

Effect of Planting Time on Genotypes of Tuberose (*Polianthes tuberosa* L.) for Flowering Characters

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(Received: November 5, 2022; Accepted: December 6, 2022)

ABSTRACT

The botanical name combines the Latin word *tuberosa*, which means “swollen root,” or tuber, with the Greek word *polianthes*, which means “multi-flowered”. The flowers are important in the flower market because they keep their freshness for a long time and endure long distance transportation. In light of all these, the present study was undertaken to investigate the response of plant height of tuberose, spike length, rachis length and number of flowers per spike. The results demonstrated that the time of planting had a substantial influence on the plant height and spike length of tuberose plants i.e. every delay in planting reduced plant height, regardless of genotype. During both the years, the greatest plant height was seen in March planting (84.48 and 76.20 cm), while the shortest was reported in May planting (76.64 and 68.32 cm). The results also showed a considerable impact of different genotypes and planting time on rachis length, with different genotypes and planting time delayed greatly increasing rachis length in tuberose throughout the years 2019-20 and 2020-21. During both the years, the Mexican Single (46.96 and 42.47) genotype had the most florets per spike, while the Hyderabad Double (22.11 and 16.22) had the fewest.

Key words: Tuberose, plant height, spike length, rachis length

INTRODUCTION

Commercial cultivation of tuberose for its multiple purposes is effective in pots, borders and beds. Additionally, tuberose blooms are used to create floral garlands, decorations, bouquets, buttonholes, gajras and essential oil. It is also a well-liked cut flower since the individual florets may add fragrance to bouquets and boutonnières in addition to being used in arrangements.

The prolonged flower spikes make beautiful table decorations when chopped into smaller pieces. The blossoms give off a lovely scent. Because of its capacity to open the heart and calm the nerves, tuberose, which represents sensuality, is used in aromatherapy to bring back happiness, serenity and harmony. Tuberose is a plant that originated in Mexico and spread over the world in the sixteenth century. One of the first plants to be domesticated could be extinct in its native environment.

Pearl Double Tuberose makes an excellent cut flower for long-lasting floral arrangements. During the summer, single Mexican Tuberose has fragrant blossoms that attract pollinators. It also makes an excellent cut flower. Tuberose scent has long been used in fragrances to give delicate, lingering middle notes. The Bengaluru-based Indian Institute of

Horticulture Research introduced the Prajwal Tuberose variety in 2014. Prajwal is a hybrid of Mexican Single and Shringar. This hybrid has tall, rigid spikes with single-type white flowers (95 cm, 50 florets per spike).

The bulbs can also be planted between July and August. Sequential planting may be used to get blooms virtually all the year round. Freshly harvested tuberose bulbs can be planted 4 to 5 weeks after being picked. Bulbs, bulblets and seeds can all be used to multiply tuberose. It is also common to undertake bulb-segment multiplication and *in vitro* micro propagation from scale stem sections. The most popular technique used for the commercial propagation of tuberose is bulb propagation. Although they are not related to roses in terms of genus, look, or scent, tuberose plants do contain florets that are tube-shaped and sprout from tubers.

The present investigation was undertaken to study the plant height, spike length, rachis length and number of flowers per spike of tuberose during both fresh and ratoon crops and to analyze the level of critical difference for fresh and ratoon crops.

MATERIALS AND METHODS

The current study was conducted at the Experimental Farm of the Department of Horticulture, CCS Haryana Agricultural

University, Hisar, to examine the responses of plant height of tuberose, spike length, rachis length and number of flowers per spike during the year 2019-20 and 2020-21. Using a randomized block design (RBD), the data gathered on various factors were assembled, tabulated and statistically evaluated. Mean score and critical difference (CD) were used to tabulate the data. Six genotypes (varieties) of tuberose, namely, Pearl Double, Hyderabad Double, Mexican Single, Prajwal, Suvasini and Vaibhav were used in this experiment. The objective of the study was to analyze the plant height, spike length, rachis length and number of flowers per spike of tuberose and finding the critical difference during both the fresh and ratoon crops.

RESULTS AND DISCUSSION

Planting time had a substantial influence on tuberose plant height i.e. every delay in planting reduced plant height, regardless of genotype (Table 1). During both the years, the greatest plant height was seen in March planting (84.48 and 76.20 cm), while the shortest was reported in May planting (76.64 and 68.32 cm). Plant height was dramatically influenced as a result of the interaction between genotypes and planting time. The Prajwal genotype, which was planted in March, had the tallest plants (103.4 and 87.07 cm), whereas the Pearl Double genotype, which was planted in May in 2019-20 and 2020-21, had the shortest plants (61.6 and 53.13 cm). Similar findings were observed by Chawla *et al.* (2019) with the maximum plant height (45.10 cm) in cultivar Prajwal and maximum florets per spike (50.11) in cultivar Suvasini. Lalthawmliana *et al.* (2017) studied that among double pettled

floret cultivars, cultivar Suvasini showed maximum plant height (58.13 cm). However, the single pettled floret cultivar, Prajwal had maximum plant height of 48.63 cm. Ravi *et al.* (2018) observed the maximum plant height (66.81 cm) in 15th April planting date in Phule Rajani tuberose under sub-humid southern plains of Rajasthan.

Planting time had a considerable impact on the spike length of tuberose plants; every delay in planting caused the plant's spike length to steadily decrease, regardless of genotype (Table 2). In both the years, planting in March greatly lengthened the spikes (70.79 and 61.66 cm), but planting in May resulted in shorter spikes (62.88 and 54.41 cm). The combination between genotypes and planting time greatly lengthened the tuberose plant's spikes. The Prajwal genotype during planting in March had the longest spikes (86.73 and 69.27 cm), whereas the Pearl Double genotype during planting in May in 2019-20 and 2020-21 had the shortest spikes (45.33 and 42.27 cm). Similar findings were observed by Nikita *et al.* (2019) in Sikkim Selection that the 20th May planting gave the best results (maximum spike length). Prakash *et al.* (2016) also observed the similar findings with maximum length of spike (110.50 and 109.50 cm) in Prajwal and Arka Nirantra varieties. Similarly, Ravi *et al.* (2018) observed the maximum spike length (59.94 cm) in 15th April planting date in Phule Rajani tuberose under sub-humid southern plains of Rajasthan. Regardless of genotypes, planting time had a substantial impact on the rachis length of tuberose plants (Table 3). Every delay in planting caused the rachis length of the plant to gradually decrease. While planting in May lowered the rachis length of the tuberose plant

Table 1. Effect of time of planting on plant height (cm) in tuberose genotypes

Genotypes	Time of planting							
	2019-20 (Fresh crop)				2020-21 (Ratoon crop)			
	March	April	May	Mean	March	April	May	Mean
Pearl Double	68.60	66.2	61.60	65.47	62.20	57.07	53.13	57.47
Hyderabad Double	70.27	67.2	63.80	67.09	66.47	62.07	57.93	62.16
Mexican Single	93.87	89.2	86.47	89.84	80.60	77.53	71.87	76.67
Prajwal	103.40	99.33	94.13	98.96	87.07	82.67	80.20	83.31
Suvasini	83.40	80.67	76.53	80.20	77.53	74.20	70.80	74.18
Vaibhav	87.33	81.6	77.33	82.09	83.33	79.53	76.00	79.62
Mean	84.48	80.7	76.64		76.2	72.18	68.32	
C. D. (P=0.05)		2019-20	2020-21					
Time of planting		0.49	0.47					
Genotypes		0.70	0.67					
Time of planting × Genotypes		1.20	1.16					

Table 2. Effect of time of planting on spike length (cm) in tuberose genotypes

Genotypes	Time of planting							
	2019-20 (Fresh crop)				2020-21 (Ratoon crop)			
	March	April	May	Mean	March	April	May	Mean
Pearl Double	55.13	52.13	45.33	50.87	50.60	47.60	42.27	46.82
Hyderabad Double	60.00	58.33	54.13	57.49	54.33	50.53	45.87	50.24
Mexican Single	81.87	78.87	75.4	78.71	63.80	60.07	56.27	60.04
Prajwal	86.73	82.67	79.93	83.11	69.27	64.53	62.60	65.47
Suvasini	67.93	64.40	59.87	64.07	63.40	61.47	58.73	61.20
Vaibhav	73.07	67.67	62.60	67.78	68.53	65.33	60.73	64.87
Mean	70.79	67.34	62.88		61.66	58.26	54.41	
C. D. (P=0.05)		2019-20	2020-21					
Time of planting		0.49	0.45					
Genotypes		0.70	0.63					
Time of planting × Genotypes		1.21	1.09					

(31.96 and 27.00 cm for both the years, respectively), planting in March markedly boosted it (39.37 and 35.36 cm). The largest rachis length of a Prajwal genotype plant was measured in March planting (49.40 and 41.53 cm), whereas the smallest rachis length of a Pearl Double genotype plant was measured in May planting during 2019-20 and 2020-21, respectively (22.47 and 18.40 cm). Similar findings were observed by Naik *et al.* (2018) in the Vaibhav with the maximum rachis length (34.27 cm) and Nikita *et al.* (2019) in Sikkim Selection in the 20th May planting giving the best results with maximum rachis length. Similalry, Prakash *et al.* (2016) observed the highest rachis length (31.00 and 30.50 cm) in Prajwal and Arka Nirantra varieties.

Every delay in planting time gradually reduced the number of florets per spike in tuberose plants, regardless of genotype (Table 4). March-planted tuberose had the most florets per spike (42.81 and 36.16), whereas May-planted tuberose had the fewest (29.18 and 27.51). The Mexican Single genotype had the most florets

per spike (54.13 and 46.73) when it was planted in March, whereas Hyderabad Double genotype had the fewest florets per spike (16.20 and 11.27) when it was planted in May in each of the two years. Similar findings were observed by Madhumathi *et al.* (2018) in cv. Prajwal, with the most spikes and yield were produced by the genotype Rajat Rekha, while genotype GKTC-4 had the most florets per spike. Similar findings were observed by Naik *et al.* (2018) with Shringar producing the most florets per spike (47.27) and Nikita *et al.* (2019) in Sikkim Selection in the 20th May planting giving the best results (maximum number of florets per spike). Similarly, Ramachandrudu and Thangam (2016) observed the highest plant growth in Prajwal and lowest in “Shringar” respectively. Suvasini had the most florets per spike, Mexican Single had the largest spike among others, and Vaibhav was right behind it. Ravi *et al.* (2018) observed the maximum florets/spike (35.72) on 15th April planting date in Phule Rajani tuberose under sub-humid southern plains of Rajasthan. Similarly,

Table 3. Effect of time of planting on rachis length (cm) in tuberose genotypes

Genotypes	Time of planting							
	2019-20 (Fresh crop)				2020-21 (Ratoon crop)			
	March	April	May	Mean	March	April	May	Mean
Pearl Double	28.73	26.07	22.47	25.76	26.53	23.00	18.40	22.64
Hyderabad Double	37.80	34.60	30.53	34.31	34.27	30.40	23.67	29.44
Mexican Single	41.87	38.87	33.67	38.13	37.60	34.80	30.53	34.31
Prajwal	49.40	45.07	42.07	45.51	41.53	36.07	34.53	37.38
Suvasini	37.67	34.47	29.73	33.96	34.60	30.07	25.73	30.13
Vaibhav	40.73	36.13	33.27	36.71	37.60	34.27	29.13	33.67
Mean D	39.37	35.87	31.96		35.36	31.43	27.00	
C. D. (P=0.05)		2019-20	2020-21					
Time of planting		0.46	0.54					
Genotypes		0.64	0.76					
Time of planting × Genotypes		1.11	1.32					

Table 4. Effect of time of planting on number of florets per spike in tuberose genotypes

Genotypes	Time of planting							
	2019-20 (Fresh crop)				2020-21 (Ratoon crop)			
	March	April	May	Mean	March	April	May	Mean
Pearl Double	37.73	30.33	21.27	29.78	25.13	20.60	16.47	20.73
Hyderabad Double	27.73	22.40	16.20	22.11	21.60	15.80	11.27	16.22
Mexican Single	54.13	46.20	40.53	46.96	46.73	41.80	38.87	42.47
Prajwal	48.80	41.80	34.13	41.58	43.2	39.80	36.53	39.84
Suvasini	42.67	35.67	32.73	37.02	38.87	34.13	29.2	34.07
Vaibhav	45.80	38.87	30.2	38.29	41.4	36.87	32.73	37.00
Mean	42.81	35.88	29.18		36.16	31.50	27.51	
C. D. (P=0.05)		2019-20	2020-21					
Time of planting		0.37	0.34					
Genotypes		0.52	0.48					
Time of planting × Genotypes		0.90	0.84					

Sendhilmathan and Manivannana (2019) observed that the highest number of florets per spike (36.21) with 150 kg N and 80 kg P₂O₅/ha in a tuberose (*Polianthes tuberosa* L.) cv. Single. Suseela *et al.* (2017) on Hyderabad Single cv. had the most florets per spike (35.80) than of other cultivars.

CONCLUSION

Tuberose are often planted on the plains between March and April, and in the hills between April and May. Planting time and genotypes significantly increased the plant height of tuberose during the years 2019-20 and 2020-21. Maximum plant height (98.96 and 83.31 cm) was observed in Prajwal genotype with highest spike (83.11 and 65.47 cm), while the lowest in Pearl Double (50.87 and 46.82 cm) during 2019-20 and 2020-21, respectively. Similarly, the maximum rachis length (45.51 and 37.38 cm) was observed in Prajwal genotype, while the minimum in Pearl Double (25.76 and 22.64 cm). However, maximum number of florets per spike was observed in Mexican Single (46.96 and 42.47) genotype and minimum in Hyderabad Double (22.11 and 16.22) during both the years. To conclude, the fresh crop planting should be done to ensure high-quality cut flowers.

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