	123.90	46.13
V <sub>12</sub> : Arka Nirantara	69.80	83.46	112.81	45.80
'F' test	Sig.	Sig.	Sig.	Sig.
SE (m) ±	2.21	2.55	3.33	1.94
CD @ 5%	6.50	7.50	9.79	5.69

From the present study it can be concluded that among the twelve varieties cultivated the variety Prajwal appears to be superior with respect to growth and flowering characters as compared to the other varieties for Akola conditions.

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